

## Enclosure 2

### **IDEM's Preliminary Assessment of the Fine Particulate (PM 2.5) Standard**

Consistent with the United States Environmental Protection Agency's (USEPA) April 1, 2003 guidance memorandum titled "Designations for the Fine Particulate National Ambient Air Quality Standards", the Indiana Department of Environmental Management (IDEM) has conducted a thorough review of the affected areas in Indiana. IDEM's review focused on the following primary and secondary analysis criteria:

#### Primary Analysis Criteria:

1. Monitoring data.
  - ❑ The annual standard is 15 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) and attainment is determined by the average of the Particulate Matter (PM) 2.5 values over a three-year period. Due to rounding, values greater than 15.0 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) are considered to exceed the standard.
  - ❑ The daily standard is 65 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) and attainment is determined by taking the 98<sup>th</sup> percentile of the PM 2.5 values over a three-year period. Due to rounding, values greater than 65.0 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) are considered to exceed the standard.
2. Existing MSA/CMSA boundaries
  - ❑ Following the current April 2003 guidance, IDEM's core evaluation is based on the 1999 MSA boundary definitions.
  - ❑ The U.S. Office of Management and Budget published revised MSA boundary definitions on June 6, 2003. Therefore, IDEM has done a cursory evaluation of the counties affected by the new definitions and has incorporated the relevant information into this evaluation, as appropriate.

#### Secondary Analysis Criteria:

1. Emissions and air quality in adjacent areas (including adjacent MSAs/CMSAs). Data are available for volatile organic compounds (VOC), oxides of nitrogen ( $\text{NO}_x$ ), direct PM 2.5, and sulfur dioxide ( $\text{SO}_2$ ). Ammonia emissions inventories are not available at this time.
2. Population density and degree of urbanization including commercial development.
3. Monitoring data representing ozone concentrations in local areas and larger areas (urban or regional scale) as surrogate for PM 2.5 where we are not monitoring for PM 2.5. Location of emission sources.
4. Traffic and commuting patterns.
5. Expected growth.
6. Meteorology.
7. Jurisdictional boundaries, including existing 1-hour and proposed 8-hour ozone nonattainment area boundaries.
8. Level of control of emissions.
9. Regional emission reductions (e.g.,  $\text{NO}_x$  SIP call or other enforceable regional strategies).

Table I outlines the MSAs/CMSAs and Indiana Counties subjected to the analysis criteria. A map of the affected Indiana Counties, titled Figure 2, accompanies this document. Figure I summarizes PM 2.5 monitoring information. IDEM's core analysis is based on the 1999 defined MSA/CMSA boundaries. As a result of the 2000 Census, the 2003 MSA/CMSA boundary definitions were published on June 6, 2003. IDEM has incorporated a cursory review of the counties affected by the new boundary definitions into our core analysis.

**Table I**

| <u>Evansville Area</u>              | <u>Other Potentially Affected Areas</u> |
|-------------------------------------|---|
| Gibson County <sup>1</sup>          |   |
| Posey County                        | <u>Cincinnati Area</u>                  |
| Vanderburgh County                  | Dearborn County                         |
| Warrick County                      | Franklin County <sup>1</sup>            |
|                                     | Ohio County                             |
| <u>Indianapolis/Central Indiana</u> |   |
| Boone County                        | Dubois County                           |
| Brown County <sup>1</sup>           |   |
| Hamilton County                     | <u>Fort Wayne Area</u>                  |
| Hancock County                      | Adams County <sup>2</sup>               |
| Hendricks County                    | Allen County                            |
| Johnson County                      | DeKalb County <sup>2</sup>              |
| Madison County <sup>3</sup>         | Huntington County <sup>2</sup>          |
| Marion County                       | Wells County                            |
| Morgan County                       | Whitley County                          |
| Putnam County <sup>1</sup>          |   |
| Shelby County                       | <u>Kokomo Area</u>                      |
|                                     | Howard County                           |
| <u>Louisville Area</u>              | Tipton County                           |
| Clark County                        |   |
| Floyd County                        | <u>Lafayette Area</u>                   |
| Harrison County                     | Benton County <sup>1</sup>              |
| Scott County <sup>2</sup>           | Carroll County <sup>1</sup>             |
| Washington County <sup>1</sup>      | Tippecanoe County                       |
|                                     | Clinton County <sup>2</sup>             |
| <u>Northwest Indiana</u>            | <u>Muncie Area</u>                      |
| Jasper County <sup>1</sup>          | Delaware County                         |
| Lake County                         |   |
| LaPorte County <sup>4</sup>         | <u>Terre Haute Area</u>                 |
| Newton County <sup>1</sup>          | Clay County                             |
| Porter County                       | Sullivan County                         |
|                                     | Vermillion County                       |
| <u>South Bend/Elkhart/Goshen</u>    | Vigo County                             |
| Elkhart County                      |   |
| St. Joseph County                   |   |

<sup>1</sup> County added to MSA in June 2003 as a result of the 2000 Census.

