



## INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

*We Protect Hoosiers and Our Environment.*

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*Thomas W. Easterly*  
Commissioner

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April 13, 2012

Ms. Susan Hedman  
Regional Administrator  
U.S. Environmental Protection Agency  
Region V  
77 West Jackson Boulevard  
Chicago, IL 60604-3950

Dear Ms. Hedman:

Re: Indiana 120-Day Response to U.S. EPA's  
Revised Designations for the 2008 8-Hour  
Ozone National Ambient Air Quality Standard

This letter is in response to the United States Environmental Protection Agency's (U.S. EPA's) January 31, 2012, notification of revised air quality designations for the 2008 8-hour ozone National Ambient Air Quality Standard (NAAQS) from those specified in U.S. EPA's December 9, 2011, letter to Governor Daniels. Indiana has carefully reviewed U.S. EPA's revised designations for Indiana under the 2008 8-hour ozone NAAQS. Indiana disagrees with U.S. EPA's recommendation that Jasper, Lake, and Porter counties be designated as nonattainment for the 2008 8-hour ozone NAAQS.

The counties at issue have no monitored violations themselves. Rather, the sole basis for U.S. EPA's recommendation that the above-mentioned counties be designated as nonattainment is a single monitored violation of the standard at the Zion, Illinois monitor. Indiana believes and is submitting modeling to demonstrate that this monitored violation is the result of the relaxation of requirements for the Northeast Illinois vehicle emissions testing (VET) program, and that meteorological and emissions data do not support the inclusion of the Indiana counties at issue as nonattainment. Indiana's modeling contradicts the less relevant data relied upon by U.S. EPA. Indiana is also submitting information demonstrating that U.S. EPA's recommendation that the counties at issue be designated as nonattainment is inconsistent with U.S. EPA's treatment of similarly-situated counties elsewhere in the country.

The attached technical support document (TSD) and appendices demonstrate, through the use of modeling and the designation factors identified by U.S. EPA, that Jasper, Lake, and Porter counties do not significantly contribute to the isolated monitor

violation in Zion, Illinois, and thus there is no basis for designating these counties as nonattainment for the 2008 8-hour ozone NAAQS.

First, emissions data and modeling do not support the inclusion of the counties at issue as nonattainment. Specifically, Indiana has conducted modeling that demonstrates that the monitored violation in Zion, Illinois is caused primarily by significant changes to the Northeast Illinois VET program, including the exemption of all vehicles from model years 1968 through 1995. As explained further in the TSD, IDEM evaluated whether the changes made to the Northeast Illinois VET program could have led to increased ozone concentrations, including the isolated violation at the Zion monitor. The results of IDEM's analysis indicate that the relaxation of state implementation plan (SIP)-based Northeast Illinois VET program requirements could, in fact, result in an increase of ozone concentrations in excess of 0.0004 parts per million. Absent the changes to the VET program, it is unlikely that there would be any monitored violations of the standard within the region. Additional analyses of the counties' respective share of nitrogen oxides (NO<sub>x</sub>) and volatile organic compounds (VOC) emissions further support Indiana's position that these counties do not significantly contribute to the isolated violation in Zion, Illinois.<sup>1</sup>

Second, the emissions and the meteorological modeling relied upon by U.S. EPA are dated and not relevant to the monitored violation U.S. EPA seeks to address. U.S. EPA has indicated its inclusion of the counties at issue is "based on the high emissions in these counties that contribute to high ozone concentrations at the Zion monitor". U.S. EPA further stated that "meteorology on high ozone days in the Chicago area favor transport of ozone and ozone precursor emissions from these counties to the Zion monitor". However, U.S. EPA failed to conduct its own modeling and meteorological analysis to support these conclusions, and relied instead on limited and outdated meteorological analyses from the States of Illinois and Wisconsin to determine Indiana's potential culpability. Emission volumes or mass are far less relevant than the geographic origin of the emissions and whether meteorology enables those emissions to contribute to ozone formation at a specific downwind location, as at the Zion, Illinois site. The analyses utilized by U.S. EPA are irrelevant to this matter because they do not evaluate data relevant to the 2009 through 2011 time period of the single monitored violation, nor are they specific to the lone violating site. Furthermore, U.S. EPA failed to conduct or reference a culpability analysis to support its conclusion. IDEM cannot provide a full critique of the meteorological analyses provided by Wisconsin and Illinois, because they have not been made available for our review. However as shown in the TSD, Indiana's own modeling, which properly accounts for the geographic, meteorological, and emission features of the counties at issue, indicates that these counties do not significantly contribute to the isolated monitored violation in Zion, Illinois.

Third, when compared with U.S. EPA's treatment of similarly situated counties, Jasper, Lake, and Porter counties' inclusion among nonattainment counties is in clear

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<sup>1</sup> IDEM notes that the monitored violation in Zion, Illinois was certified prior to the requirement that states submit such data. IDEM believes this certification was performed with the sole purpose in preserving Congestion Mitigation and Air Quality (CMAQ) funding for the Chicago area.



error. IDEM's review of the materials available for proposed designations under the 2008 8-hour ozone NAAQS reveals widespread inconsistency in how U.S. EPA is handling counties within statistical area boundaries based on the contribution criteria. For example, in Indiana alone, U.S. EPA has proposed to designate an entire Indiana county (Jasper) as nonattainment with less technical support than it provided to narrow a nonattainment boundary for another Indiana county (Dearborn) to just a single township. As explained further in the TSD, the treatment of the Indiana counties at issue also differs greatly from similarly situated counties in metropolitan areas outside of Indiana. Specifically, U.S. EPA has proposed to designate Pickaway County, Ohio, Point Coupee Parish, Louisiana, and Roane County, Tennessee, as unclassifiable/attainment, despite the fact that the analyses of these counties under the contribution factors is nearly identical to the Indiana counties that U.S. EPA proposes to designate as nonattainment. IDEM also cites Lancaster and Berks counties in Pennsylvania as further evidence that U.S. EPA has applied the contribution guidance inconsistently. Due to the adverse consequences associated with a nonattainment designation, U.S. EPA should ensure absolute consistency in applying clearly defined criteria for designation purposes.

Monitoring data indicate that air quality throughout the State of Indiana meets the 2008 8-hour ozone NAAQS. Indiana firmly believes that nonattainment boundaries for the 2008 8-hour ozone NAAQS should be limited to the counties that actually possess a three-year average ambient monitor-based design value above the standard. However, even if some counties with no monitored violations are properly included as contributing to nonattainment in other counties, the counties at issue here are not properly included under U.S. EPA's contribution factors.

Indiana is in full compliance with its SIP and the emission control measures in place within Northwest Indiana represent one of the most stringent collections of SIP-based control strategies in the country. The wrongful inclusion of these counties will not result in any additional controls or emission reductions, or advance attainment of the standard for Illinois' portion of the area. It is unreasonable to punish Indiana, which is in full compliance with the air quality standard and its federally-approved SIP, for the negligence of a neighboring state.

Indiana continues to believe that U.S. EPA should issue designations based on sound science and not rely on arbitrary statistical area boundaries or incomplete and outdated data sets to substantiate this important and far-reaching policy matter. Therefore, Indiana urges U.S. EPA to carefully review the information presented herein, as well as federal and regional modeling of the impact of federal and state control measures prior to imposing undue economic hardships on Indiana counties that are simply adjacent to areas where data at a single monitor barely exceeds the revised standard.

I appreciate the opportunity to provide comments and recommendations to U.S. EPA concerning designations for the 2008 8-hour ozone NAAQS. Likewise, I look forward to working with your staff as U.S. EPA moves forward with the designation

Ms. Hedman  
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process. If you have any questions regarding IDEM's analysis and recommendations, please feel free to contact me at (317) 232-8611 or Keith Baugues, Assistant Commissioner, Office of Air Quality, at (317) 232-8222.

Sincerely,

A handwritten signature in black ink, appearing to read 'Tom Easterly', with a long horizontal flourish extending to the right.

Thomas W. Easterly  
Commissioner

#### Enclosures

- Enclosure 1—Indiana's Assessment of the Revised 2008 8-Hour Ozone National Ambient Air Quality Standard and Technical Support Documents
  - Appendix A—1990 Through 2010 Northwest Indiana Growth Rates and Patterns
  - Appendix B—2009 Northwest Indiana Commuting Patterns
  - Appendix C—2008 Nonattainment Area Emissions Inventory
  - Appendix D—Emission Reductions for Lake and Porter Counties Vehicle Emissions Testing
  - Appendix E—U.S. EPA Region 3, Region 4, Region 5, and Region 6 Technical Support Documents
  - Appendix F—Northwest Indiana Wind and Pollution Rose Analysis
- Enclosure 2—2000-2011 Indiana Ozone Monitoring Data Summary
- Enclosure 3—List of Indiana Counties with Final Ozone Designation Recommendations
- Enclosure 4—Map of Indiana Counties with Final Ozone Designation Recommendations

cc: Gina McCarthy, U.S. EPA Headquarters  
Janet McCabe, U.S. EPA Headquarters  
George Czerniak, U.S. EPA Region 5  
John Mooney, U.S. EPA Region 5  
Doug Aburano, U.S. EPA Region 5  
Keith Baugues, IDEM-OAQ

**Enclosure 1**

**Indiana's Assessment of the Revised 2008 8-Hour Ozone National  
Ambient Air Quality Standard and Technical Support Documents  
April 2012**

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## **Executive Summary**

On March 11, 2009, Indiana submitted designation recommendations to the United States Environmental Protection Agency (U.S. EPA) in reference to the 2008 8-hour ozone standard. These recommendations were based on air quality data through the 2008 ozone season. At that time, 12 Indiana counties measured air quality above the standard, including Lake County. At this point in time, there were multiple measured violations of the standard within the Greater Chicago area as well. Since that time, much has changed. Indiana measures air quality that meets the standard throughout the state, Lake and Porter counties possess some of the lowest measured concentrations within the state, and there is only one of 22 monitors within the Greater Chicago area that measures air quality above the standard and it is within 0.0004 parts per million (ppm) of attaining as well.

Due to its reconsideration of the 2008 8-hour ozone standard, U.S. EPA did not proceed with the designation process upon receipt of state designation recommendations in 2009. Via memorandum to Air Division Directors on September 22, 2011, U.S. EPA outlined its intent to proceed with implementing the 2008 8-hour ozone standard, which included an expedited designation process. This process did not afford states the opportunity to develop designation recommendations based on updated air quality data and a proper nine-factor analysis per U.S. EPA's December 4, 2008 policy guidance concerning the designation process for the 2008 8-hour ozone standard.

U.S. EPA proposed designation boundaries for Indiana via letter to Governor Daniels dated December 9, 2011. Despite the fact that U.S. EPA's recommended boundaries were based on a dataset and analysis not relevant to Indiana's March 11, 2009, recommendations, Indiana was in agreement with U.S. EPA's recommended boundaries. However, on January 31, 2012, U.S. EPA issued a second letter to Governor Daniels updating its boundary recommendations to include Jasper, Lake, and Porter counties as part of the Chicago nonattainment area. Indiana is not in agreement with U.S. EPA's January 31, 2012, revisions to the proposed designation boundaries for Indiana.

Not only was Indiana not afforded the opportunity to conduct a proper nine-factor analysis and update its designation recommendations prior to U.S. EPA proceeding with designations, U.S. EPA failed to conduct an appropriate nine-factor analysis in proposing its designation boundaries for Indiana. U.S. EPA's January 31, 2012, letter to Governor Daniels states the following: "During the 120 day process, EPA will continue to work with state officials regarding appropriate designations and boundaries for the areas in Indiana. States will have time to review these letters and provide EPA with information to support any further changes to EPA's response." However, Indiana was subsequently notified by U.S. EPA in late March that any information to support further changes must be provided by mid-April to receive consideration. As a result, insufficient



time was available for Indiana to conduct an appropriate nine-factor analysis consistent with U.S. EPA's December 4, 2008, policy guidance. Nonetheless, Indiana has carefully reviewed U.S. EPA's January 31, 2012, letter and supplement, and has conducted an analysis that focuses on the conclusions that U.S. EPA made based on its limited evaluation.

U.S. EPA's letter to Governor Daniels stated that it intended to designate the Chicago-Naperville, Illinois-Indiana-Wisconsin area as nonattainment, with boundaries that include Jasper, Lake, and Porter counties in Indiana, revising U.S. EPA's December 9, 2011, proposal that designated these counties as unclassifiable/attainment. U.S. EPA based the revised proposal on 2011 data certified by the State of Illinois on December 7, 2011, which contained a monitored violation at the Zion, Illinois monitor.

However, in proposing that these Indiana counties be designated nonattainment in the Illinois-Indiana-Wisconsin Supplement, U.S. EPA performed no independent culpability study as a part of a complete five- or nine-factor analysis to support the designation recommendations and focused primarily on an unfounded cause and contribution assumption. In place of an independent analysis based on current data, U.S. EPA references the meteorological analyses conducted by the States of Illinois and Wisconsin in early 2009 (based on data through 2008). Indiana is not familiar with these analyses because they have not been made available for our review or comment. However, these analyses are irrelevant to this matter because they do not evaluate data for the 2009 through 2011 time period during which the lone area violation occurred. IDEM has performed detailed analyses to address these shortcomings to make scientifically sound recommendations for Indiana counties, which begins on page 8.

Indiana's analysis concludes that the localized nature of the violating Zion monitor is largely caused by onroad mobile source emissions originating in Illinois, that meteorological conditions do not support including any Indiana counties in the nonattainment area, and that the proposed inclusion of Indiana counties is inconsistent with U.S. EPA's proposed designations in other areas. Accordingly, Lake and Porter counties in Northwest Indiana should be designated attainment, and Jasper County should be designated unclassifiable/attainment for the 2008 8-hour ozone national ambient air quality standards (NAAQS).

Additionally, Indiana's analysis highlights the deficiencies associated with U.S. EPA's analysis provided to Governor Daniels on January 31, 2012. First, Indiana is concerned with Illinois' rush to provide the monitoring data to U.S. EPA. When a state certifies its data early with the sole interest of preserving its Federal Highway Administration Congestion Mitigation and Air Quality (CMAQ) funding, as Illinois has done, careful consideration is imperative. No other geographic area of the country has been put in the situation of being proposed attainment in one month (December 2011) to nonattainment the next (January 2012) as a result of a neighboring state's action to preserve CMAQ funding, as opposed to a focus on air quality and maintaining compliance with its own State Implementation Plan (SIP). Given the hurried quality



assurance process of the Illinois monitoring data and the variability in accuracy of the monitored data, it is especially important that U.S. EPA take more time to consider and then act on the data. As an initial matter, the data itself should undergo careful scrutiny to assure its accuracy, as U.S. EPA has properly acknowledged in its own standards for automated ozone monitors. See, e.g., 40 Code of Federal Regulations (CFR) 58, Appendix A.2.3.1.2 (upper confidence limit of 95%; absolute bias of 7). Proper review of the data is especially important where only 1 of 22 monitors was measured a mere 0.0004 ppm above the standard. With a measured exceedance of less than 0.001 ppm at the single Zion monitor, the recommendation of a far-reaching nonattainment boundary is questionable at best. Moreover, there is a question as to the validity of an actual violation because U.S. EPA's administrative record is missing the raw data from the Zion monitor. Illinois' related assessment of the validity of that key data also has not been made available for IDEM's review. In spite of Illinois' rush to secure its CMAQ funding and provide this data to U.S. EPA, U.S. EPA proposes this last-minute change to include all of Jasper, Lake, and Porter counties as a part of the Chicago nonattainment area.

U.S. EPA's proposed designation boundaries are contrary to what regulators have learned about regional transport of pollutants in implementing the Clean Air Act (CAA) and will not facilitate or expedite compliance with the standard. The CAA provides highly specific requirements for attainment of the 1-hour ozone NAAQS, but does not make provisions for an 8-hour ozone NAAQS. IDEM recognizes that U.S. EPA is trying to make the existing language of Title I, Part D, Subpart 2 of the CAA fit the needs of the revised 8-hour ozone NAAQS. However, issuing designations and associated requirements based on guidance developed for the outdated 1-hour and the soon to be replaced 1997 8-hour ozone NAAQS is not supported by current science or the regional nature of emissions transport. Indiana counties are significantly impacted by regional transport of ozone and its precursors, nitrogen oxides (NO<sub>x</sub>) and volatile organic compounds (VOCs). Reducing ozone precursors regionally has a much greater impact on ground-level ozone than reductions achieved locally. Designating counties nonattainment that measure air quality that attains the standard, or designating adjacent counties or portions of counties nonattainment just because major stationary sources are located within them, serves no purpose in improving air quality. The inclusion of adjacent counties based on a potential to nominally contribute to monitored violations contradicts the federal and state emission control strategies being deployed today based on proper scientific evaluation.

No Indiana counties currently violate the revised 2008 8-hour NAAQS and modeling demonstrates that all Indiana counties will continue to attain the standard in advance of the applicable deadline. Additionally, most of the stationary sources within Indiana are already subject to federal control programs, including the Cross-State Air Pollution Rule (CSAPR), the Boiler Maximum Achievable Control Technology (MACT), and Mercury and Air Toxics Standards. Given the existing federal control plans, the inclusion of counties beyond those where monitored violations occur will not achieve additional emission reductions or advance the attainment date under the revised 2008 8-hour ozone NAAQS. Designating an Indiana county nonattainment solely based on a

slight and unproven potential to contribute at a monitor located in the same metropolitan statistical area will not result in additional controls on any major emission sources and the attainment date will not move forward or backward as a result of including surrounding counties based on this non-scientific approach. Modeling results, beginning on page 14, which include the U.S. EPA's own analyses of the CSAPR and Lake Michigan Air Director's Consortium (LADCO) technical modeling to date, suggest that all of Indiana will continue to meet the revised 2008 8-hour ozone NAAQS.

Second, U.S. EPA's justification for its revised designation proposal fails to properly account for the primary cause of the monitored violation in Zion, Illinois, and is unsupported by available data and modeling. IDEM's review of the Zion monitor clearly indicates that the monitored violation is caused primarily by significant changes to the Northeast Illinois Vehicle Emissions Testing (VET) program made by Illinois without first obtaining SIP approval. Beginning in 2007, Illinois made significant changes to its VET program, including the exemption of all vehicles from model years 1968 through 1995. Beginning on page 29, IDEM explains its study and the direct correlation between the Northeast Illinois VET program modifications and the monitored violation. IDEM's analysis goes on to demonstrate that Illinois' onroad mobile sources are the primary contributor to the emissions that form ozone over Lake Michigan, and that the lone violating monitor in Zion, Illinois is then impacted by "lake effect" ozone concentrations.

This analysis by IDEM stands in stark contrast to U.S. EPA's own justification provided in the revised designation proposal. U.S. EPA indicated in its letter to Governor Daniels that the proposed designations are "based on the high emissions in these counties that contribute to high ozone concentrations at the Zion monitor." U.S. EPA went on to state that "meteorology on high ozone days in the Chicago area favor transport of ozone and ozone precursor emissions from these counties to the Zion monitor." However, U.S. EPA failed to conduct its own modeling and meteorological analysis to support these conclusions. IDEM's analysis shows that emissions volume is far less relevant than the geographic origin of the emissions and whether meteorology enables those emissions to contribute to ozone formation at a specific downwind location when properly accounting for the "lake effect" on regional ozone formation. IDEM's conclusions are supported by stationary source emission inventories that demonstrate the overall emissions contribution to the Chicago nonattainment area from Jasper, Lake, and Porter counties is relatively insignificant when compared to Illinois counties. Illinois counties contribute 73% of the total NO<sub>x</sub> and 86% of the total VOC emissions that typically build up over Lake Michigan to form ozone and return to the shoreline at a later date resulting in random and sometimes isolated monitor spikes. Furthermore, IDEM was able to conduct its review without being given the opportunity to adequately review the quality-assured monitoring data provided by the State of Illinois that indicates a monitored violation at the Zion, Illinois site in 2011. Therefore, IDEM urges U.S. EPA to review the information provided and ensure that it provides sound justification for any final action affecting Indiana counties.

Third, U.S. EPA is proceeding with implementation of the 2008 8-hour ozone standard in an inconsistent and unjustified manner. As demonstrated in further detail

beginning on page 32, U.S. EPA's proposed designations and the amount of scrutiny applied by U.S. EPA in making its proposals varies significantly between similarly situated counties. U.S. EPA cannot apply its designation criteria "inconsistently, resulting in similar counties being treated dissimilarly." *ATK Launch Sys., Inc. v. EPA*, 2012 U.S. App. LEXIS 3693, 10 (D.C. Cir. 2012) (emphasis omitted), *citing Catawba County v. EPA*, 571 F.3d 20, 40 (D.C. Cir. 2009). IDEM's review of several counties demonstrates that U.S. EPA not only applied a five-factor analysis inconsistently across the country, but also that other U.S. EPA regions applied a more robust analysis—for example, conducting their own analysis of state-provided data—than in the case of the rushed designation proposed based on last-minute data provided by Illinois. For example, in Indiana alone, U.S. EPA has proposed to designate all of Jasper County, Indiana, based predominantly on the contributions of Northern Indiana Public Service Company R. M. Schahfer Generating Station (NIPSCO - Schahfer), as nonattainment under the 2008 8-hour ozone NAAQS with less technical support than it provided to narrow down the nonattainment boundary for Dearborn County in Southeastern Indiana to just a single township that includes a lesser controlled coal-fired power plant. Jasper County's large emissions base was treated dissimilarly from Dearborn County and other comparable counties, where U.S. EPA apparently concluded that designating a county-wide area nonattainment based solely on the fact that a facility such as a coal-fired power plant is located there will not result in any further emission reductions or serve any useful purpose, as detailed on page 38 of this document. This widespread variability and inconsistency with the level of technical support and analyses used to support U.S. EPA's proposed actions in Indiana further support U.S. EPA reconsidering its proposed designations in Northwest Indiana.

Jasper, Lake, and Porter counties were proposed nonattainment by U.S. EPA under the 2008 8-hour ozone NAAQS as part of the greater Chicago nonattainment area due to their assumed contribution to the Zion, Illinois monitor, based on, in IDEM's view, insufficient and outdated information. The technical information provided below demonstrates that Jasper, Lake, and Porter counties in Northwest Indiana did not contribute to the elevated ozone concentrations during the days that led to the monitored violation at the Zion, Illinois monitor, and should not be included in the nonattainment area.



## **Northwest Indiana Ozone Designation History**

Lake and Porter counties were designated nonattainment under the 1997 8-hour ozone NAAQS as part of the greater Chicago nonattainment area due measured violations of the standard throughout the region. Although Jasper County was part of the combined statistical area (CSA) at that time, and the NIPSCO – Schahfer facility was less controlled in 2004 than it is today, U.S. EPA did not include Jasper County in the nonattainment area designated in 2004.

All of the monitor sites in Lake and Porter counties have measured air quality that meets the 1997 8-hour ozone NAAQS since 2007. A Redesignation Petition and Maintenance Plan for the 1997 8-hour ozone NAAQS for Indiana's portion of the Chicago-Naperville-Michigan City, Illinois-Indiana-Wisconsin (IN-IL-WI) Combined Statistical Area herein referred to as the "Chicago nonattainment area" was approved by U.S. EPA on May 11, 2010 (75 FR 26113). The Indiana portion of the Chicago CSA includes Jasper, Lake, Newton, and Porter counties. There are no monitors in Jasper or Newton counties, but all remaining monitors in Lake and Porter counties measure attainment of the revised 2008 8-hour ozone NAAQS.

### **I. Monitoring Network and Measured Air Quality Data**

#### **Northwest Indiana Monitoring Data**

There are five monitors located in the Indiana portion of the proposed Chicago nonattainment area. All five of the monitors listed in Table 1 are currently measuring attainment of the 2008 8-hour ozone NAAQS.

**Table 1 –Monitor Values for Indiana Counties located in Chicago Nonattainment Area from 2008 – 2011**

County	Monitor Location*	4 <sup>th</sup> Highest Ozone Values (ppm)				Design Value 2008-2010 (ppm)	Design Value 2009-2011 (ppm)
		2008	2009	2010	2011		
Lake, IN	Gary IITRI	0.062	0.058	0.064	0.066	0.061	0.062
Lake, IN	Whiting	0.062	0.062	0.069	0.069	0.064	0.066
Lake, IN	Hammond	0.068	0.065	0.069	0.072	0.067	0.068
Porter, IN	Ogden Dunes	0.069	0.067	0.067	0.068	0.067	0.067
Porter, IN	Valparaiso	0.061	0.064	0.061	0.063	0.062	0.062

\*There are no monitors in Jasper or Newton Counties.

## **Chicago CSA Monitoring Data**

Table 2 shows the 19 monitors located in the Illinois and Wisconsin portion of the proposed Chicago nonattainment area. One of these monitors (Zion) is measuring values barely above the 2008 8-hour ozone NAAQS based on recent quality-assured monitoring data for the years 2009 through 2011.

**Table 2 – Chicago Nonattainment Area Monitor Values from 2008 – 2011**

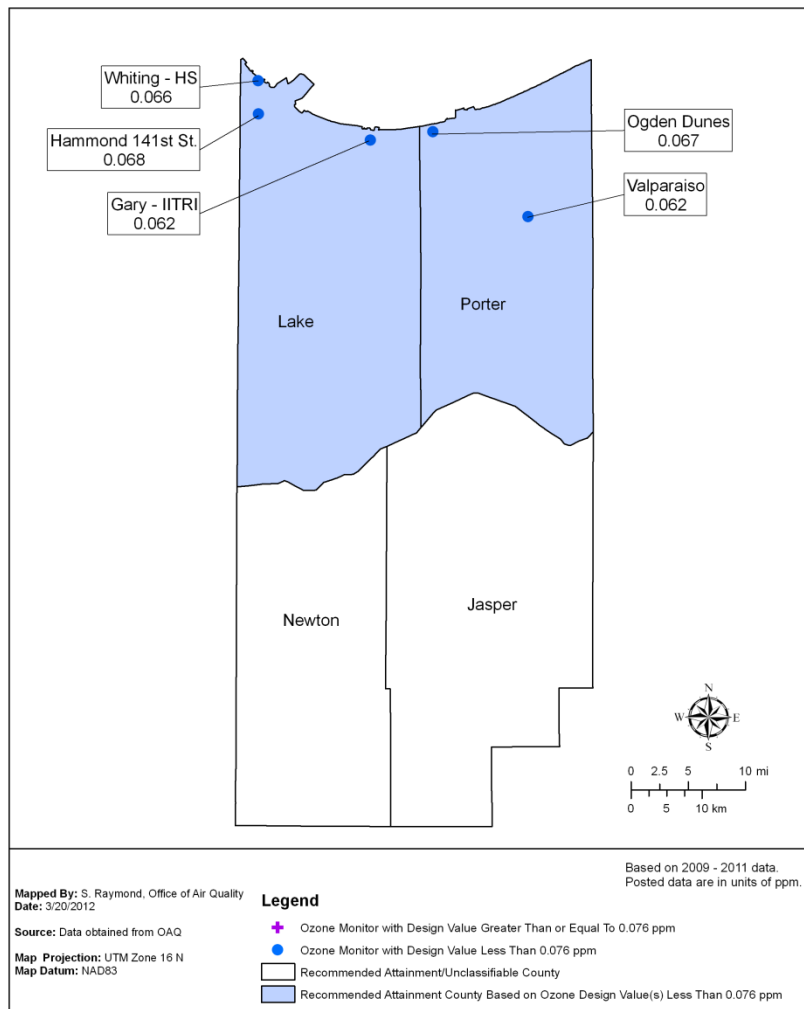
County	Monitor Location	4 <sup>th</sup> Highest Ozone Values (ppm)				Design Value 2008-2010 (ppm)	Design Value 2009-2011 (ppm)
		2008	2009	2010	2011		
Cook, IL	Alsip	0.066	0.069	0.073	0.071	0.069	0.071
Cook, IL	Chicago-E. Cheltenham	0.067	0.065	0.074	0.079	0.069	0.073
Cook, IL	Chicago-Wacker at Adams	0.059	0.076	0.077		0.071	
Cook, IL	Chicago-S. Ellis Ave	0.063	0.060	0.071	0.074	0.065	0.068
Cook, IL	Chicago-E. Ohio	0.063	0.062	0.071	0.074	0.065	0.069
Cook, IL	Chicago-Lawndale	0.066	0.067	0.068	0.073	0.067	0.069
Cook, IL	Chicago-W. Hurlbut St.	0.064	0.064	0.070	0.067	0.066	0.067
Cook, IL	Lemont	0.071	0.067	0.073	0.069	0.070	0.070
Cook, IL	Cicero	0.060	0.067	0.068	0.072	0.065	0.069
Cook, IL	W. Harrison St.	0.057	0.057	0.064	0.065	0.059	0.062
Cook, IL	Northbrook	0.065	0.069	0.072	0.076	0.069	0.072
Cook, IL	Evanston	0.058	0.064	0.067	0.078	0.063	0.070
DuPage, IL	Rt. 53	0.057	0.059	0.064	0.068	0.060	0.064
Kane, IL	Elgin	0.061	0.068	0.069	0.070	0.066	0.069
Lake, IL	Waukegan	0.063	0.057	0.074		0.065	
Lake, IL	Zion	0.069	0.075	0.078	0.076	0.074	0.076
McHenry, IL	Cary	0.065	0.066	0.065	0.071	0.065	0.067
Will, IL	S. Essex Rd.	0.060	0.063	0.065	0.061	0.063	0.063
Kenosha, WI	Chiwaukee Prairie	0.072	0.071	0.081	0.081	0.075*	

Highlighted values are 0.076 ppm or above

\*Most current certified data is based on 2008 through 2010 data.

Although Jasper County, Indiana is part of the proposed Chicago nonattainment area, there are no ozone monitors located in the county as can be seen in Figure 1. The only stationary emission source in Jasper County is NIPSCO - Schahfer, which is controlled under the NO<sub>x</sub> SIP Call and CSAPR. Jasper County is essentially rural in nature, does not have measured air quality in excess of the 2008 8-hour ozone NAAQS, and is not contributing to elevated ozone levels in the nonattainment area. Jasper County accounts for a small percentage of the total emissions for the entire MSA. Jasper County also maintains low population density, which is not expected to grow, and fewer than 10,000 of its residents work and commute outside the county. Indiana believes there is no justification to include Jasper County in the nonattainment area. U.S. EPA should keep the nonattainment area as small as possible due to the isolated manner of the violation in Northeast Illinois, and base designations on sound science, real-world air quality drivers, while ensuring absolute consistency.

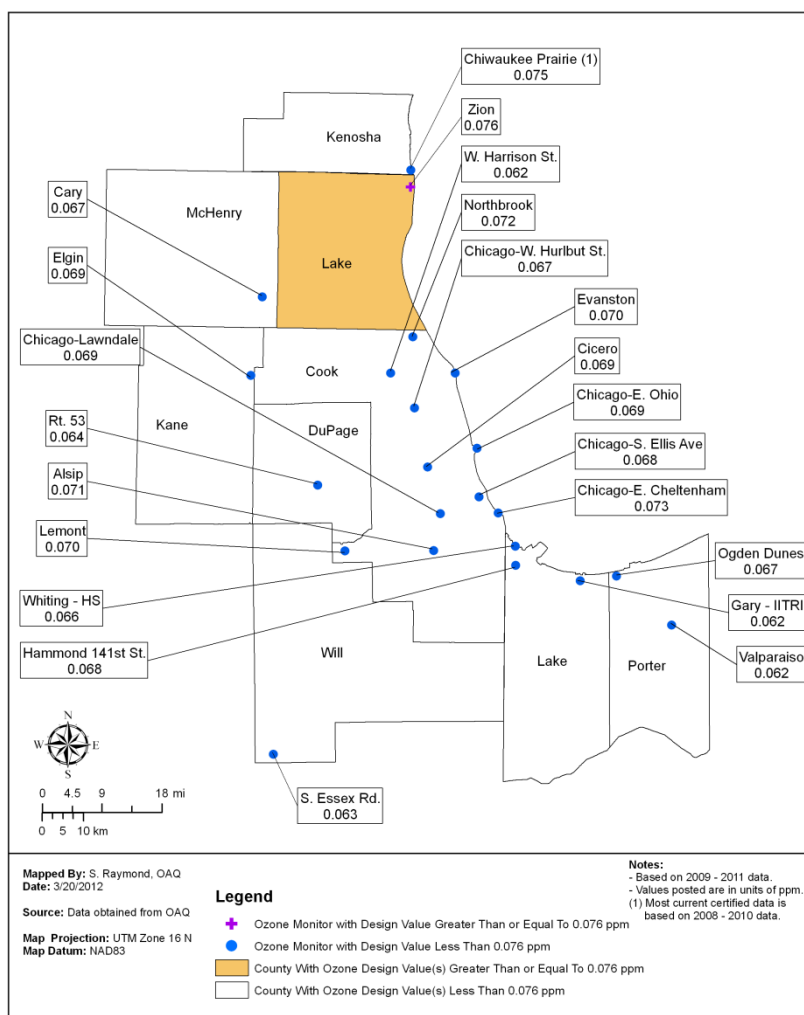
**Figure 1 – Indiana Portion of Chicago MSA**





Figures 1 and 2 also demonstrate that Lake and Porter counties both currently measure attainment of the 2008 8-hour ozone NAAQS. Lake and Porter counties also do not significantly impact monitored violations in the Chicago area. IDEM has conducted an evaluation to determine the impact Lake and Porter counties have on ozone monitors in the Chicago area. It should be noted that quality-assured monitor values in Lake and Porter counties continue to be some of the lowest in the State of Indiana. The detailed results of this analysis are included later in this technical support document to show that Jasper, Lake, and Porter counties are not culpable for elevated ozone concentrations during the days that led to the single Chicago area violation at the Zion, Illinois monitor.

**Figure 2 –U.S. EPA Proposed Chicago Nonattainment Area**

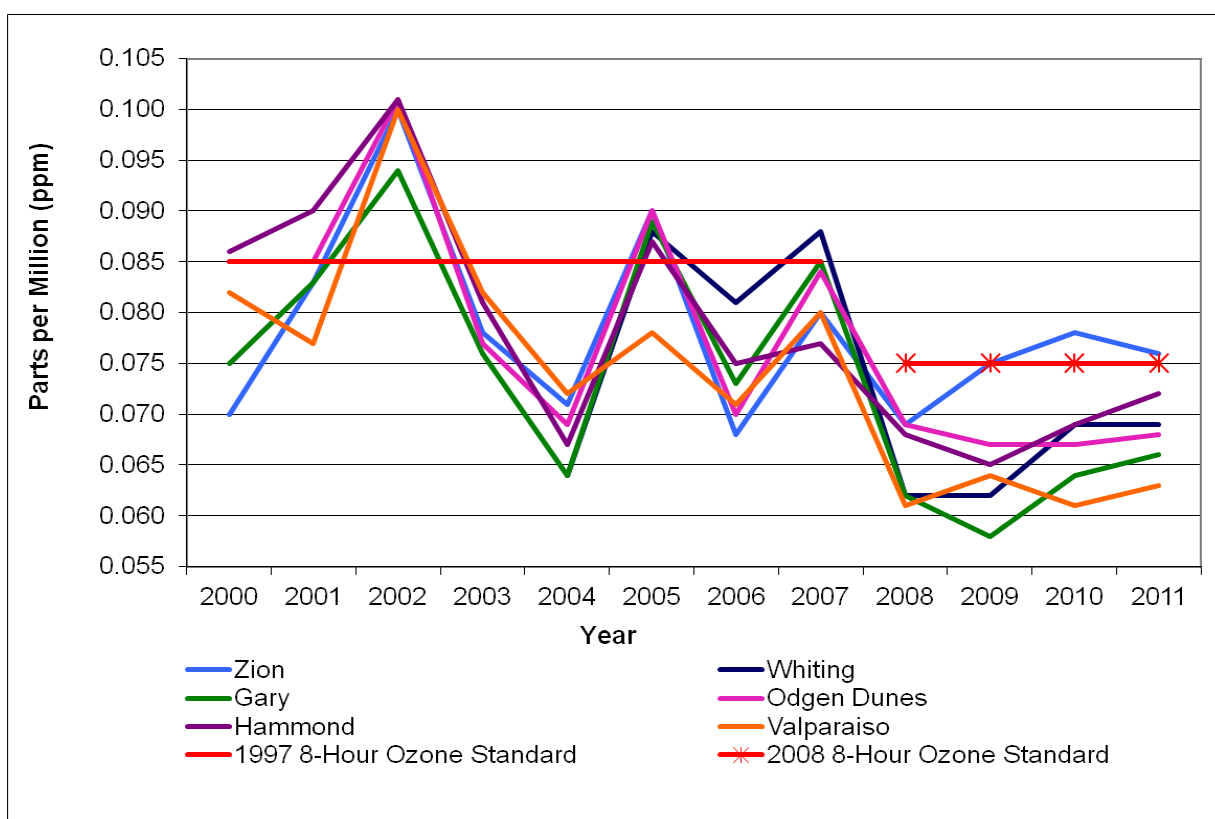


Monitoring data in Tables 1 and 2 come from U.S. EPA's Air Quality System (AQS) repository of ambient air quality data. The U.S. EPA AQS lists monitor values in ppm using three significant digits. The procedure for calculating the three-year design value for the 2008 8-hour ozone NAAQS is detailed in the Federal Register at 73 FR 16512 (March 27, 2008), stating, "The computed 3-year average of the annual fourth-

highest daily maximum 8-hour average O<sub>3</sub> concentrations shall be reported to three decimal places (the digits to the right of the third decimal place are truncated, consistent with the data handling procedures for the reported data).” As such, a monitor reading of 0.0759 ppm would be in attainment of the 2008 8-hour ozone NAAQS. Using this calculation method, the three-year average for the years 2009, 2010, and 2011 at the Zion monitor listed in Table 2 results in a value of 0.0763.

Figure 2 shows the locations and current quality-assured monitor values of the 18 monitors within Illinois’ portion of the Chicago CSA, of which only one (located in Zion, IL) is over the revised 2008 8-hour ozone NAAQS by merely 0.0004 ppm.

**Chart 1 - Comparison of 8-Hour 4<sup>th</sup> High Values from 2000 – 2011**



**Chart 2 - Comparison of 8-Hour Design Values from 2000 – 2011**

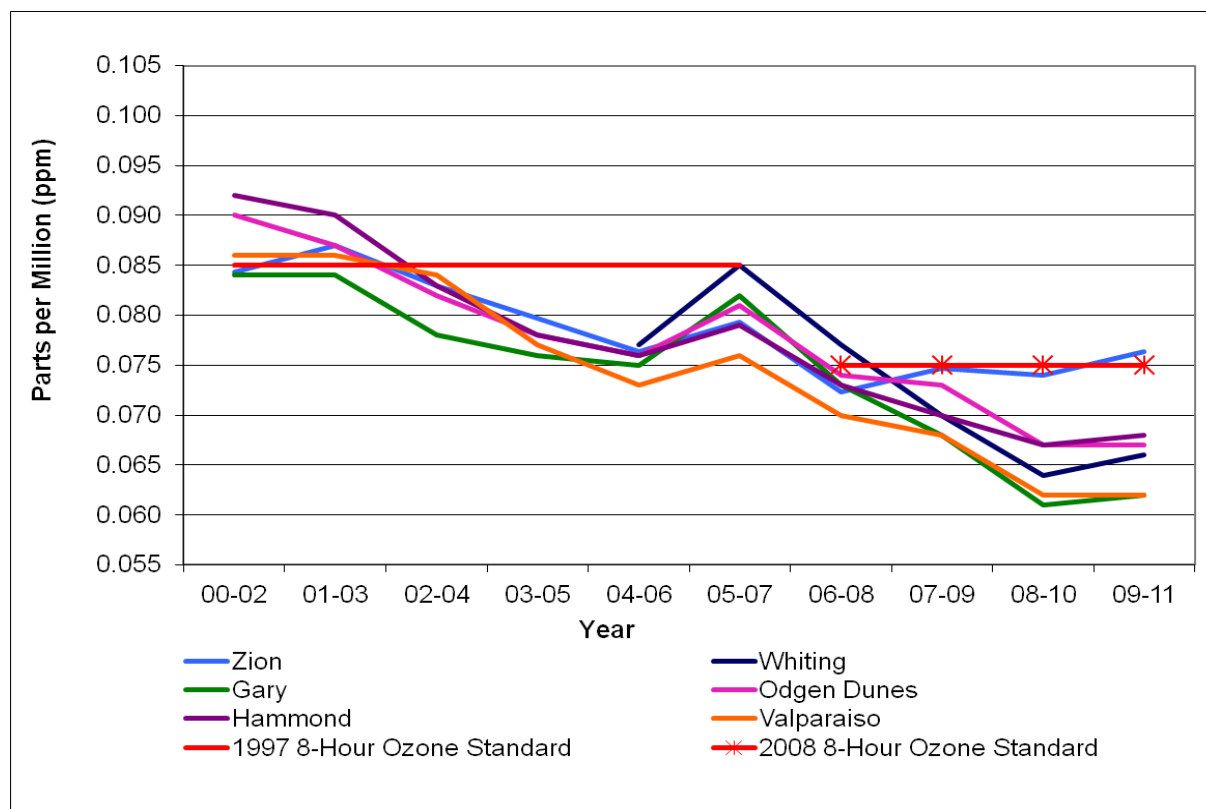


Chart 1 shows a clear decline in 4<sup>th</sup> high monitor values across the nonattainment area from 2000 through 2011, with the sole exception of the Zion, Illinois monitor. Chart 2 shows similar downward trends for these same monitors, once again with the notable exception of the Zion, Illinois location. If valid, this is clearly an isolated incident across the greater Chicago area. Local contributions can often be the cause of these unique circumstances. The monitors in the Chicago area located closest to the Indiana state line and the lakefront, which should be more directly impacted by emission sources located in Jasper, Lake, and Porter counties, are monitoring attainment of the revised 2008 8-hour ozone NAAQS. If emissions from Jasper, Lake, and Porter counties were significantly contributing to a monitored violation, higher concentration levels would be expected at the monitors located between Indiana and the violating monitor, not just the one isolated location of Zion, Illinois.

## **II. Air Quality Modeling, Meteorological, and Culpability Analyses**

### **LADCO Ozone Source Apportionment Modeling**

LADCO recently performed photochemical modeling, using the Comprehensive Air Quality Model (CAMx) model and most recent emission inventories and model updates. This modeling was performed to support attainment demonstrations and redesignation SIPs for the six-state LADCO region, consisting of Indiana, Illinois, Michigan, Minnesota, Ohio, and Wisconsin.

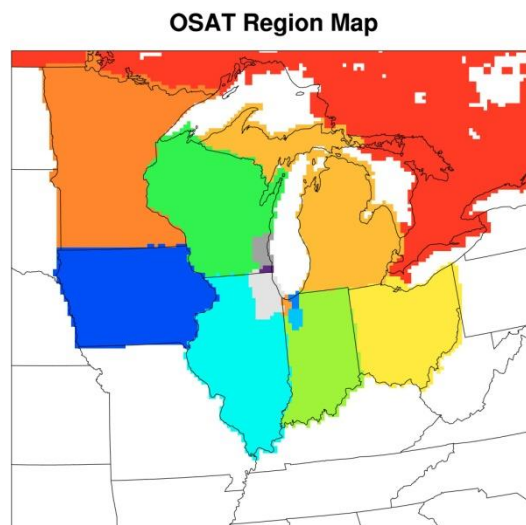


## Model Inputs

The photochemical model used by LADCO for the 8-hour ozone NAAQS analysis is CAMx version 5.2, developed by Environ. This model has been accepted by U.S. EPA as an approved air quality model for regulatory analysis and attainment demonstrations. Requirements of 40 CFR 51.112, as well as “Guidance on the Use of Models and Other Analyses in Attainment Demonstrations for the 8-Hour Ozone NAAQS” (EPA-454/R-05-002, Oct. 2005) are satisfied with the use of CAMx. Meteorology, as well as baseyear emissions from 2007, were used to conduct this photochemical modeling. Ozone source apportionment (OSAT) traces the emissions from different emission sectors and regions to determine the modeled ozone impacts from each. The modeled impacts are then displayed in a chart to show the ozone contributions from specific regions and emission source sectors on an ozone monitor.

The regions modeled in LADCO’s CAMx photochemical modeling run include: the Illinois portion of the Chicago nonattainment area; the Milwaukee nonattainment area: the Kenosha County, Wisconsin area; Lake County, Indiana; Porter County, Indiana; Jasper County, Indiana; the State of Illinois (without the Chicago nonattainment area); the State of Wisconsin (without the Milwaukee nonattainment area); the State of Indiana (without Lake, Porter and Jasper counties); the states of Ohio, Michigan, Minnesota, Iowa; and the southern portion of Canada. Other states included in the modeling grid and boundary conditions (BC) represent emissions from outside the boundary of the modeling grid domain. A representation of the regions modeled is shown below in Figure 3.

**Figure 3 - Region Map for LADCO’s OSAT Run**

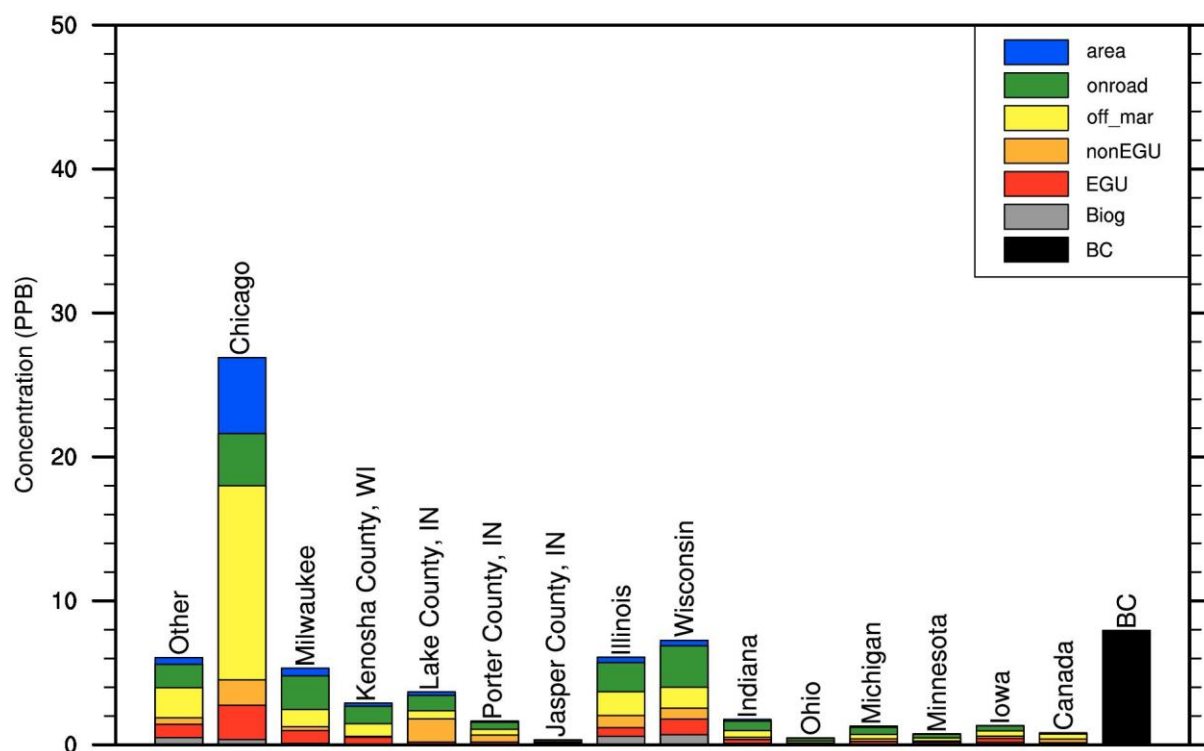


The individual emission sectors modeled in LADCO's OSAT run include all low level area sources, mobile sources (onroad), offroad and marine/air/rail sources (off\_mar), large point sources with boilers or large heaters (nonEGUs), electric generating unit (EGU) point sources, biogenic naturally occurring emissions (biog), and BC. All the emission sectors are tracked separately to determine each sector's impact on ozone concentrations at an ozone monitor.

Chart 3 was created by LADCO to show the impact on the Zion ozone monitor in northern Lake County, Illinois. The results are listed by the level of ozone contributed in parts per billion (ppb) by each region modeled (total amount of each bar) and by the emission sector (colored portions of each bar, corresponding to each emission sector for the modeled region).

**Chart 3 - Ozone Contributions at the Zion, Lake County, Illinois Monitor**

Contribution to Ozone (Monid: 1709710071)



### OSAT Modeling Results - Regional Analysis

Based on the LADCO OSAT modeling results detailed in Chart 3, Jasper County, Indiana emissions accounted for less than 0.5 ppb (0.0005 ppm) impact on ozone concentrations at the Zion ozone monitor in Lake County, Illinois, while Porter County, Indiana accounted for less than 2 ppb (0.002 ppm), and Lake County, Indiana accounted for approximately 4 ppb (0.004 ppm). The rest of the State of Indiana contributed approximately 2 ppb (0.002 ppm) to ozone concentrations at the Zion ozone monitor. In comparison, the Chicago, Illinois portion of the Chicago nonattainment area

contributed approximate 27 ppb (0.027 ppm), the State of Wisconsin (minus the Milwaukee area) contributed 8 ppb (0.008 ppm), the State of Illinois (minus the Chicago nonattainment area) contributed 6 ppb (0.006 ppm), while the Milwaukee area was modeled to contribute over 5 ppb (0.005 ppm) to ozone concentrations at the Zion, Illinois monitor. If these results were used to evaluate potential cause and contribution of the monitored violation at the Zion site, U.S. EPA's proposed boundaries would be inconsistent and unfounded as the Milwaukee, Wisconsin impacts are higher than Lake, Porter, and Jasper counties impact. This is due to the fact that the contributions for Jasper and Porter counties are insignificant and below the threshold that U.S. EPA has used to address transport in the recent past, and the contributions from Lake County are exceeded by other areas not addressed in U.S. EPA's action, such as Milwaukee.

### **OSAT Modeling Results – Emission Sector Analysis**

Emission sector contributions vary according to the regions. Lake County, Indiana contributions to ozone at Zion, Illinois were modeled to be from nonEGU sources and onroad emissions with lesser contributions from area, offroad and marine/aircraft/rail emissions. Porter County, Indiana contributions to ozone at Zion, Illinois included nonEGU sources and onroad emissions, as well as offroad and marine/aircraft/rail emissions. Jasper County, Indiana contributions were less than 0.5 ppb (0.0005 ppm) and each emission sector's impact on ozone was considered negligible.

These results show that Lake and Porter counties in Northwest Indiana have a very small impact on monitor values at Zion, Illinois. Most stationary sources in Lake and Porter counties are already stringently controlled and a designation of nonattainment would not have any quantifiable affect on emissions. As such, a designation of attainment based on this limited impact and current local monitor values in Northwest Indiana would be most appropriate for Lake and Porter counties. Moreover, the minimal impact from Jasper County, Indiana, is a clear indication that a designation of unclassifiable/attainment is both reasonable and scientifically sound.

### **U.S. EPA Modeling Analysis for Cross-State Air Pollution Rule (CSAPR)**

U.S. EPA conducted modeling for CSAPR. This analysis was performed in 2011 and included in the "Air Quality Modeling – Final Rule Technical Support Document" to assist states in attaining the 1997 8-hour ozone NAAQS. CSAPR requires a total of 28 states to reduce annual SO<sub>2</sub> and NO<sub>x</sub> emissions and/or ozone season NO<sub>x</sub> emissions from power plants. Emission reductions will total 1.4 million tons per year of NO<sub>x</sub>, representing a 54% reduction, including 340,000 tons per year of NO<sub>x</sub> during the ozone season.

## **Model Inputs**

The air quality model used for this rulemaking was the CAMx version 5.3. The modeling domain consisted of 36 kilometer (km) x 36 km coarse grid covering the continental United States and portions of Canada and Mexico with a 12 km x 12 km fine grid covering the East Coast westward to Texas to North Dakota. Thirty-seven states and the District of Columbia were included in the grid configuration. Baseyear 2005 emissions were modeled. Meteorology from 2005 was created using the Mesoscale Model (MM5) and used for the base case and future year modeling runs. More detailed information on the CAMx input file and additional data used for the photochemical modeling can be found in the U.S. EPA's "Air Quality Modeling Final Rule Technical Support Document," dated June 2011.

## **Modeling Results**

Table 3 shows the results of U.S. EPA's CSAPR modeling for ozone impacts at the Zion ozone monitor in Lake County, Illinois and ozone monitors in Lake and Porter counties in Indiana. The monitor identification number, name and county are listed, as well as the 2003 through 2007 8-hour ozone design values that were used to calculate base case and future year modeling results. Model results are used in a relative rather than absolute sense. Relative use of the model results calculates the percent change in concentrations based on two different emission scenarios. This percent change can be applied to each monitor's design value to determine ozone impacts. This approach differs from using the absolute or actual modeled result, which may show under or over-predictions with the actual monitored values. Based on the relative response factors (RRFs) that were modeled for each monitor site, the 2003 through 2007 design values were multiplied by the corresponding RRF to determine all future year base case and remedy modeled design values. The remedy design value takes into account all emission reductions that would be associated with the CSAPR rule and assesses the impacts from those emission reductions on the modeled ozone concentrations. The 2012 and 2014 base case emissions, along with the 2014 emissions with CSAPR emission reductions included, were modeled to determine the future year design values. The 2014 modeled future year design values for the Zion monitor in Lake County, Illinois are in attainment of the 8-hour ozone NAAQS of 0.075 ppm.

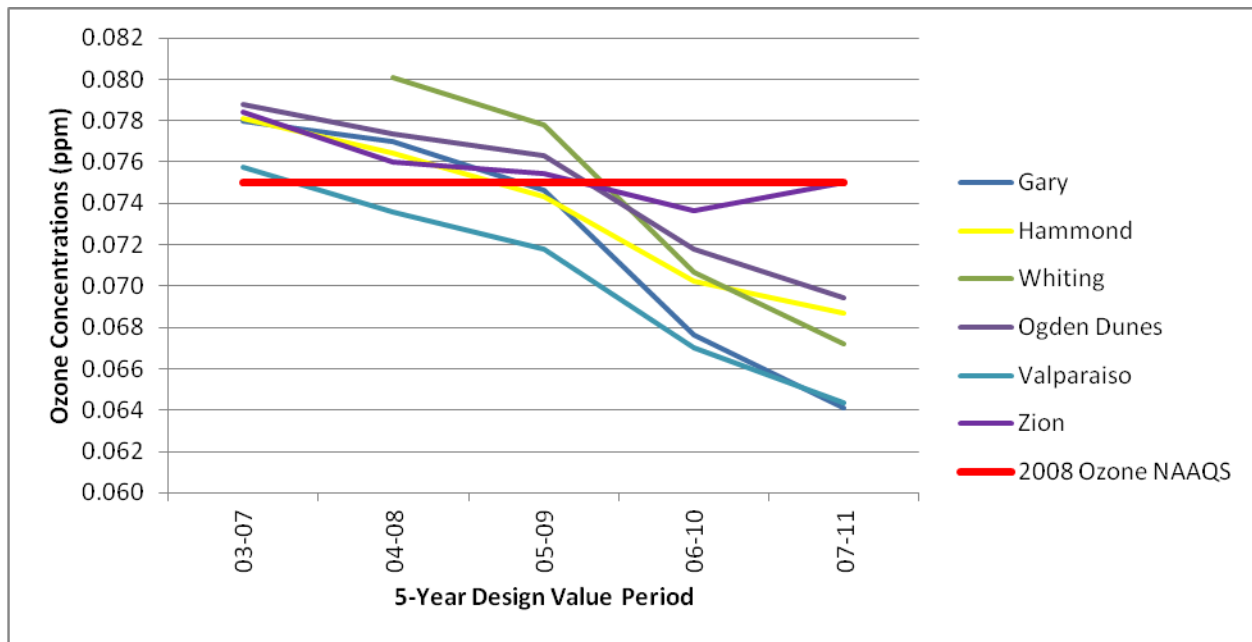
**Table 3 - U.S. EPA CSAPR Modeling Results (Values in Parts Per Million)**

<b>Monitor ID</b>	<b>Monitor Name</b>	<b>County</b>	<b>Design Value</b>	<b>Base Case Maximum Value</b>	<b>Future Maximum Design Value</b>	<b>Future Maximum Design Value</b>
			<b>2003-2007</b>	<b>2012 Base</b>	<b>2014 Base</b>	<b>2014 Remedy</b>
170971007	Zion	Lake, IL	0.079	0.074	0.073	0.072
180890022	Gary	Lake, IN	0.082	0.076	0.075	0.074
180892008	Hammond	Lake, IN	0.085	0.079	0.078	0.078
180890030	Whiting	Lake, IN	0.079	0.073	0.073	0.072
181270024	Ogden Dunes	Porter, IN	0.081	0.074	0.073	0.073
181270026	Valparaiso	Porter, IN	0.077	0.069	0.068	0.068

U.S. EPA used its modeling results to determine the contribution from each state on each ozone monitor in the modeling domain that had five days or more of maximum 8-hour ozone concentrations above 0.07 ppm. This approach is consistent with U.S. EPA's guidance on calculating ozone contributions, as described in the "Air Quality Modeling - Final Rule Technical Support Document". The entire State of Indiana's contribution to the Zion, Illinois modeled ozone concentrations were 0.01096 ppm, representing 14.8 % of Zion's ozone concentration. No further breakdown of emissions was modeled by U.S. EPA. It should be noted that various emission control strategies have gone into effect that would not be reflected in the 2005 base emissions that were modeled by U.S. EPA for CSAPR. Therefore, these results may be overly conservative as current design values are lower and emission controls may be in place in Northwest Indiana that would lessen the impacts. Comparison of the five-year average 8-hour ozone design values for the monitors in Northwest Indiana and Zion, Illinois over the past 9 years are shown in Chart 4.



**Chart 4 - Comparison of Five-Year Average 8-Hour  
Ozone Design Values from 2003 – 2011**



As Chart 4 shows, the downward trend in ozone concentrations from the 2003 through 2007 design value period to the most current 2007 through 2011 design value period is evident, with concentration decreases ranging from 0.009 to 0.014 ppm at all ozone monitors in Lake and Porter counties in Northwest Indiana and all other monitors within the region except the Zion ozone monitor in Lake County, Illinois. If more current design values were used in the CSAPR modeling, modeling results would show that the future year modeled design values for all area monitors would be up to 0.014 ppm lower and all monitors would fall well below the 2008 ozone NAAQS of 0.075 ppm. The upward trend in ozone concentrations between the five-year periods of 2006 through 2010 and 2007 through 2011 solely at the Zion, Illinois monitor demonstrates that this is an isolated incident driven by local emissions.

### **Summary of LADCO and U.S. EPA Modeling Results**

LADCO's OSAT modeling results show lesser impacts from Lake and Porter counties, and most notably Jasper County, in Northwest Indiana when compared to the State of Illinois, and Wisconsin's portions of the Chicago nonattainment area (not to mention Milwaukee). Impacts from offroad and marine/air/rail emissions, as well as area and onroad sources in the Chicago nonattainment area have larger impacts on ozone at the Zion, Illinois monitor than the total impacts of all of the emission sectors from each of the three Northwest Indiana counties. U.S. EPA's CSAPR modeling results show that future year modeled design values for the Zion ozone monitor in Lake County, Illinois will fall below the 2008 8-hour ozone NAAQS, despite basing the relative modeling results on higher design values from 2003 to 2007 than the current 2007

through 2011 design values that are markedly lower. In the Illinois-Indiana-Wisconsin Supplement provided by U.S. EPA along with its letter to Governor Daniels, it was stated that the proposed designations are “based on the high emissions in these counties that contribute to high ozone concentrations at the Zion monitor.” Modeling performed by LADCO and U.S. EPA, as contained in this technical support document, suggests that this broad approach to an isolated monitor violation lacks the technical support to include the Indiana counties of Jasper, Lake and Porter as “culpable,” nor does it warrant adversely impacting this portion of the State of Indiana that is in full compliance with the air quality standard and its federally-approved SIP.

### **Northwest Indiana Topography and Geography**

IDEM agrees with U.S. EPA’s assessment that the topography of the Greater Chicago area is not unique and does not limit transport. However, IDEM strongly believes that the unique geography of the area does in fact affect ozone formation and transport within the air-shed. More specifically, the geographic proximity and vast size of Lake Michigan results in unique meteorological patterns that impact ozone formation and transport considerably in comparison to areas with contiguous land mass and no topographic limitations (i.e., Greater Indianapolis). The manner in which ozone forms over Lake Michigan and then transports in virtually all directions based on changes in temperatures, wind speed, and wind direction throughout the day results in “lake effect” impacts at shoreline monitors. This presents unique challenges from an air quality mitigation perspective because elevated ozone levels can be isolated and occur randomly with no consistent pattern or controlling monitor. The fact that the Zion, Illinois monitor has never represented the controlling design value for the region exemplifies this point.

## **III. Emissions Data and Emissions-Related Analysis**

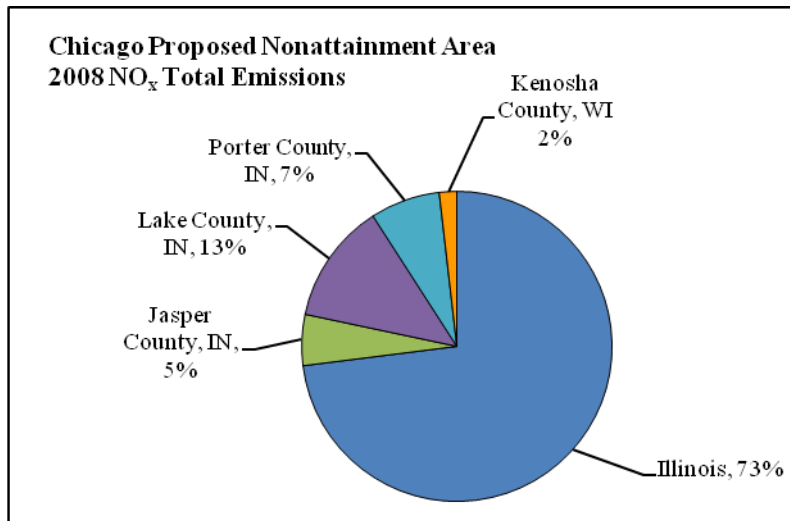
### **Northwest Indiana Emissions Data**

Indiana counties are significantly impacted by regional transport of ozone and its precursors, NO<sub>x</sub> and VOCs. Reducing ozone precursors regionally has a much greater impact on ground-level ozone concentrations than reductions achieved locally. The inclusion of adjacent counties based on cause and contribution contradicts federal and state control programs. Designating counties or portions of counties just because they contain major stationary sources would serve no positive purpose for air quality.

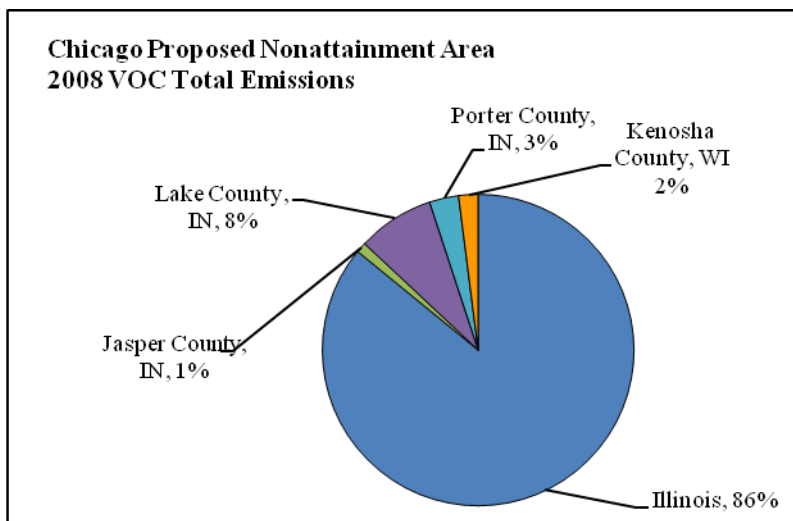
**Table 4 – Total Chicago Nonattainment Area  
2008 Stationary Source NO<sub>x</sub> and VOC Emissions Breakdown**

<b>Chicago Proposed Nonattainment Area Emissions Summary 2008 Total NO<sub>x</sub> and VOC Emissions (Tons Per Year)</b>				
<b>County/State</b>	<b>NO<sub>x</sub></b>	<b>Percent of Nonattainment Area</b>	<b>VOC</b>	<b>Percent of Nonattainment Area</b>
Illinois	271,712.29	73%	229,333.51	86%
Jasper County, Indiana	19,787.78	5%	2,845.03	1%
Lake County, Indiana	46,808.29	13%	21,266.91	8%
Porter County, Indiana	27,054.63	7%	8,099.75	3%
Kenosha County, Wisconsin	6,788.19	2%	5,370.52	2%
<b>Total</b>	<b>372,151.18</b>		<b>266,915.72</b>	

**Chart 5 - Total Chicago Nonattainment Area  
2008 Stationary Source NO<sub>x</sub> Emissions Breakdown**



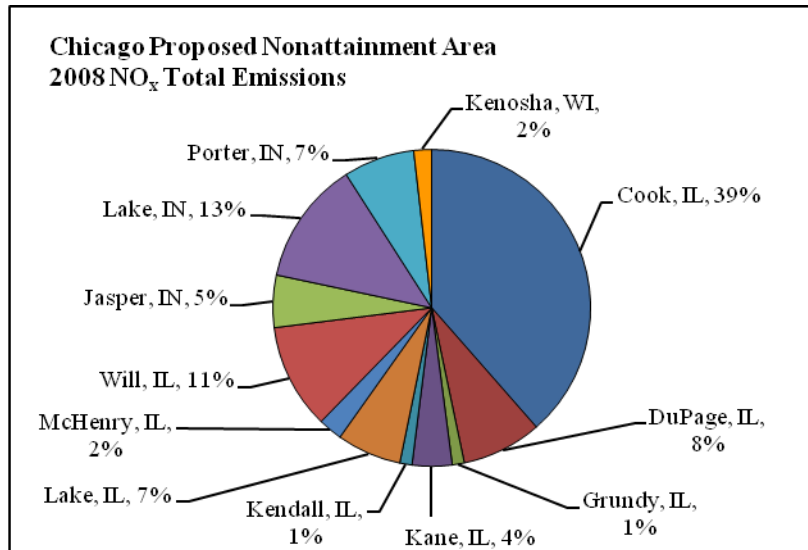
**Chart 6 - Total Chicago Nonattainment Area  
2008 Stationary Source VOC Emissions Breakdown**



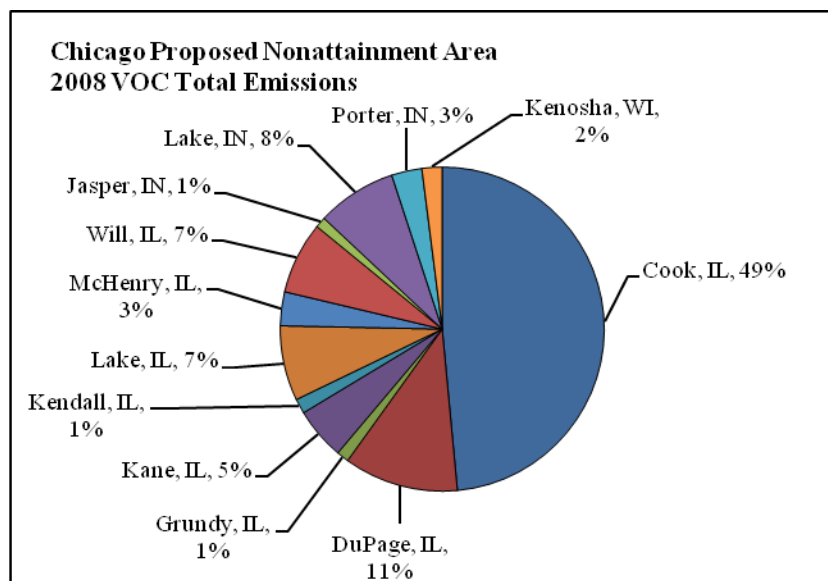
**Table 5 – Total Chicago Nonattainment Area County-Level  
2008 Stationary Source NO<sub>x</sub> and VOC Emissions Breakdown**

<b>Emissions Summary Chicago Proposed Nonattainment Area 2008 Total NO<sub>x</sub> and VOC Emissions (Tons Per Year)</b>				
<b>County/State</b>	<b>NO<sub>x</sub></b>	<b>% of Area</b>	<b>VOC</b>	<b>% of Area</b>
Cook, IL	143,374.18	39%	129,469.81	49%
DuPage, IL	30,412.57	8%	30,508.73	11%
Grundy, IL	4,567.62	1%	3,269.52	1%
Kane, IL	15,161.39	4%	13,893.96	5%
Kendall, IL	4,636.17	1%	3,956.70	1%
Lake, IL	24,548.91	7%	19,978.44	7%
McHenry, IL	9,138.08	2%	9,012.59	3%
Will, IL	39,873.38	11%	19,243.76	7%
Jasper, IN	19,787.78	5%	2,845.03	1%
Lake, IN	46,808.29	13%	21,266.91	8%
Porter, IN	27,054.63	7%	8,099.75	3%
Kenosha, WI	6,788.19	2%	5,370.52	2%
<b>Total</b>	<b>372,151.18</b>		<b>266,915.72</b>	

**Chart 7 - Total Chicago Nonattainment Area County-Level  
2008 Stationary Source NO<sub>x</sub> Emissions Breakdown**



**Chart 8 - Total Chicago Nonattainment Area County-Level  
2008 Stationary Source VOC Emissions Breakdown**



As can be seen in Table 4 and Charts 5 and 6, Jasper, Lake, and Porter counties, on the whole, account for a small portion (25%) of the stationary source contribution of NO<sub>x</sub> and an even smaller portion (12%) of VOC emissions. The “lake effect” is a major factor when considering an area’s actual contribution to high ozone



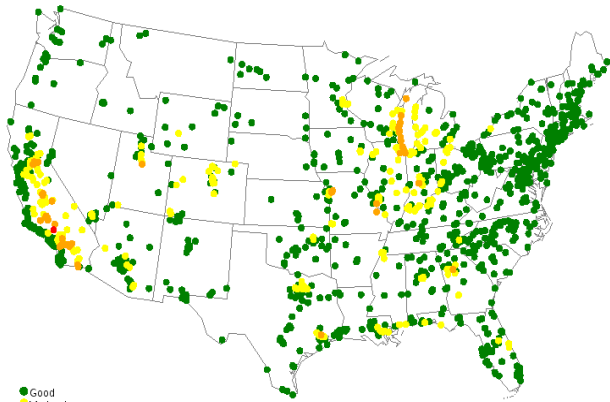
concentration days at any given air quality monitor within the region. Lake breezes form during sunny days when the sun heats land surfaces at a quicker pace than large bodies of water, such as Lake Michigan. This contrast in warmer air temperature on land and cooler air temperature over water produces 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. Information on how the “lake effect” impacted the Zion, Illinois monitor on the four highest days for 2011 can be found in Appendix F of this document. The impact of emissions building over Lake Michigan and returning to the shoreline and impacting monitor values is a product of overall emission contributions from the greater Chicago area. Table 4 and Charts 5 and 6 also show that nearly 73% of the Chicago nonattainment area’s total NO<sub>x</sub> and 86% of the total VOC emissions are contributed by the Illinois counties of Cook, DuPage, Grundy, Kane, Kendall, Lake, McHenry, and Will. With Illinois counties providing the great majority of emissions in the area that cause and contribute to the “lake effect,” it is unfair and unreasonable to include Jasper, Lake, and Porter counties based on the small overall emissions contribution to the nonattainment area, especially due to the isolated nature of the lone monitored violation within the area.

Charts 9, 10, and 11 are AIRNOW depictions of the four highest days for the Zion, Illinois, monitor site in 2009, 2010, and 2011, respectively. These charts were obtained from <http://www.airnow.gov>. The AIRNOW charts demonstrate a clear “lake effect” for these key days in 2009, 2010, and 2011, and further support that the impact of total NO<sub>x</sub> and VOC emissions to the Lake Michigan airshed plays a significant role in the monitor readings at the Zion, Illinois, monitor site. When considering culpability for “lake effect” ozone concentrations at a near-shore monitor location, it is also important to point out that counties and urban areas outside of the CSA are equally or more culpable than the Indiana counties that U.S. EPA is proposing to single out.

## Chart 9 – 2010 AIRNOW Depiction of Four Highest Monitor Value Days

**June 23, 2009 Zion => 86 ppb**

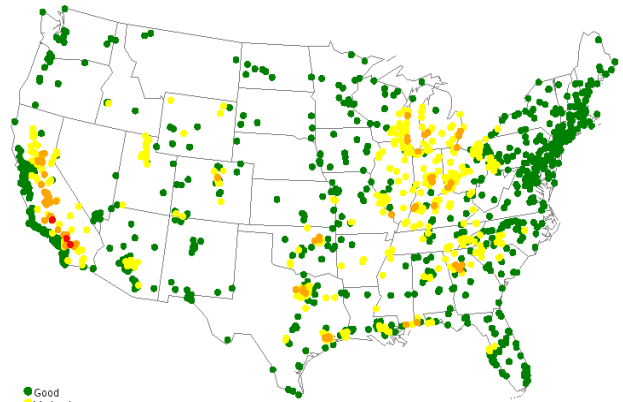
Ozone AQI Values by site on 06/23/2009



Source: U.S. EPA AirData <<http://www.epa.gov/airdata>>  
Generated: April 9, 2012

**June 24, 2009 Zion => 78 ppb**

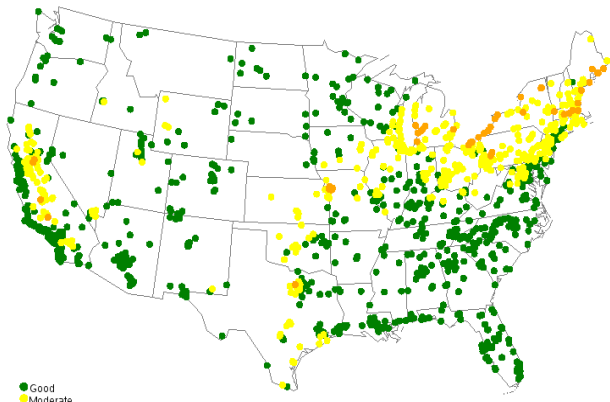
Ozone AQI Values by site on 06/24/2009



Source: U.S. EPA AirData <<http://www.epa.gov/airdata>>  
Generated: April 9, 2012

**May 23, 2009 Zion => 75 ppb**

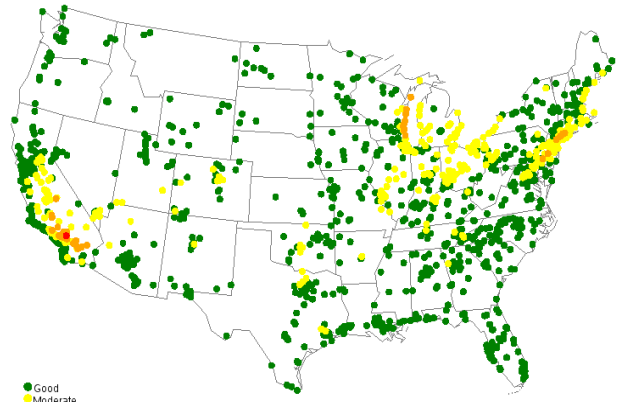
Ozone AQI Values by site on 05/21/2009



Source: U.S. EPA AirData <<http://www.epa.gov/airdata>>  
Generated: April 9, 2012

**August 15, 2009 Zion => 75 ppb**

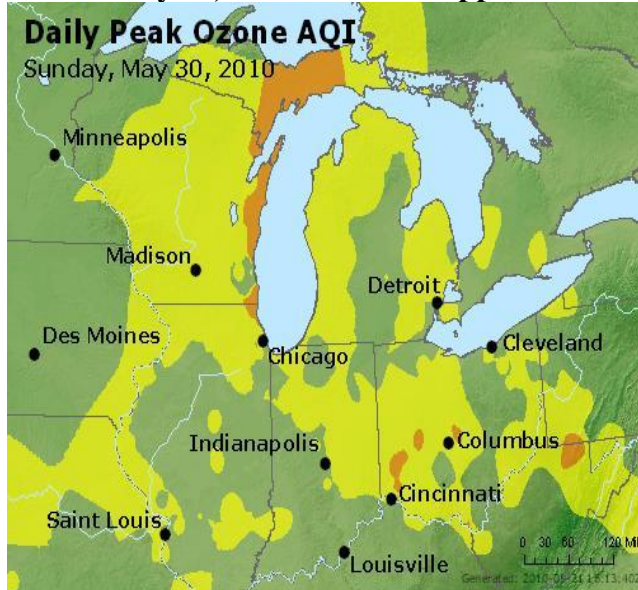
Ozone AQI Values by site on 08/15/2009



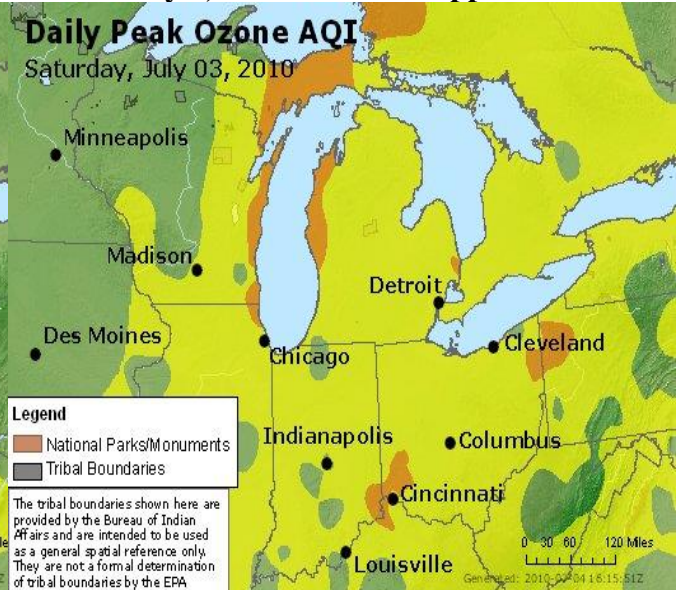
Source: U.S. EPA AirData <<http://www.epa.gov/airdata>>  
Generated: April 9, 2012

## Chart 10 – 2010 AIRNOW Depiction of Four Highest Monitor Value Days

May 30, 2010 Zion => 88 ppb



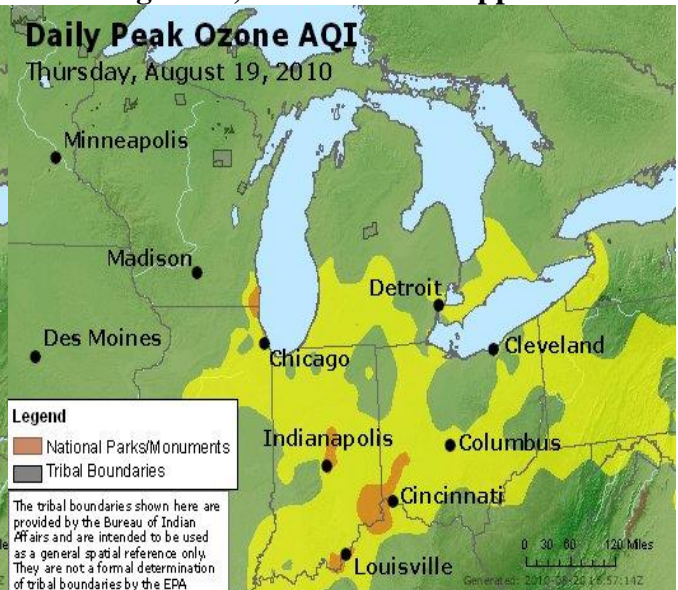
July 3, 2010 Zion => 84 ppb



May 24, 2010 Zion => 78 ppb

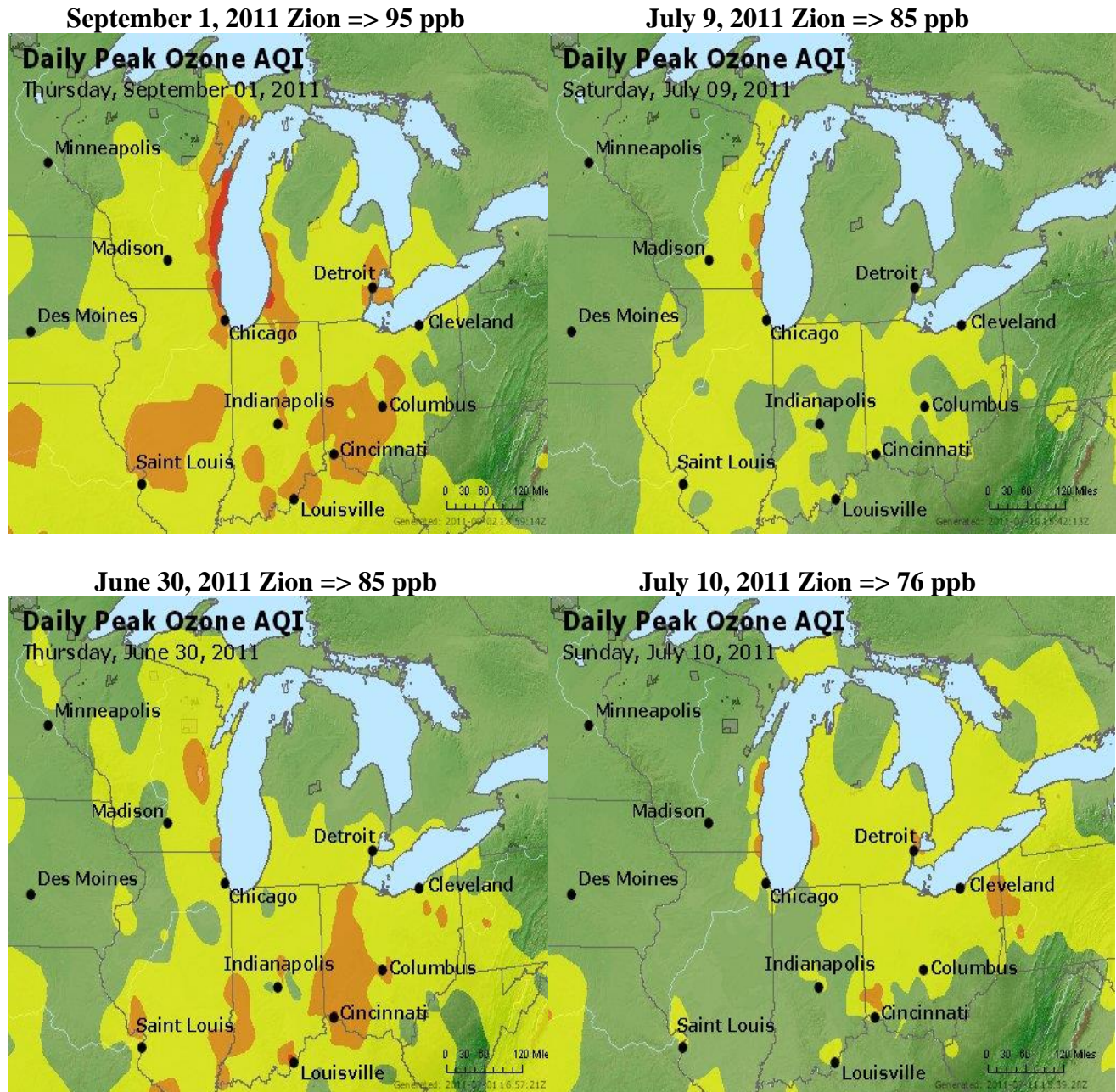


August 19, 2010 Zion => 78 ppb





## Chart 11 – 2011 AIRNOW Depiction of Four Highest Monitor Value Days



It is unlikely that the emissions from stationary sources in Jasper County, Indiana contribute any more to the values in Lake County, Illinois, than emissions from other Indiana counties, or from counties outside Indiana's borders within or beyond the proposed nonattainment area. Table 5 and Charts 7 and 8 clearly show the limited emissions contribution from Jasper County, Indiana, as the county only contributes approximately 5% of the total NO<sub>x</sub> emissions and 1 % of the VOC emissions in the proposed nonattainment area. These insignificant stationary source contributions and emissions-related population and vehicle miles travelled (VMT) data, as found in

Appendix B of this document for Jasper County, Indiana favor the exclusion of this county from the nonattainment area. In the specific case of Jasper County, Indiana, U.S. EPA focused on the combined total emissions from Jasper, Lake, and Porter counties as its basis for inclusion in the Chicago nonattainment area for the 2008 8-hour ozone NAAQS. U.S. EPA should consider each county on its own merits to fairly assess contributions to a monitored violation that results in a designation of nonattainment. As stated previously, the only significant source of ozone precursor emissions in Jasper County, Indiana is the well controlled coal-fired NIPSCO – Schahfer. U.S. EPA should not designate an area nonattainment based solely on the fact that a facility and/or coal-fired power plant is located there, especially when this designation will not result in any further emission reductions due to the existing controls on the facility. Additional details to support the exclusion of Jasper County, Indiana based on the cause and contribution methodology related to the NIPSCO – Schahfer facility are included later in this document.

Lake and Porter counties are subject to the most stringent group of emission controls within the State of Indiana. This collection of permanent and enforceable controls is equally stringent as those that apply elsewhere within the proposed nonattainment area and in some cases are more stringent. Vehicles registered in Lake and Porter counties are subject to reformulated gasoline and enhanced vehicle inspection and maintenance requirements. Indiana maintains a comprehensive vehicle inspection and maintenance program in Lake and Porter counties for all vehicles of model year 1976 and newer. Lake and Porter counties' vehicle inspection and maintenance program is more stringent than that which applies to the vast majority of the fleet that accounts for the VMT and long-term idling in close proximity to the monitoring sites. Furthermore, designating Jasper, Lake, or Porter counties as part of the Chicago nonattainment area would not result in substantive additional controls or subsequent emission reductions beyond those already in place.

### **Level of Control of Emission Sources (Anticipated Growth)**

NO<sub>x</sub> emissions within Northwest Indiana are projected to decline by almost 42% between 2005 and 2020. Emission reduction benefits from federal rules are factored into the emission projections. These rules include the NO<sub>x</sub> SIP Call, CSAPR, Tier 2 Motor Vehicle Emission Standards and Gasoline Sulfur Control Requirements, the Highway Heavy-Duty Engine Rule, and the Non-Road Diesel Engine Rule. In fact, most of the major stationary sources within the area are already subject to the NO<sub>x</sub> SIP Call, CSAPR, or RACT requirements.

#### **IV. Illinois Vehicle Emissions Testing Program Changes-Impact Analysis**

##### **Northeastern Illinois Vehicle Inspection and Maintenance Lost Reductions and Modeling Analysis**

Due to the localized nature of the violating monitor, IDEM evaluated potential causes for the isolated and marginal violation in Northeast Illinois. As the emissions inventory references for 2008, Illinois accounts for 73% of the total NO<sub>x</sub> and 86% of the total VOC for the proposed nonattainment area. The sector responsible for the vast majority of Illinois' inventory for NO<sub>x</sub> and VOC is onroad mobile. As with Lake and Porter counties in Northwest Indiana, VET, Stage II vapor recovery and reformulated gasoline apply to most of Northeast Illinois. Therefore, at first glance it would seem that the mobile source category is fully controlled, making the apparent backsliding at the Zion site even more puzzling.

However, beginning in 2007, Illinois made significant changes to its VET program, including the exemption of all vehicles from model years 1968 through 1995. Around that same time, IDEM considered making similar changes to its program but chose to conduct a detailed study to determine the potential impacts to air quality in the region. Instead of relying on output from the MOBILE6.2 model alone, IDEM evaluated actual tailpipe test data for the portion of the fleet in question, using actual reductions from 1995 and older vehicles that failed a tailpipe emissions test and subsequently passed during the same test period, as well as supplemental data from testing in British Columbia and Colorado. This was to evaluate the potential real-world impacts on air quality. The results of this study determined that Indiana would likely lose around 50% of the real reductions achieved from the program for ozone precursors. Therefore, IDEM chose to leave its VET program and the federally-approved SIP intact. A summary of this study is included in Appendix D of this Enclosure.

Due to the potential impacts of the changes that Illinois made to its VET program, and the absence of any technical information available since Illinois did not submit a SIP revision to support the program changes, IDEM investigated the potential impacts of the program changes to air quality, including at the Zion, Illinois, monitor location.

Time constraints associated with U.S. EPA's 120-day process prohibited IDEM from conducting as thorough analysis as desired; however, the results are quite compelling. First, two composite emission factors were created using MOBILE6.2: one based on Illinois VET program parameters used today, and one based on Illinois VET program parameters used prior to the changes in 2007. The difference between these two composite emission factors provided a difference of 3% for NO<sub>x</sub> and 12% for VOC. This represents a general estimate of the MOBILE6.2-based lost reductions from Illinois' changes to the program. IDEM then increased Illinois' onroad emissions inventory by 3% for NO<sub>x</sub> and 12% for VOC to evaluate the potential impact through CAMx. The results showed an increase of ozone concentrations at the Zion, Illinois, monitor of

0.0002 ppm. This is half of the difference between the level the monitor violated the standard by at the end of 2011 (0.0004 ppm).

It is important to note that the testing program for the Northwest Indiana VET program tests model year 1976 and newer vehicles, and that prior to 2007, Illinois' VET program tested model year 1968 and newer vehicles. Therefore, if methodology similar to what was used in IDEM's evaluation of potential emission reduction losses for the Northwest Indiana VET program were applied to the Northeast Illinois VET program, the lost "real" reductions would likely exceed the 50% identified in the Northwest Indiana study. Therefore, it is reasonable to assume that the true impact of the changes to Illinois' VET program would have been more than just 0.0004 ppm at the Zion, Illinois, monitor. To verify this, IDEM conducted a second CAMx run with a conservative alteration to the Northeast Illinois onroad inventory of 35% for both NO<sub>x</sub> and VOC. This second CAMx run, while not representative of realized emission reductions, shows the impact on ozone concentrations from the onroad mobile sector of the Northeast Illinois VET area on the Zion, Illinois monitor. **The results of this model-based analysis show that the Zion, Illinois monitor would have attained the standard, if Illinois continued with its VET program as originally required by U.S. EPA by testing pre-1996 model year vehicles, and was in full compliance with its federally-approved SIP.**

## **Model Inputs**

Photochemical modeling was performed for the Northeast Illinois VET program analysis using the CAMx version 5.2, developed by Environ. This model has been accepted by U.S. EPA as an approved air quality model for regulatory analysis and attainment demonstrations. Requirements of 40 CFR 51.112, as well as "Guidance on the Use of Models and Other Analyses in Attainment Demonstrations for the 8-Hour Ozone NAAQS" (EPA-454/R-05-002, Oct. 2005) are satisfied with the use of CAMx.

Meteorological files from 2007 were processed using the WRF modeling system. WRF is an update to the MM5 meteorological model that serves as an atmospheric simulation system. Emissions from 2007 were processed through the CONSolidated Community Emissions Processing Tool (CONCEPT) emissions modeling system to develop CAMx-ready emission files.

## **Emission Adjustments from Northeast Illinois VET Program**

There are several types of emission sectors that are processed: area emission sources (marine/air/rail, nonroad, ammonia, other emissions not emitted through a stack), low-level point sources, EGUs, nonEGU point sources, and motor vehicle emissions. For purposes of this modeling demonstration, all emission files remained the same as the base case modeling run, except for the motor vehicle emissions in the seven-county Northeast Illinois VET program. The results of the MOBILE6.2 run showed an increase in NO<sub>x</sub> emissions of 2.768% and an increase in VOC emissions of 11.945% when comparing the 2010 VET program to the 2005 VET program in



Northeast Illinois. IDEM maintains all emissions, meteorological and output files and these files can be made available upon request.

## Results

Table 6 shows the modeling results of the NO<sub>x</sub> and VOC emission changes from the Northeast Illinois VET program on the Zion, Illinois and the Northwest Indiana ozone monitors. The difference between the two results is the ozone impact (in ppm) on each ozone monitor. The calculated RRF are also listed for each monitor.

**Table 6 – Results of Northeast Illinois VET Runs for Zion, Illinois and Northwest Indiana Ozone Monitors (3% NO<sub>x</sub>, 12% VOC)**

Monitor ID	County	Site	Relative Response Factor	2003-2007 Modeled Design Value (ppm)	2003-2007 Modeled Chicago VET Design Value (ppm)	2003-2007 Modeled Difference/ ozone impact (ppm)
170971007	Lake	Zion, IL	0.997	0.0780	0.0778	0.0002
180890022	Lake	Gary	1.0	0.0777	0.0777	0.0000
180890030	Lake	Whiting	0.999	0.0793	0.0793	0.0000
180892008	Lake	Hammond	0.999	0.0777	0.0776	0.0001
181270024	Porter	Ogden Dunes	1.002	0.0783	0.0785	+0.0002
181270026	Porter	Valparaiso	1.0	0.0753	0.0753	0.0000

Table 7 shows the modeling results of the 35% NO<sub>x</sub> and VOC emission reductions from the Northeast Illinois VET program on the Zion, Illinois and the Northwest Indiana ozone monitors. The difference between the two results is the ozone impact of the VET program change on each ozone monitor. The ozone impact at the Zion, Illinois ozone monitor was modeled to be 0.0027 ppm.

**Table 7 – Results of Northeast Illinois VET Runs for Zion, Illinois and Northwest Indiana Ozone Monitors (35% NO<sub>x</sub>, 35% VOC)**

Monitor ID	County	Site	Relative Response Factor	2003-2007 Modeled Design Value (ppm)	2003-2007 Modeled VET Design Value (ppm)	2003-2007 Modeled Difference (ppm)
170971007	Lake	Zion, IL	0.966	0.0780	0.0753	0.0027
180890022	Lake	Gary	1.021	0.0777	0.0793	+0.0016
180890030	Lake	Whiting	1.002	0.0793	0.0795	+0.0002
180892008	Lake	Hammond	1.002	0.0777	0.0778	+0.0001
181270024	Porter	Ogden Dunes	1.047	0.0783	0.0820	+0.0037
181270026	Porter	Valparaiso	1.013	0.0753	0.0763	+0.001

## **Summary**

Photochemical analyses were conducted to determine the ozone impact from reductions in the mobile NO<sub>x</sub> and VOC emissions from the seven-county area included in the Northeast Illinois VET program. Illinois revised its Northeast Illinois VET program by exempting 1995 and older model vehicles from the Northeast Illinois VET program starting in 2007. The first modeling analysis looked at the ozone impacts resulting from this relaxation of the previously approved VET program and were quantified using MOBILE6.2 to determine a general estimate of lost reduction of NO<sub>x</sub> and VOC emissions from local mobile sources. A second modeling analysis looked at the ozone impacts directly related to the 2007 relaxation of the Northeast Illinois VET program with mobile NO<sub>x</sub> and VOC emissions reduced by 35%.

Reducing NO<sub>x</sub> and VOC emissions from the seven-county Northeast Illinois VET program area and IDEM's first photochemical analysis showed a change in modeled ozone concentrations at the Zion, Illinois ozone monitor of 0.0002 ppm. A 0.0002 ppm increase in ozone concentrations was modeled at the Ogden Dunes, Porter County, Indiana monitor, indicating possible NO<sub>x</sub> disbenefit associated with the Illinois VET program changes. These modeled results, from the Northeast Illinois VET program exemption of older vehicles being tested, results in more NO<sub>x</sub> and VOC emissions in the Lake Michigan airshed, and shows ozone impacts on the Zion, Illinois ozone monitor.

The second photochemical analysis studied the ozone impact at the Zion, Illinois monitor, based on a conservative 35% reduction in the mobile NO<sub>x</sub> and VOC emissions resulting from the Northeast Illinois VET program area. This analysis showed a change in modeled ozone concentrations at the Zion, Illinois ozone monitor of 0.0027 ppm (2.7 ppb). These modeled results, further demonstrate that lost NO<sub>x</sub> and VOC emission reductions due to the relaxation of the Northeast Illinois VET program produced an increase in emissions to the Lake Michigan airshed and have a direct connection to the elevated ozone concentrations at the Zion, Illinois ozone monitor. If the modeled difference is applied to the current design value for the Zion site, the value would be 73.6 ppb, which would be in compliance with the standard.

## **V. Jurisdictional Considerations**

### **Jurisdictional Coverage of the Air Quality Problem**

Indiana has demonstrated herein that the monitored violation within Northeast Illinois is an isolated incident and does not represent a regional air quality problem warranting a widespread nonattainment boundary. Additionally, Indiana has demonstrated that the isolated violation of the standard within Northeast Illinois is likely the result of excess emissions deriving from the state of Illinois, and that these excess emissions derive from the relaxation of its vehicle emissions testing program.

Both the measured air quality problem and the remedy to solve it reside within the jurisdiction of the state of Illinois. Therefore, the nonattainment boundary should be limited to the jurisdiction where the authority resides to remedy the problem. In this case, the boundary should be limited to counties and townships within Northeast Illinois, and exclude any portion of Indiana.

### **Consistency With Existing Jurisdictional Boundaries**

Jasper County is not within the jurisdiction of a Metropolitan Planning Organization (MPO) and has not been subject to transportation conformity for any criteria pollutant to date. Excluding Jasper County from the nonattainment area poses no inconsistencies with existing jurisdictional boundaries.

Lake and Porter counties fall under the jurisdiction of the Northwestern Indiana Regional Planning Commission, the MPO for Lake, LaPorte, and Porter counties, Indiana. The Illinois portion of the proposed nonattainment area falls under the jurisdiction of two MPOs, neither of which has jurisdiction for any portion of Indiana.

Lake and Porter counties are within the current maintenance area boundaries for the 1997 8-hour ozone standard. However, transportation conformity and SIP planning for Lake and Porter counties are conducted independently due to limitations of jurisdictional authority. Excluding Lake and Porter counties does not present any challenge with regard to coordination of transportation conformity or SIP development activities.

## **VI. Designation Consistency Evaluation**

### **Nationally Recommended Designation Inconsistencies**

IDEM continues to maintain that nonattainment designations should be nationally consistent and based on sound science and real-world air quality drivers. IDEM has studied U.S. EPA's proposed designations across the nation. As a result of this study, it is clear that Northwest Indiana is being treated disparately in comparison to similar areas across the country. In addition to the fact that all air quality monitors in Indiana currently measure attainment of the 2008 8-hour ozone NAAQS, IDEM also offers the following five examples of U.S. EPA inconsistencies associated with proposed designation boundaries:

1. Pickaway County, Ohio
2. Point Coupee Parish, Louisiana
3. Roane County, Tennessee
4. Berks County, Pennsylvania
5. Lancaster County, Pennsylvania

IDEM believes that, if U.S. EPA applied uniformly – in general terms and rigor of analysis – the factors it purports to have considered in proposing the revised Chicago nonattainment area, no Indiana counties would have been included in the revised designation.

### **Pickaway County, Ohio**

Pickaway County, Ohio is part of the Columbus-Marion-Chillicothe 2009 Combined Statistical Area (CSA) boundary. U.S. EPA Region 5 proposed designating six of the twelve counties in the area as nonattainment under the 2008 8-hour ozone NAAQS. Five of these six counties have at least one ozone monitor. Only one county in this region of Ohio is currently above the standard (Franklin County) based on quality-assured monitoring data for the years 2008 through 2010. Pickaway County, Ohio borders Franklin County, Ohio and two other counties that U.S. EPA Region 5 is proposing to designate nonattainment. Columbus, Ohio is located in Franklin County, and population data show that approximately half of the 2010 population and 2000-2010 growth in the area occurred in this county. Based on 2030 projections, the populations in a number of counties in the area are expected to increase significantly (including Franklin, Pickaway, and Ross counties). However, U.S. EPA Region 5 proposed designating Pickaway County, Ohio as unclassifiable/attainment under the 2008 8-hour ozone NAAQS.

The proposed unclassifiable/attainment designation of Pickaway County, Ohio shows clear inconsistencies within the U.S. EPA Region 5 process. U.S. EPA Region 5 notes that population is “projected to increase significantly” in Pickaway County, Ohio, unlike Jasper, Lake, and Porter counties in Northwest Indiana. Pickaway County, Ohio is adjacent to Franklin County, Ohio and even with this “significant” population increase projection, U.S. EPA Region 5 recommended a designation of unclassifiable/attainment under the 2008 8-hour ozone NAAQS. In addition, Ross County, Ohio’s population is “projected to increase significantly” as well. Not only is the population in Ross County projected to increase dramatically, but Ross County, Ohio, like Jasper County, Indiana, has a coal-fired power plant located within its borders. However, unlike Jasper County, Indiana, Ross County, Ohio was proposed unclassifiable/attainment under the 2008 8-hour ozone NAAQS. U.S. EPA seems to lack consistency applying designation criteria, and the weighting does not appear to be based on actual or potential air quality impact.

U.S. EPA Region 5 also notes that “wind direction percentage data do little to shed light on which counties in the Columbus-Marion-Chillicothe, Ohio CSA are the most important from an ozone and ozone precursor transport standpoint.” In addition, U.S. EPA Region 5 chose to use a three-year old analysis provided by the States of Illinois and Wisconsin as the basis for determining Indiana’s effect on the monitored violation at the Zion, Illinois monitor. IDEM strongly believes designation recommendations should be based on current, area specific

meteorological data and analysis, as opposed to using incomplete and/or out-of-date information to isolate the most critical ozone precursor source areas. Furthermore, if the necessary information is reasonably available, U.S. EPA should not justify its policy position on information not being “readily available.”

IDEM strongly believes that national consistency based on sound science should be a priority for U.S. EPA. Considering the similarities between the Ohio and Indiana areas mentioned, IDEM would expect similar consideration for Northwest Indiana. Modeling and emissions data provided within this document demonstrate that Jasper, Lake, and Porter counties (as a part of the Chicago, Illinois area) are very similar to Pickaway County (as a part of the Columbus, Ohio area). IDEM believes that these two areas should be treated consistently. In addition, Ross County, Ohio mirrors the impact of Jasper County, Indiana as both contain coal-fired power plants. With consistent analysis and consideration, IDEM encourages U.S. EPA Region 5 to revise the recommendations for the Northwest Indiana counties of Lake and Porter to attainment under the 2008 8-hour ozone NAAQS based on the information contained within this document. Furthermore, Jasper County, Indiana, should be treated consistently with other areas across the country, and especially within the same U.S. EPA Region 5 area, and designated as unclassifiable/attainment under the 2008 8-hour ozone NAAQS.

### **Point Coupee Parish, Louisiana**

Point Coupee Parish is part of the Baton Rouge-Pierre Part 2009 Consolidated Metropolitan Statistical Area (CMSA) boundary. U.S. EPA Region 6 proposed designating five of the ten parishes in this area as nonattainment for the 2008 8-hour ozone NAAQS. Six of the ten parishes have at least one ozone monitor. Point Coupee is the only parish with an ozone monitor that U.S. EPA is not proposing to designate nonattainment under the 2008 ozone NAAQS. However, two of the parishes U.S. EPA is proposing to designate nonattainment have 2008 through 2010 three-year design values lower than Point Coupee (Iberville, 0.071 ppm; and West Baton Rouge, 0.073 ppm).

The U.S. EPA Region 6 Point Coupee proposed designations are a good example of how Northwest Indiana should have been treated regarding the 8-hour ozone designation process. First and foremost, U.S. EPA Region 6 conducted its own meteorology and back trajectory analysis to support their recommendations. Through their analysis, it was determined that although Point Coupee Parish has a coal-fired power plant located within its borders—similar to Jasper County in Northwest Indiana—it was not scientifically valid to designate the parish nonattainment. U.S. EPA Region 6 based the designations of the parishes on recent information and sound science, as opposed to using default CMSA boundaries, outdated and non-localized meteorological analysis conducted by a third party, and no cause and contribution evaluation.

In lieu of U.S. EPA Region 5 conducting this analysis to support their proposed designations, IDEM has recently completed the necessary analysis and is providing this detailed information as part of this technical support document. IDEM believes that if U.S. EPA Region 5 had conducted a similar analysis they would have been able to use the same sound science to propose a designation of attainment for Lake and Porter counties and a designation of unclassifiable/attainment for Jasper County in Northwest Indiana under the 2008 8-hour standard.

### **Roane County, Tennessee**

Although Roane County, Tennessee is not part of a multi-state nonattainment area, it is part of the Knoxville-Sevierville-La Follette 2009 CSA boundary. U.S. EPA Region 4 proposed to designate five full counties and one partial county in the area as nonattainment. All of the full counties have monitors located within them, while the partial county does not. Three of these counties are currently above the standard (Blount, Knox, and Sevier counties) based on quality assured ambient air quality monitoring data for the years 2008 through 2010. U.S. EPA Region 4 is proposing to designate Roane County, Tennessee, as unclassifiable/attainment even though the county borders three other counties that it is proposing to designate nonattainment of the 8-hour ozone NAAQS.

Just as Northwest Indiana is included in the Chicago CSA, Roane County, Tennessee is included in the Knoxville CSA. Roane County, Tennessee has a notably greater portion of the CSA's VMT (5.8% versus 1.0%) and population (5.1% versus 1.0%) when compared to Jasper County, Indiana. Similar to Jasper County, Indiana, Roane County, Tennessee has a coal-fired power plant. Dissimilarly, Roane County, Tennessee was proposed as unclassifiable/attainment under the 2008 8-hour ozone NAAQS by U.S. EPA Region 4.

IDEM would appreciate consistent consideration and weight assigned to designation criteria for Northwest Indiana. Lake and Porter counties continue to have air quality monitors that measure attainment of the 8-hour ozone NAAQS. Although Jasper County, Indiana, is very similar to Roane County, Tennessee, from the standpoint of CSA inclusion, based on VMT and population alone, it is clear that Roane County, Tennessee, has a notably greater chance to contribute to air quality issues. However, U.S. EPA Region 4 chose not to include Roane County, Tennessee, in the Knoxville nonattainment area solely based on default CSA boundaries. IDEM recommends that U.S. EPA Region 5 provide the same consideration to Northwest Indiana, particularly Jasper County.

### **Berks County, Pennsylvania**

Berks County, Pennsylvania, is a single-county MSA based on economic, political, and commuting patterns. After a very thorough analysis, U.S. EPA

Region 3 proposed to designate Berks County, Pennsylvania, which contains the City of Reading, as a single-county nonattainment area, consistent with the 1997 ozone designations for the Reading area. Berks County, Pennsylvania, has at least one ozone monitor located within its borders currently above the standard based on quality-assured monitoring data for the years 2008 through 2010 (0.079 ppm). U.S. EPA Region 3 also assessed two bordering counties (Lebanon and Schuylkill) in its technical analysis of the area. Lebanon and Schuylkill counties do not have ozone monitors located within their borders, but clearly contribute to ozone concentrations in the Reading area.

U.S. EPA Region 5's recommendations for Northwest Indiana in the letter of January 31, 2012, to Governor Daniels states that Jasper, Lake, and Porter counties in Indiana were proposed to be designated nonattainment based on "high emissions in these counties that contribute to high ozone concentrations at the Zion monitor." U.S. EPA Region 5 provided limited technical support for this assessment. However, emissions data included in this document demonstrate that the proportion of Indiana emissions are notably less than those of Lebanon and Schuylkill counties similarly located adjacent to Berks County, Pennsylvania. Specifically, Indiana has contributed approximately 25% of the NO<sub>x</sub> and 12% of the VOC emissions in the recommended nonattainment area. When compared to the combined contributions of Lebanon and Schuylkill counties adjacent to Berks County, Pennsylvania of approximately 41% of the NO<sub>x</sub> and 42% of the VOC emissions, it is clear that Northwest Indiana is not being designated for the 8-hour ozone NAAQS consistently with similar areas across the nation and that large discrepancies existing between the Regions in the depth and rigor of analyses conducted for proposing designations.

## **Lancaster County, Pennsylvania**

Lancaster County, Pennsylvania, is a single-county MSA based on economic, political, and commuting patterns. U.S. EPA Region 3 proposed to designate Lancaster County, Pennsylvania, as nonattainment under the 2008 8-hour ozone NAAQS. Lancaster County, Pennsylvania, has at least one ozone monitor located within its borders currently above the 8-hour ozone NAAQS based on quality assured ambient air quality monitoring data for the years 2008 through 2010 (0.077 ppm). U.S. EPA Region 3 also assessed three bordering counties (Dauphin, Lebanon, and York) in its very detailed technical analysis of the area. Dauphin and York counties have at least one monitor located within their borders which currently have 2008 through 2010 three-year design values below the standard (0.073 ppm and 0.072 ppm, respectively).

Similar to Berks County, Pennsylvania, the Lancaster County, Pennsylvania example fits nicely with Northwest Indiana based on U.S. EPA Region 5's use of mass emission contributions to the area and the potential effect on the Zion, Illinois monitor. Even though York County, Pennsylvania is



not part of the single-county Lancaster County MSA, the county's NO<sub>x</sub> emissions are approximately twice those of Lancaster County, the VOC emissions are the second highest in the area and York County has the highest population growth over the past decade. Northwest Indiana, in contrast, contributes significantly lower mass NO<sub>x</sub> and VOC emissions to the nonattainment area and is growing at a substantially lower rate. Unlike U.S. EPA Region 6, U.S. EPA Region 5 did not perform or supply a detailed analysis of speciated emissions and the overall potential to impact air quality on a particular area or monitor. To address this deficiency, IDEM has performed a detailed analysis of area-specific emissions, meteorology, and the resulting culpability. The results of this analysis are included in this document.

## **Summary**

IDEM agrees that using mass emissions for the purpose of determining a county's contribution to high ozone concentrations can be helpful, though inconclusive independently. Without quality emission analyses and modeling, mass emissions should not be the primary means of designating areas under the 2008 8-hour ozone NAAQS. In addition to the real-world support of air quality monitors that measure attainment under the 2008 8-hour ozone NAAQS, such as those in Lake and Porter counties, scientifically sound modeling, emissions, and meteorological analysis such as that included in this document should be used for to justify a designation of attainment for Lake and Porter counties along with unclassifiable/attainment for Jasper County in Northwest Indiana.

Nonattainment designations should be conducted on a nationally consistent basis using sound science and real-world air quality drivers weighted and applied fairly. As outlined above, Jasper, Lake, and Porter counties in Northwest Indiana share many characteristics with other areas across the nation, but U.S. EPA is proposing to handle them differently. It is clear that U.S. EPA's expedited implementation of the 2008 8-hour ozone NAAQS is leading to problematic and disparate inconsistencies. The manner in which the CAA is applied when proposing and finalizing designations simply must be fair and consistent. Using only these five examples, IDEM continues to believe that Northwest Indiana counties are not being treated fairly in comparison to similar areas across the nation.

The treatment of Jasper, Lake, and Porter counties in Northwest Indiana related to last-minute non-air quality-related decisions by a neighboring state are another example of unjust inconsistencies. Using the Zion, Illinois monitor as an example, because a state certifies its data early with the sole interest in preserving its Federal Highway Administration CMAQ funding, careful, and consistent consideration is imperative. No other geographic area of the country has been put in the situation of being proposed attainment in one month (December, 2011) to nonattainment the next (January, 2012) due to a neighboring state's action to preserve CMAQ funding, as opposed to focusing on air quality and maintaining compliance with its own SIP. Not to mention that this action was based on only 1 of 22 monitors being 0.0004 ppm above

the standard. This is a unique circumstance and quite different than was the case with the 1-hour and 1997 8-hour ozone NAAQS. If no precedent exists, U.S. EPA should proceed with designations in a consistent and conservative manner and not rush towards inclusion of non-culpable counties without clear scientific evidence to support its decision.

If emission contributions and potential impacts on upwind monitors are going to be considered when making 8-hour ozone NAAQS designations, IDEM encourages U.S. EPA Region 5 to perform detailed scientific analysis of all applicable data. As opposed to waiting for U.S. EPA Region 5 to complete or provide this detailed analysis, IDEM has worked within the less than 120-day response period to provide the necessary support for appropriate designations in Northwest Indiana. Based on current air quality data in Lake and Porter counties, in addition to the modeling and emissions data provided below, IDEM continues to support a recommendation of attainment for Lake and Porter counties and unclassifiable/attainment for Jasper County under the 2008 8-hour ozone NAAQS in Northwest Indiana.

### **Inconsistent Designations of “Power Plant” Counties**

At a minimum, U.S. EPA should consider the size of any facility or power plant and its emission control effectiveness for a county that U.S. EPA feels may be contributing to a downwind monitor violation. For example, Jasper County, Indiana’s emissions base is overwhelmingly dominated by a single source in the county. The only significant source of NO<sub>x</sub> and VOC emissions in Jasper County, Indiana is the NIPSCO - Schahfer Generating Station. NIPSCO - Schahfer has had controls for NO<sub>x</sub> installed since 2008. In 2008, Jasper County, Indiana stationary sources emitted NO<sub>x</sub> emissions totaling 19,788 tons, NIPSCO - Schahfer accounted for 17,324 tons of this total, approximately 88%. However, in 2011, NIPSCO - Schahfer emitted 7,327 tons of NO<sub>x</sub>, approximately a 10,000 ton reduction.

In addition to consideration of facility size and emission controls, IDEM encourages U.S. EPA to be consistent when making designations involving areas containing coal-fired power plants. The Technical Support Document sent to Louisiana with the December 9, 2011, U.S. EPA response letter, “LOUISIANA, Area Designations for the 2008 Ozone National Ambient Air Quality Standards,” states “In our analysis of the emissions data for the area, we took note that the NO<sub>x</sub> emissions from Pointe Coupee are primarily from a single point source that is already well-controlled and may undergo further emissions reductions resulting from implementation of regional air quality measures such as CSAPR.” That single point source is the Big Cajun 2 plant. In the Clean Air Markets Division database, the three units at Big Cajun 2 are listed as having low NO<sub>x</sub> Burners with overfire air (LNB/OFA) combustion controls, but no post-combustion controls such as selective catalytic reduction (SCR) or selective non-catalytic reduction (SNCR).

If combustion controls at Big Cajun 2 are described as “already well controlled,” then NIPSCO - Schahfer with the same controls plus advanced SCR and SNCR controlled units, should also be described as “already well controlled.” Furthermore, with roughly the same power output, NIPSCO - Schahfer already has lower ozone season NO<sub>x</sub> emissions than Big Cajun 2, and these emission levels will likely continue to be the same or lower into the future.

NIPSCO has entered into a consent decree (CD) with U.S. EPA for the NIPSCO – Schahfer facility and their two other facilities in Northern Indiana. The CD requirements are intended to achieve greater efficiency from the present SCR system on Unit 14 and installation of a SNCR on Unit 15. Units 17 and 18 at NIPSCO - Schahfer will continue to operate with LNB/OFA combustion controls. Furthermore, there is an overall cap on total emissions from the three NIPSCO generating stations in Northern Indiana, which tightens each year through 2016, providing incentive to operate controls at maximum efficiency. Therefore, it is likely that emission levels at NIPSCO - Schahfer will remain near or below current levels into the future. The reductions from a facility like NIPSCO - Schahfer will help improve air quality in and around Northwest Indiana.

Table 8 compares actual 2011 emissions, CSAPR allocations, and 2014 emissions based upon the CD from NIPSCO - Schahfer, in Jasper County, Indiana. Projections for 2014 are based upon 2011 operating levels. Table 9 compares Big Cajun 2, in Point Coupee Parish, Louisiana, actual emissions in 2011 and CSAPR allocations. NO<sub>x</sub> emissions in Jasper County, Indiana and Point Coupee Parish, Louisiana are each overwhelmingly dominated by a single coal-fired power plant located in the county and parish, respectively. Both power plants generate approximately 1.9 gigawatt electrical (GWe).

**Table 8 –NIPSCO – Schahfer Ozone Season Emissions**

		<b>2011 Emissions</b>	<b>CSAPR Allocations</b>	<b>Consent Decree Limit</b>	<b>Projected 2014 Emissions</b>
<b>Unit</b>	<b>NO<sub>x</sub> Rate</b>	<b>NO<sub>x</sub> Tons</b>	<b>NO<sub>x</sub> Tons</b>	<b>NO<sub>x</sub> Rate</b>	<b>NO<sub>x</sub> Tons</b>
14	0.11	715	1,159	0.1	650
15	0.15	1,124	1,148	0.15	1124
17	0.18	832	1,002	0.2	924
18	0.19	934	1,004	0.2	983
<b>Total</b>		<b>3,605</b>	<b>4,313</b>		<b>3,682</b>

**Table 9 – Big Cajun 2 Ozone Season Emissions**

Unit	2011		CSAPR
	NO <sub>x</sub> Rate	Emissions NO <sub>x</sub> Tons	Allocations NO <sub>x</sub> Tons
2B1	0.2	1,688	1,328
2B2	0.2	1,983	1,307
2B3	0.15	1,431	1,299
<b>Total</b>		<b>5,102</b>	<b>3,934</b>

NIPSCO - Schahfer is below the CSAPR ozone season allocation level for NO<sub>x</sub>. If CSAPR becomes effective, Big Cajun 2 would need 1,168 tons of reductions to meet those levels of allocations, if operated at 2011 levels. This is further evidence that NIPSCO-Schahfer should be described as “already well controlled.” A factor that IDEM believes would support excluding Jasper County from the proposed nonattainment area.

It is unlikely that NO<sub>x</sub> or VOC emissions from Jasper County, Indiana, most specifically NIPSCO – Schahfer, have a significant impact on ozone values elsewhere in the Chicago nonattainment area. According to the Clean Air Markets Division, NIPSCO - Schahfer emitted 17,323.6 tons of NO<sub>x</sub> in 2008, which is only 4% of the total NO<sub>x</sub> emissions within the entire Chicago nonattainment area. However, as mentioned earlier, NIPSCO - Schahfer has substantially decreased NO<sub>x</sub> emissions by installing permanent combustion controls and annual NO<sub>x</sub> emissions from this facility have been reduced by over 10,000 tons. Once these reductions are applied to the inventory data, NIPSCO - Schahfer accounts for only 7,327 (2%) of the total annual NO<sub>x</sub> emissions, and Jasper County, Indiana would account for only 9,791 (2.7%) of the total NO<sub>x</sub> emissions within the Chicago nonattainment area.

U.S. EPA Region 6 excluded Point Coupee Parish, Louisiana from the nonattainment area because their analysis indicated that there was minimal impact on high ozone concentrations at the violating monitor (i.e. East Baton Rouge) and emissions from the parish were primarily from a single, well controlled stationary source. Since the same is clearly true of Jasper County, Indiana, where emissions from the NIPSCO – Schahfer Generating Station are actually better controlled than in Point Coupee, IDEM requests consistent treatment resulting in a designation of unclassifiable/attainment for Jasper County, Indiana under the 2008 8-hour ozone NAAQS.

Lastly, U.S. EPA has improperly evaluated Jasper, Lake, and Porter county emissions by comparing them to each other as opposed to all jurisdictions within the CSA, including the counties or portions of counties that U.S. EPA excluded from its proposal. Once conducted properly, it is clear that U.S. EPA cannot substantiate its conclusions. Also, with Jasper County and the primary emissions source being so far southeast of the urban area and Lake Michigan, the true impacts from emissions deriving from Jasper County are outside the proposed nonattainment area entirely. This is demonstrated through back trajectory analysis, and modeling conducted by IDEM and U.S. EPA. This again demonstrates why it is inappropriate to place weight on mass emissions as opposed to evaluate cause and contribution from a true scientific perspective.

## **Conclusion**

IDEM's independent emissions, modeling, and meteorological analyses support the conclusion that that no Indiana counties should be included in the Chicago nonattainment area. Taken as a whole, the information presented in this document indicates that these counties do not contribute to the elevated concentrations that resulted in the violation at the Zion, Illinois, monitor in 2011. IDEM is concerned that U.S. EPA is proceeding with implementation of the 2008 8-hour ozone NAAQS in an unjustified and inconsistent manner based on the presumption that designated areas be based on default statistical area boundaries.

Indiana does not believe there would have been a violation at the Zion site at the close of 2011 if the State of Illinois was administering its VET program in compliance with its SIP, and thus properly fulfilling its obligations under the CAA. Indiana's analysis indicates that the large volume of ozone precursor emissions from Illinois—not Indiana—combined with Lake Michigan's unique effect on ozone formation and movement back onto land, has the greatest impact on measured high ozone levels in Illinois. Along with this compelling data, IDEM believes that the remaining factors and a need for consistent designations nationwide also support a conclusion that the monitored nonattainment is best remedied by the State of Illinois, without the inclusion of any Indiana counties in the nonattainment area.

Current quality-assured monitoring data indicates that air quality throughout the State of Indiana continues to meet the 2008 8-hour ozone NAAQS. Indiana continues to be in full compliance with its approved SIP, and the emission control measures in place within Northwest Indiana are some of the most stringent SIP-based controls in the nation. The wrongful inclusion of Jasper, Lake, and Porter counties will not result in any additional controls or advance attainment of the standard for Illinois' portion of the Chicago nonattainment area.

Based on the information contained within this technical support document, IDEM encourages U.S. EPA to reconsider the proposed designations for Jasper, Lake, and Porter counties. To be consistent with designations across the nation, IDEM

recommends U.S. EPA propose to designate Lake and Porter counties as attainment and Jasper County as unclassifiable/attainment under the 2008 8-hour ozone NAAQS.

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## Appendix A

### 1990 through 2010 Northwest Indiana Growth Rates and Patterns

	Population 1990	Population 2000	Percent Change from 1990 to 2000	Population 2010	Percent Change from 2000 to 2010	Population Estimate 2015	Percent Change from 2000 to 2015	Population Estimate 2020	Percent Change from 2000 to 2020
<b>Jasper County</b>	24,960	30,043	20.36%	33,478	11.43%	34,456	14.69%	35,206	17.19%
<b>Lake County</b>	475,594	484,564	1.89%	496,005	2.36%	496,191	2.40%	503,203	3.85%
<b>Porter County</b>	128,932	146,798	13.86%	164,343	11.95%	171,122	16.57%	175,175	19.33%

Jasper, Lake, and Porter counties have not grown very rapidly over the past decade, nor are they expected to in the future. There are no expectations for regional growth that would adversely affect air quality.

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## Appendix B

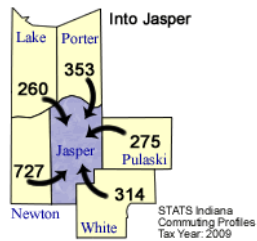
### 2009 Northwest Indiana Commuting Patterns

	Total Workforce: Number of Persons Who Live in County and Work	Number of Persons Who Live and Work in County	Number of Persons Who Live in County and Work in Another County	Percent in County	Percent out of County
<b>Jasper County</b>	21,473	16,107	5,366	75.01%	24.99%
<b>Lake County</b>	296,657	244,291	52,366	82.35%	17.65%
<b>Porter County</b>	106,390	76,079	30,311	71.51%	28.49%

Top five counties sending workers  
INTO Jasper County:

County Sending Workers	Workers
Newton County	727
Porter County	353
White County	314
Pulaski County	275
Lake County	260
<b>Total of above</b>	<b>1,929</b>

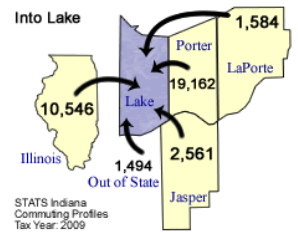
(10.2% of Jasper County workforce)



Top five counties sending workers  
INTO Lake County:

County Sending Workers	Workers
Porter County	19,162
Illinois	10,546
Jasper County	2,561
LaPorte County	1,584
Out of State	1,494
<b>Total of above</b>	<b>35,347</b>

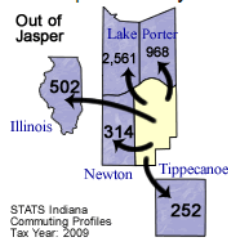
(12.5% of Lake County workforce)



Top 5 counties receiving workers FROM Jasper County:

County Receiving Workers	Workers
Lake County	2,561
Porter County	968
Illinois	502
Newton County	314
Tippecanoe County	252
<b>Total of above</b>	<b>4,597</b>

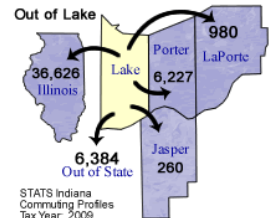
(21.4% of Jasper County labor force)



Top 5 counties receiving workers FROM Lake County:

County Receiving Workers	Workers
Illinois	36,626
Out of State	6,384
Porter County	6,227
LaPorte County	980
Jasper County	260
<b>Total of above</b>	<b>50,477</b>

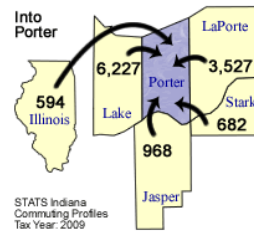
(17.0% of Lake County labor force)



Top five counties sending workers  
INTO Porter County:

County Sending Workers	Workers
Lake County	6,227
LaPorte County	3,527
Jasper County	968
Starke County	682
Illinois	594
Total of above	11,998

(13.4% of Porter County workforce)

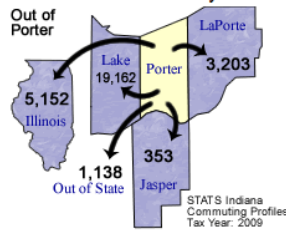


STATS Indiana  
Commuting Profiles  
Tax Year: 2009

Top 5 counties receiving workers FROM Porter County:

County Receiving Workers	Workers
Lake County	19,162
Illinois	5,152
LaPorte County	3,203
Out of State	1,138
Jasper County	353
Total of above	29,008

(27.3% of Porter County labor force)



STATS Indiana  
Commuting Profiles  
Tax Year: 2009

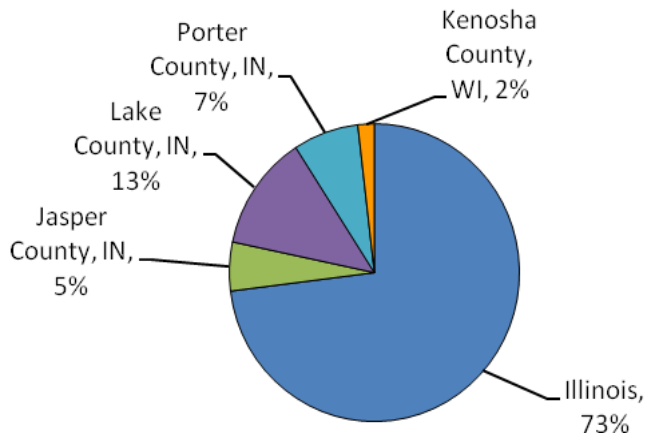
Within Northwest Indiana, Lake County maintains the highest concentration (82.3%) of employment by residents of the county, compared to the other counties within the area. Jasper and Porter counties also maintain high concentrations of employment of their residents (75% and 71.5%, respectively). The majority of the traffic congestion occurs in Lake County. A significant level of commuting occurs from the surrounding counties to Lake and Porter counties. In fact, Lake and Porter counties have the largest level of commuting to and from each other in Northwest Indiana.

## Appendix C

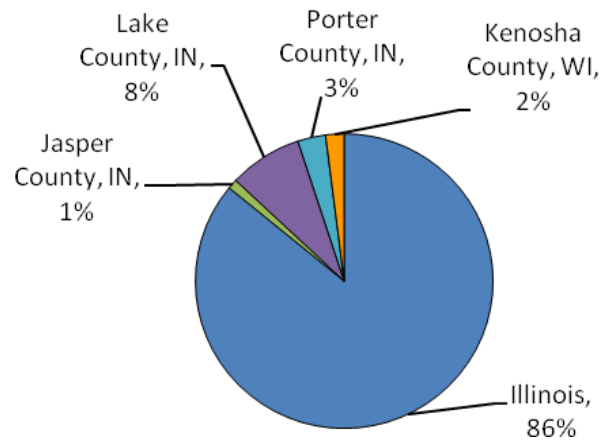
### 2008 Nonattainment Area Emissions Inventory

Chicago Proposed Nonattainment Area Emissions Summary 2008 Total NO <sub>x</sub> and VOC Emissions (Tons Per Year)				
County/State	NO <sub>x</sub>	Percent of Nonattainment Area	VOC	Percent of Nonattainment Area
Illinois	271,712.29	73%	229,333.51	86%
Jasper County, Indiana	19,787.78	5%	2,845.03	1%
Lake County, Indiana	46,808.29	13%	21,266.91	8%
Porter County, Indiana	27,054.63	7%	8,099.75	3%
Kenosha County, Wisconsin	6,788.19	2%	5,370.52	2%
<b>Total</b>	<b>372,151.18</b>		<b>266,915.72</b>	

**Chicago Proposed Nonattainment Area  
2008 NO<sub>x</sub> Total Emissions**

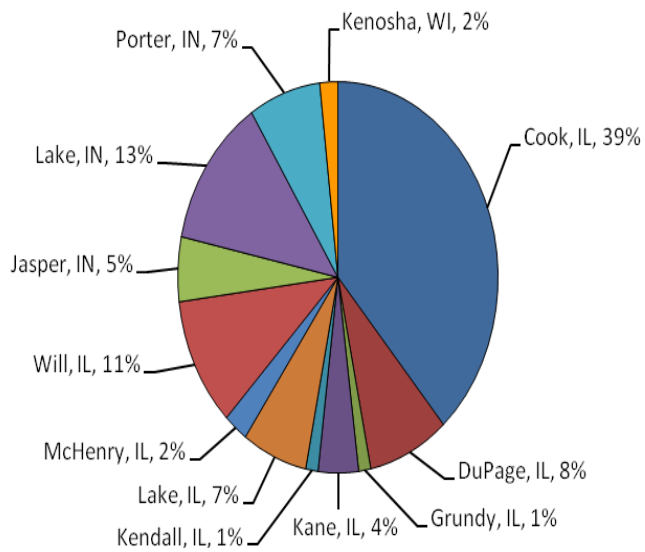


**Chicago Proposed Nonattainment Area  
2008 VOC Total Emissions**

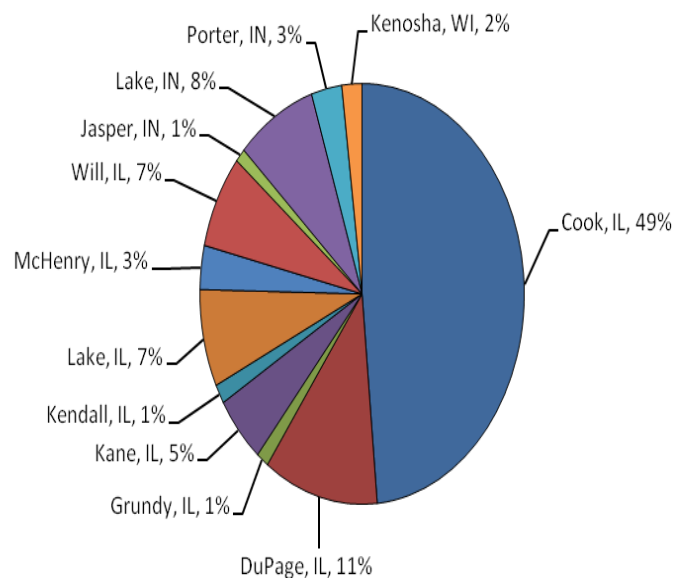


Chicago Proposed Nonattainment Area Emissions Summary 2008 Total NO <sub>x</sub> and VOC Emissions (Tons Per Year)				
County/State	NO <sub>x</sub>	Percent of Nonattainment Area	VOC	Percent of Nonattainment Area
Cook County, Illinois	143,374.18	39%	129,469.81	49%
DuPage County, Illinois	30,412.57	8%	30,508.73	11%
Grundy County, Illinois	4,567.62	1%	3,269.52	1%
Kane County, Illinois	15,161.39	4%	13,893.96	5%
Kendall County, Illinois	4,636.17	1%	3,956.70	1%
Lake County, Illinois	24,548.91	7%	19,978.44	7%
McHenry County, Illinois	9,138.08	2%	9,012.59	3%
Will County, Illinois	39,873.38	11%	19,243.76	7%
Jasper County, Indiana	19,787.78	5%	2,845.03	1%
Lake County, Indiana	46,808.29	13%	21,266.91	8%
Porter County, Indiana	27,054.63	7%	8,099.75	3%
Kenosha County, Wisconsin	6,788.19	2%	5,370.52	2%
<b>Total</b>	<b>372,151.18</b>		<b>266,915.72</b>	

**Chicago Proposed Nonattainment Area  
2008 NO<sub>x</sub> Total Emissions**



**Chicago Proposed Nonattainment Area  
2008 VOC Total Emissions**





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## Appendix D

### Emission Reductions for Lake and Porter Counties Vehicle Emissions Testing

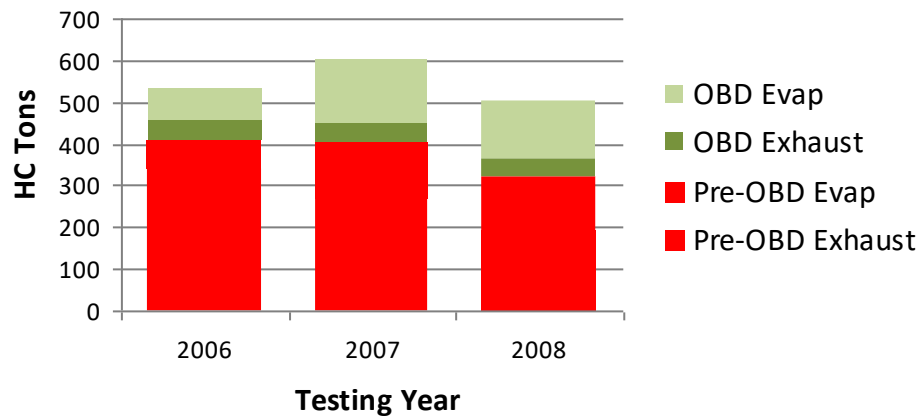
The Office of Air Quality was asked by agency management to evaluate the emission reduction benefits of the vehicle emissions and testing program in Lake and Porter counties, (referred to as the Clean Air Car Check program), to determine the reductions for pre-1996 model year vehicles. Specifically, the Office of Air Quality was tasked to compare the reduction benefits of testing pre-1996 model year vehicles (non-OBD) and 1996 model year and newer vehicles (OBD equipped). Due to limitations associated with the MOBILE emissions factor model, the Office of Air Quality's approach to this analysis was to quantify actual emission reductions to the extent possible. In order to accomplish this, the Office of Air Quality secured the technical assistance of our contractor for the program, Envirotest Systems Corporation, and its technical consultant, Dr. Peter McClintock.

This report is structured to first provide a summary of the analysis, and then provide a detailed explanation of how the analysis was conducted. A description of the key assumptions, limitations, and caveats associated with the analysis is also provided following the summary of results.

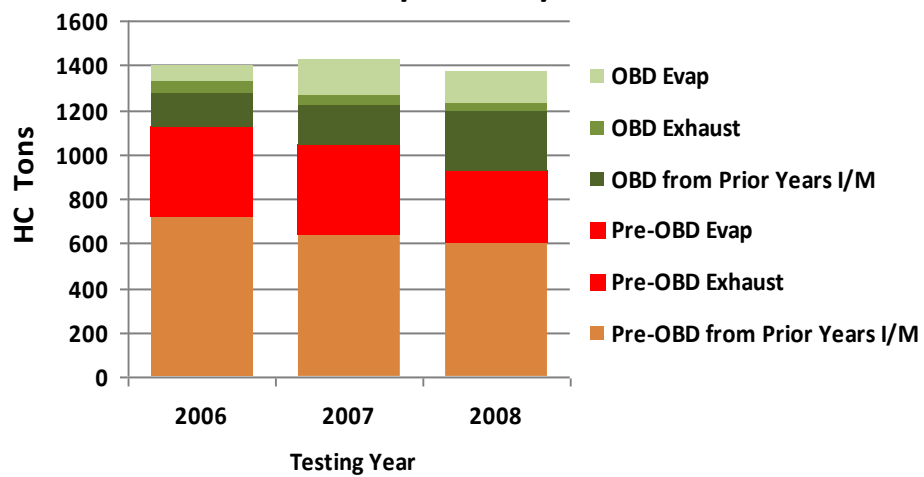
The following summarizes the results of the analysis:

Lake/Porter I/M Reductions	HC Tons			CO Tons			NO <sub>x</sub> Tons		
	2006	2007	2008	2006	2007	2008	2006	2007	2008
OBD Exhaust	48	46	44	662	669	655	40	40	41
OBD Evap	79	156	140	0	0	0	0	0	0
Pre-OBD Exhaust	341	267	191	3,626	2,510	1,990	186	269	196
Pre-OBD Evap	65	136	130	0	0	0	0	0	0
OBD from Prior Years I/M	152	181	265	794	943	1,000	48	57	60
Pre-OBD from Prior Years I/M	721	640	606	6,436	5,711	4,323	329	292	362
Total	1,406	1,425	1,376	11,518	9,833	7,967	603	659	659

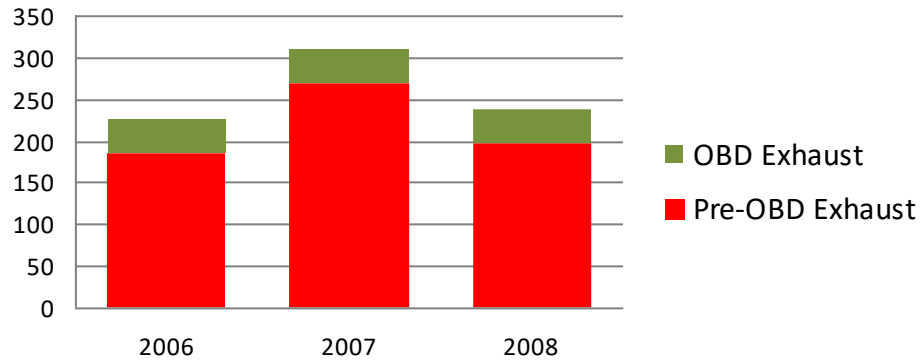
### Estimated Lake/Porter HC Reductions from Current Year I/M Testing



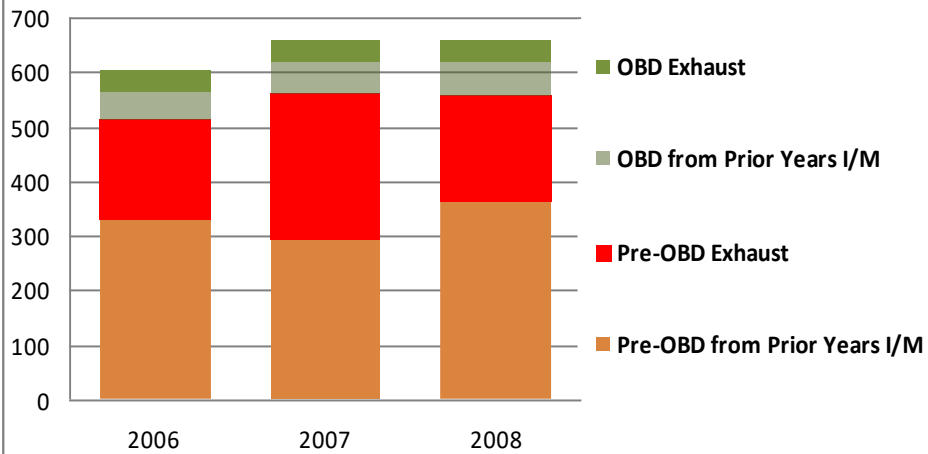
### Estimated Lake/Porter I/M HC Reductions

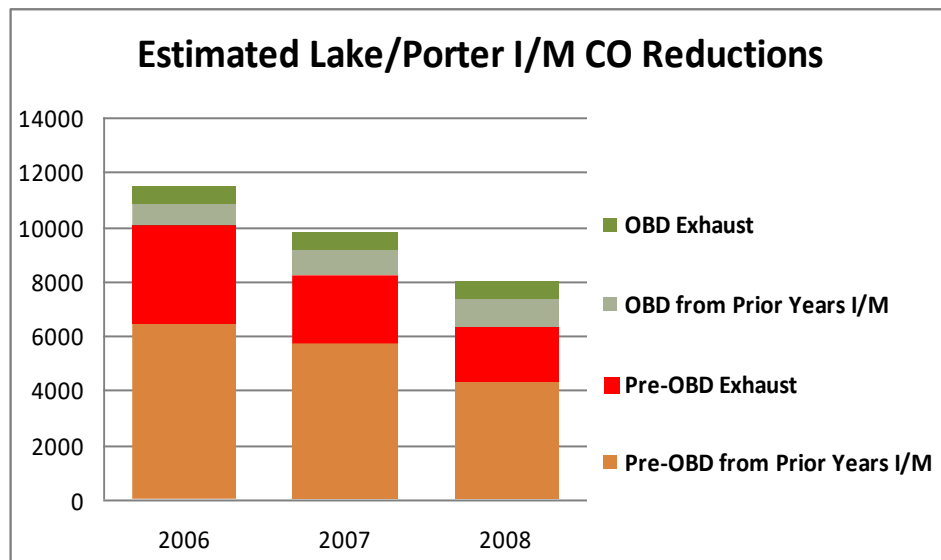
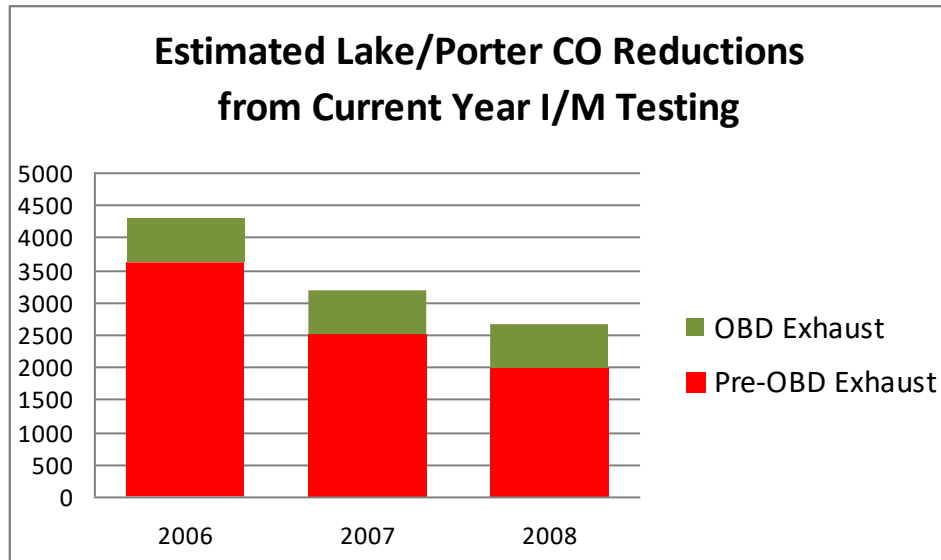


### Estimated Lake/Porter NOx Reductions from Current Year I/M Testing



### Estimated Lake/Porter I/M NOx Reductions





### Reduction Calculation and Methodology

The general approach to this analysis was to calculate emission reductions for the vehicle emissions testing program through the use of actual test data specific to the program in place within Lake and Porter counties. However, due to the fact that little tailpipe data is collected for 1996 and newer vehicles, and actual vehicle use data (vehicle miles traveled by vehicle type and age) is unknown, some key assumptions and data from other programs was necessary to complete this analysis. Nevertheless, the results based on real world data should be more representative than those produced from a standard MOBILE model-based estimation.

## Pre-1996 Vehicles:

Vehicle exhaust reductions for pre-1996 vehicles were calculated based on the difference between initial total failures and the final test (post repair) for the portion of the fleet that initially failed. This difference represents the actual reductions achieved through vehicle repairs made in conjunction with failed tailpipe testing (either IM 240 or BAR 90). In most cases, the final test represents a passing test, but in some cases, the needed repairs may be unresolved (most likely minimum expenditure waiver). The majority (80%) of unresolved vehicles are assumed to leave the jurisdiction following the unresolved test cycle and credit is taken for the removal of these vehicles from I/M area. MOBILE6 does not assume benefit for the removal or retirement of vehicles – the modeler would have to adjust the input registration fractions in I/M and no-I/M scenarios.

Owners of high emitting vehicles are often aware there is a problem in advance of the I/M inspection. This is obviously true in the case of OBD vehicles that have a malfunction indicator light specifically related to monitoring emissions controls. But many earlier models also had various malfunction indicators. Pre-inspection repairs of more than 50% were reported by Wenzel<sup>1</sup> and the percentages of measured exhaust emissions reductions within each OBD model year in Colorado were observed to be progressing at half the rate by age of the percentages of measured reductions within each pre-OBD model year<sup>2</sup>. For this assessment of emissions reductions in Indiana, for 1995 and older models, pre-inspection repairs were assumed to be an incremental 50% of the measured reductions described above. For 1996 and newer OBD models, pre-inspection repairs were assumed to be an incremental 100% of the measured exhaust reductions and 50% of the evaporative reductions. The lower percentage was used for evaporative emissions since most liquid leaks are not detected by OBD.

Since the test cycle is once every two years, and repairs made as a result of previous failures provide a residual benefit, reductions from previous year repairs have been accounted for. For vehicles repaired within the current test cycle (2007-2008), the assumed reduction benefit is 100%. For those repairs made in the year prior to the current two-year test cycle, e.g. repairs in 2006 for the 2007-2008 test cycle, the assumed residual benefit is 50%.

Tailpipe emissions data are collected in a grams per mile unit. In order to convert this to a tons per summer day or annual tons unit, the grams per mile factor for a vehicle classification is multiplied by the annual vehicle miles traveled for the same vehicle classification. The vehicle miles traveled assumptions made for this analysis derive from a study conducted and published by the Eastern Research Group for the State of Colorado in June of 2008. This showed higher annual mileage by older models than MOBILE6 default assumptions.

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<sup>1</sup> Wenzel T, "Human Behavior in I/M Programs", 15th Annual Mobile Sources/Clean Air Conference, Sept 1999.

<sup>2</sup> McClintock P. "Trends in Vehicle Emissions Testing, Presentation to BC AirCare Steering Committee", April 2009.

Evaporative emission reductions were calculated based on the total number of gas caps replaced within the Clean Air Car Check program for Lake and Porter counties. The emission factor for evaporative system leaks derive from two separate studies: 1) Amlin D, Carlisle R, Kishan S, Klausmeier R, Haskew H "Evaporative Emissions Impact of Smog Check" California Bureau of Automotive Repair, ERG, dKC, August 2001; 2) Martin Reineman, "Effectiveness of OBD II Evaporative Emission Monitors - 30 Vehicle Study", EPA420-R-00-012, August 2000.

Clean Air Car Check did not initiate a liquid leak inspection procedure until mid-2007. Therefore, evaporative leak reductions are only quantified for 2008. Liquid leak reductions for 2008 were calculated based on an emission factor specific to the volume of leak detected. The assumptions were as follows: 1) <100ppm equivalent to leaky gas cap 3.5 g/mi; 2) 100-499 ppm equivalent to 7g/mi; 3) 500 & up equivalent to 15g/mi.

The following tables outline the results of the pre-1996 vehicle analysis for Lake and Porter counties:

#### 2008: 1995 & Older Models

	Initial Fails	Total VMT 'M	Tons Per Year Reduction			Notes
			HC	CO	NO <sub>x</sub>	
<b>IM240 Tested Vehicles</b>						
Repaired	4,875	33.8	56.0	607	61.7	1
Unresolved	3,903	26.9	67.3	689	69.0	1, 2
<b>BAR90 Tested Vehicles</b>						
Repaired	44	0.2	1.5	12		1, 8
Unresolved	56	0.3	2.3	18		1, 2, 8
<b>Total Measured Exhaust</b>	8,878	61.2	127.1	1,327	130.7	
<b>Evaporative Emissions 1995 &amp; Older:</b>						
<b>Gas Cap Repairs</b>	1,036	7.3	28.4			1,3
<b>Leaks Identified</b>	1,795	12.1	58.4			1,4
<b>Subtotal Evap</b>		19.3	86.8	-	-	
<b>Exhaust + evap</b>			213.8	1,326.6	130.7	
<b>Pre-inspection repairs</b>		50%	106.9	663.3	65.4	5
<b>Total new 2008</b>			<b>320.7</b>	<b>1,989.9</b>	<b>196.1</b>	
<b>Continuing Reductions from previous years repairs and retirements:</b>						
From 2007	100%		402.9	2,510.0	269.1	6
From 2006 & before	50%		203.1	1,813.0	92.8	7
<b>Total effective in 2008</b>			<b>926.7</b>	<b>6,312.9</b>	<b>557.9</b>	

**2007: 1995 & Older Models**

	Initial Fails	Total VMT 'M	Tons Per Year Reduction			Notes
			HC	CO	NO <sub>x</sub>	
<b>IM240 Tested Vehicles</b>						
Repaired	7,002	52.2	86.1	847	89.6	1
Unresolved	4,958	36.4	90.0	814	89.8	1, 2
<b>BAR90 Tested Vehicles</b>						
Repaired	15	0.1	0.6	5.3		1, 8
Unresolved	34	0.2	1.6	6.9		1, 2, 8
<b>Total Measured Exhaust</b>	12,009	88.9	178.3	1,673.2	179.4	
<b>Evaporative Emissions 1995 &amp; Older:</b>						
<b>Gas Cap Repairs</b>	3,300	23.1	90.4			1,3
<b>Leaks Identified</b>						
<b>Subtotal Evap</b>		23.1	90.4			
<b>Exhaust + evap</b>			268.7	1,673.2	179.4	
<b>Pre-inspection repairs</b>		50%	134.3	836.7	89.7	5
<b>Total new 2007</b>			<b>402.9</b>	<b>2,510.0</b>	<b>269.1</b>	
<b>Continuing Reductions from previous years repairs and retirements:</b>						
From 2006 & before	100%		406.1	3,625.9	185.5	6
From 2005 & before	50%		233.5	2,084.9	106.7	7, 9
<b>Total effective in 2007</b>			<b>1,042.5</b>	<b>8,220.8</b>	<b>561.3</b>	

**2006: 1995 & Older Models**

	Initial Fails	Total VMT 'M	Tons Per Year Reduction			Notes
			HC	CO	NO <sub>x</sub>	
IM240 Tested Vehicles						
Repaired	6,219	47.6	105.6	1,185	53.5	1
Unresolved	4,876	36.6	118.6	1,196	70.2	1, 2
BAR90 Tested Vehicles						
Repaired	74	0.4	2.0	21.8		1, 8
Unresolved	51	0.3	1.2	14.1		1, 2, 8
Total Measured Exhaust	11,220	84.9	227.4	2,416.9	123.7	
Evaporative Emissions 1995 & Older:						



<b>Gas Cap Repairs Leaks Identified</b>	1,582	11.1	43.3			1,3
<b>Subtotal Evap</b>		11.1	43.3	-	-	
<b>Exhaust + evap</b>			270.7	2,416.9	123.7	
<b>Pre-inspection repairs</b>		50%	135.4	1,208.6	61.8	5
<b>Total new 2006</b>			<b>406.1</b>	<b>3,625.9</b>	<b>185.5</b>	
<b>Continuing Reductions from previous years repairs and retirements:</b>						
From 2005 & before	100%		467.0	4,169.8	213.4	6, 9
From 2004 & before	50%		253.8	2,266.2	116.0	7, 9
<b>Total effective in 2006</b>			<b>1,126.9</b>	<b>10,061.9</b>	<b>514.9</b>	

#### Notes and assumptions legend:

1. VMT from Colorado 2007 Estimate by ERG, split 50/50 LDGV/LDGT. "Colorado Mileage Accumulation Rates from VID Odometer Readings Draft Report" for CDPHE by Eastern Research Group, Inc. June 30, 2008.
2. 80% of unresolved vehicles retire or leave the area as a result of registration enforcement.
3. Gas Cap Reductions: a) 1995 & older: 3.5 g/mi.  
a. 1996 & newer: 3.24 g/mi.  
b. Amlin D, Carlisle R, Kishan S, Klausmeier R, Haskew H "Evaporative Emissions Impact of Smog Check" California Bureau of Automotive Repair, ERG, dKC, August 2001.  
c. Martin Reineman, "Effectiveness of OBD II Evaporative Emission Monitors - 30 Vehicle Study", EPA420-R-00-012, August 2000.
4. Reductions per leak as identified in Leaks tab:  
a. <100ppm equivalent to leaky gas cap 3.5 g/mi.  
b. 100-499 ppm equivalent to 7g/mi.  
c. 500 & up equivalent to 15g/mi
5. Pre-inspection repairs assumed to be 50%. Wenzel T, "Human Behavior in I/M Programs", 15th Annual Mobile Sources/Clean Air Conference, Sept 1999.
6. Half the fleet is tested each year. Repairs from last year are assumed 100% effective in the current year.
7. Many repairs have a life greater than two years. Average life 3 years. Residual benefit from 2 year ago repairs assumed at 50%.
8. Idle test to IM240 conversions per Colorado via RSD (see BAR90 tab).
9. 1995 & older model original 2005 benefits assumed to be 115% of 2006, original 2004 benefits assumed to be 125% of 2006. The increased %'s are because more of these older model vehicles existed in previous years.

## 1996 and Newer Vehicles:

The Clean Air Car Check program initiated a fall-back test procedure for OBD-equipped vehicles that have failed the OBD test procedure more than three times in 2007. This has resulted in tailpipe test data for some 1996 and newer vehicles registered in Lake and Porter counties, but the sample set is too small to calculate total exhaust emission reductions for OBD vehicles. British Columbia is the only OBD I/M vehicle emissions testing program<sup>i</sup> that tests measurable emissions from a robust sample of OBD vehicles. Therefore, data was acquired from British Columbia to generate reduction factors specific to vehicle model years and classifications. These reduction factors were then applied to the fleet for Lake and Porter counties. This methodology, though not ideal, results in a more reliable estimate than that produced through MOBILE-based methodology and is more comparable to the reduction estimates for the pre-1996 fleet.

Since British Columbia only implemented OBD I/M testing at the start of 2007, the 2006 test year gram per mile reductions were assumed to be the same as those observed in 2007. This could be an overestimate of reductions since the OBD models were newer and presumably would have had a lower percentage of fails in 2006. On the other hand, British Columbia exempts the newest seven model years from inspection, which is three years longer than Indiana, and no reductions were included for 5 to 7-year old models. As noted earlier, pre-inspection repairs for 1996 and newer OBD models were assumed to be an incremental 100% of the measured exhaust reductions and 50% of the evaporative reductions. The lower percentage was used for evaporative emissions since most liquid leaks are not detected by OBD.

Since the test cycle is once every two years, and repairs made as a result of previous failures provide a residual benefit, reductions from previous year repairs have been accounted for. For vehicles repaired within the current test cycle (2007-2008), the assumed reduction benefit is 100%. For those repairs made in the year prior to the current two-year test cycle, e.g. repairs in 2006 for the 2007-2008 test cycle, the assumed residual benefit is 50%.

Tailpipe emissions data are collected in grams per mile units. In order to develop tons per summer day or annual tons, the grams per mile factor for a vehicle classification is multiplied by the vehicle miles traveled for the same vehicle classification. The vehicle miles traveled assumptions made for this analysis derive from a study conducted and published by the Eastern Research Group for the State of Colorado in June of 2008 and the number of vehicles inspected in Indiana.

Evaporative emission reductions were calculated based on the total number of gas caps replaced within the Clean Air Car Check program for Lake and Porter counties. The emission factor for evaporative system leaks derive from two separate studies: 1) Amlin D, Carlisle R, Kishan S, Klausmeier R, Haskew H "Evaporative Emissions Impact of Smog Check" California Bureau of Automotive Repair, ERG, dKC, August 2001; 2) Martin Reineman, "Effectiveness of OBD II Evaporative Emission Monitors - 30 Vehicle Study", EPA420-R-00-012, August 2000.

Clean Air Car Check initiated a liquid lead test procedure in mid-2007. However, since the procedure results from a flag established within the IM 240 software, only vehicles subject to the IM 240 test are subjected to the liquid leak test procedure. This results in 1996 and newer vehicles being exempt from liquid leak inspection.

The following tables outline the results of the 1996 and newer model year vehicle analysis for Lake and Porter counties:

### 2008 British Columbia Data

Model Years	Initial Tests	VMT' M	BC Initial Emissions g/mi			BC Reductions g/mi			BC Reductions RFUAF		
			HC	CO	NO <sub>x</sub>	HC	CO	NO <sub>x</sub>	HC	CO	NO <sub>x</sub>
1996-1997	17,702	156	0.62	10.35	1.13	0.063	0.87	0.050	0.022	0.26	0.017
1998-2001	53,860	559	0.34	6.06	0.63	0.009	0.17	0.010	0.003	0.05	0.004
2002 & newer	63,834	777	0.31	5.90	0.51	0.000	0.00	0.000	0.000	0.00	0.000
Total	135,396	1,492									
Model Years						BC Reductions (tons)			BC Reductions RFUAF		
						HC	CO	NO <sub>x</sub>	HC	CO	NO <sub>x</sub>
1996-1997						10.9	148.6	8.6	3.8	43.8	2.9
1998-2001						5.6	105.3	6.3	1.7	29.7	2.7
2002 & newer						0.0	0.0	0.0	0.0	0.0	0.0
Total						16.5	253.9	14.9	5.5	73.5	5.6

### **2008: 1996 & Newer Models-Lake and Porter**

	Initial Tests	Total VMT 'M	Tons Per Year Reduction			Notes
			HC	CO	NO <sub>x</sub>	
<b>OBD Tested Vehicles</b>	135,396	1,492				
Repaired			16.5	253.9	14.9	1, 8
Removed from Use After Failure			5.5	73.5	5.6	1, 2, 8
<b>Subtotal Exhaust reductions</b>			21.9	327.4	20.5	
<b>Pre-inspection exhaust repairs</b>		100%	21.9	327.4	20.5	9
<b>Total Exhaust</b>			43.8	654.8	41.0	
<b>Evaporative Emissions 1996 &amp; Newer:</b>						
<b>Gas Cap Repairs</b>	2,375	26.1	93.3			1,3

<b>Leaks Identified</b>					1,4
<b>Subtotal Evap</b>	26.1	93.3	-	-	
<b>Pre-inspection evap repairs</b>	50%	46.7	-	-	5
<b>Total evap</b>		140.0	-	-	
<b>Total new 2008</b>		<b>183.9</b>	<b>654.9</b>	<b>41.0</b>	
<b>Continuing Reductions from previous years repairs and retirements:</b>					
From 2007	100%	201.8	668.7	40.1	6
From 2006 & before	50%	63.4	331.0	20.1	7
<b>Total effective in 2008</b>		<b>449.1</b>	<b>1,654.6</b>	<b>101.2</b>	

### 2007 British Columbia Data

Model Years	Initial Tests	VMT' M	BC Initial Emissions g/mi			BC Reductions g/mi			BC Reductions RFUAF		
			HC	CO	NO <sub>x</sub>	HC	CO	NO <sub>x</sub>	HC	CO	NO <sub>x</sub>
1996-1997	24,128	235	0.62	10.28	1.12	0.056	0.816	0.045	0.015	0.163	0.012
1998-2001	60,212	677	0.33	6.02	0.62	0.004	0.084	0.005	0.001	0.024	0.002
2002 & newer	32,700	412	0.31	5.90	0.51	0.000	0.000	0.000	0.000	0.000	0.000
Total	117,040	1,324									
Model Years						BC Reductions (tons)			BC Reductions RFUAF		
						HC	CO	NO <sub>x</sub>	HC	CO	NO <sub>x</sub>
1996-1997						14.6	211.3	11.7	4.0	42.1	3.2
1998-2001						3.3	62.6	3.6	1.0	18.3	1.6
2002 & newer						0.0	0.0	0.0	0.0	0.0	0.0
Total						17.9	273.9	15.3	5.0	60.4	4.8

### **2007: 1996 & Newer Models-Lake and Porter**

	Initial Fails	Total VMT 'M	Tons Per Year Reduction			Notes
			HC	CO	NO <sub>x</sub>	
<b>OBD Tested Vehicles Repaired</b>	117,040	1,325	17.9	273.9	15.3	1, 8

Unresolved		5.0	60.4	4.7	1, 2, 8
<b>Subtotal Exhaust reductions</b>		22.9	334.3	20.1	
<b>Pre-inspection exhaust repairs</b>	100%	22.9	334.3	20.1	9
<b>Total Exhaust</b>		45.8	668.6	40.2	
<b>Evaporative Emissions 1996 &amp; Newer:</b>					
Gas Cap Repairs	2,650	29.2	104.1		1,3
Leaks Identified					
<b>Subtotal Evap</b>	29.2	104.1	-	-	
<b>Pre-inspection evap repairs</b>	50%	52.1	-	-	5
<b>Total evap</b>		156.2	-	-	
<b>Total new 2007</b>		<b>201.9</b>	<b>668.6</b>	<b>40.2</b>	
<b>Continuing Reductions from previous years repairs and retirements:</b>					
From 2006 & before	100%	126.9	662.0	40.1	6
From 2005 & before	50%	53.9	281.3	17.0	7, 10
<b>Total effective in 2007</b>		<b>382.7</b>	<b>1,611.9</b>	<b>97.3</b>	

### 2006\* British Columbia Data

			BC Initial Emissions g/mi			BC Reductions g/mi			BC Reductions RFUAF		
Model Years	Initial Tests	VMT' M	HC	CO	NO <sub>x</sub>	HC	CO	NO <sub>x</sub>	HC	CO	NO <sub>x</sub>
1996-1997	29,018	284	0.62	10.28	1.12	0.06	0.82	0.05	0.02	0.16	0.01
1998-2001	80,063	906	0.33	6.02	0.62	0.00	0.08	0.00	0.00	0.02	0.00
2002 & newer	43,268	546	0.31	5.90	0.51	0.00	0.00	0.00	0.00	0.00	0.00
Total	152,349	1,737									
						BC Reductions tons			BC Reductions RFUAF		
Model Years						HC	CO	NO <sub>x</sub>	HC	CO	NO <sub>x</sub>
1996-2001						17.6	255.6	14.1	4.8	50.9	3.8
						4.4	83.8	4.9	1.3	24.5	2.1
						0.0	0.0	0.0	0.0	0.0	0.0
Total						22.0	339.4	19.0	6.1	75.4	5.9

\*Assumes same gram/mile values as for 2007 due to unavailable OBD I/M data for 2006.

**2006: 1996 & Newer Models**

	Initial Fails	Total VMT 'M	Tons Per Year Reduction			Notes
			HC	CO	NO <sub>x</sub>	
<b>OBD Tested Vehicles</b>	29,018	284				
Repaired			17.6	255.6	14.1	1, 8 1, 2, 8
Unresolved			6.1	75.4	5.9	
<b>Subtotal Exhaust reductions</b>			23.8	331	20.1	
<b>Pre-inspection exhaust repairs</b>	100%		23.8	331.0	20.1	9
<b>Total Exhaust</b>			47.6	662.0	40.2	
<b>Evaporative Emissions 1996 &amp; Newer: Gas Cap Repairs</b>	1,346	14.8	52.9			1,3
<b>Leaks Identified</b>						
<b>Subtotal Evap</b>		14.8	52.9	-	-	
<b>Pre-inspection evap repairs</b>	50%		26.4	-	-	5
<b>Total evap</b>			79.3	-	-	
<b>Total new 2006</b>			<b>126.9</b>	<b>662.0</b>	<b>40.1</b>	
<b>Continuing Reductions from previous years repairs and retirements:</b>						
From 2005 & before	100%		107.8	562.7	34.1	6, 10
From 2004 & before	50%		44.4	231.7	14.0	7, 10
<b>Total effective in 2006</b>			<b>279.1</b>	<b>1,456.4</b>	<b>88.2</b>	

**Notes and assumptions:**

1. VMT from Colorado 2007 Estimate by ERG, split 50/50 LDGV/LDGT. "Colorado Mileage Accumulation Rates from VID Odometer Readings Draft Report" for CDPHE by Eastern Research Group, Inc. June 30, 2008.
2. Average per vehicle repair values from British Columbia.
3. RFUAF - Removal from Use After Failure - emissions of vehicles that cease operating after failing their I/M inspection.
4. Gas Cap Reductions: a) 1995 & older: 3.5 g/mi, b) 1996 & newer: 3.24 g/mi.
  - a. Amlin D, Carlisle R, Kishan S, Klausmeier R, Haskew H "Evaporative Emissions Impact of Smog Check" California Bureau of Automotive Repair, ERG, dKC, August 2001.

- b. Martin Reineman, "Effectiveness of OBD II Evaporative Emission Monitors - 30 Vehicle Study", EPA420-R-00-012, August 2000.
- 5. Reductions per leak as identified in Leaks tab:
  - a. <100ppm equivalent to leaky gas cap 3.5 g/mi.
  - b. 100-499 ppm equivalent to 7g/mi.
  - c. 500 & up equivalent to 15g/mi.
- 6. Pre-inspection repairs assumed to be 50%. Wenzel T, "Human Behavior in I/M Programs", 15th Annual Mobile Sources/Clean Air Conference, Sept 1999.
- 7. Half the fleet is tested each year. Repairs from last year are assumed 100% effective in the current year.
- 8. Many repairs have a life greater than two years. Average life 3 years. Residual benefit from 2 year ago repairs assumed at 50%.
- 9. OBD vehicle emissions levels and reductions assumed to be the same as those measured in British Columbia. Emissions levels are applied by model year ranges: 1996-1997, 1998-2001, 2002 & newer.
- 10. Pre-inspection exhaust repairs for OBD assumed to be 100%.
- 11. Trends in Vehicle Emissions Testing, Presentation to AirCare Steering Committee, April 2009 Slides 21-23.
- 12. 2005 original OBD benefits assumed to be 85% of 2006, and 2004 original OBD benefits assumed to be 70% of 2006 because of the fewer numbers of OBD models in those years.

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<sup>i</sup> Colorado tests 1996 and newer model vehicles using IM240 but OBD status is not part of the pass/fail determination. Therefore, emissions reductions in the Colorado program might not be representative of an OBD I/M program,