<sup>2</sup> County removed from the MSA in June 2003 as a result of the 2000 Census.

<sup>3</sup> County redefined as a separate MSA in June 2003 as a result of the 2000 Census.

<sup>4</sup> County defined as its own MSA in June 2003 as a result of the 2000 Census.

As a result of thorough analysis, IDEM has developed the following evaluation of nonattainment area boundaries for designating areas under the NAAQS for fine particulate matter. This evaluation is based on 2000-2002 and 2001 through 2003 monitoring data. There are no areas within Indiana that exceed the daily standard of 65 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ). Therefore this analysis focuses only on the annual standard of 15 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ).

PM<sub>2.5</sub> is both emitted directly in particulate form by select sources and is formed in the atmosphere by precursor gases from a variety of sources. Direct emissions come from combustion sources, such as power plants, forest fires and vehicle emissions. Precursor gases include NO<sub>x</sub>, VOCs, SO<sub>2</sub> and ammonia. These gases come from a variety of sources including combustion sources, mobile sources, manufacturing that involves coatings and solvents, and agriculture. Precursor gases can condense into particles that are made up of varying amounts of NO<sub>x</sub>, SO<sub>2</sub>, VOCs and ammonia. The PM 2.5 direct inventory estimates referenced within this document pertain solely to emissions from stationary sources.

Although IDEM has been monitoring coarse particulates (PM 10) for some time, only two relatively small geographic areas were affected by the previous particulate standard. PM 2.5 and PM 10 are very different and require separate monitoring equipment. IDEM established its PM 2.5 monitoring network in 1999, following U.S. EPA guidance for site location, which focused primarily on densely populated urban areas. Much technical work needs to be done to better understand PM 2.5. States and the U.S. EPA are still working to identify the local and regional nature of PM 2.5 formation, as well as its precursors and relative source contributions. Therefore, it is difficult to develop conclusions as to how the secondary evaluation criteria should apply to PM 2.5 nonattainment area considerations. For example, it is difficult to assume that commuting from a county that monitors attainment to a county that monitors values above the standard significantly contributes to the PM 2.5 concentrations in the county that has values above the standard.

Also, based on our data analysis, high PM 2.5 concentrations appear to be more prominent in areas where there is high population density or where there is a strong industrial base. Current scientific evidence, including EPA's modeling for the proposed Interstate Air Quality Rule and the Lake Michigan Air Directors' Consortium technical analysis, does show there is a large regional component to PM<sub>2.5</sub>, in addition to a local component. Despite this regional component, Indiana's monitors do not show widespread violations of the annual standard. Many of Indiana's urban and suburban counties monitor compliance. Regional controls, such as EPA's proposed Interstate Air Quality Rule, should secure the compliance of these counties into the future.

As noted in this document, three PM 2.5 monitoring sites produced data that is deemed incomplete, meaning that a 2001-2003 average value cannot be determined. EPA’s monitoring guidance stipulates that a minimum of 75% of the data per quarter must be available in order to determine if the design value represents attainment. If less than 75% of the data is valid, then the maximum quarterly value for that given quarter over the three-year period is substituted for all missing samples for that quarter. This method is obviously a very conservative methodology for calculating an average value. In determining whether a monitor with incomplete data attains the PM 2.5 standard, EPA encourages states to explore alternative methods for evaluating the data. As noted in this document, IDEM has done this for the Madison, Delaware, and Tippecanoe County monitor sites.

There is one further thing to note about Indiana’s PM 2.5 monitoring network. IDEM maintains four monitoring sites that are intended to reflect air quality in a relatively small geographic area directly influenced by a specific source or sources of air pollution. The data from these sites are not intended to be used to determine nonattainment status for the annual PM 2.5 standard. IDEM has included the monitored annual values from these sites in Figure 1 to Enclosure 1 and we note that the monitors are in compliance with the daily standard, but not in compliance with the annual standard. IDEM will work with the sources to address emissions that are contributing to the high annual values at these sites.

### **IDEM Analysis by Region**

**Evansville Area:**

Indiana Counties within the Area: Gibson, Posey, Vanderburgh, and Warrick.

EPA Proposed 8-hour Ozone Nonattainment Area:  
 Vanderburgh and Warrick Counties

Monitor Values (average value in micrograms per cubic meter):

| COUNTY      | MONITOR LOCATION         | 2000-2002<br>AVERAGE VALUE | 2001-2003<br>AVERAGE VALUE |
|-------------|--------------------------|----------------------------|----------------------------|
| Vanderburgh | Civic Center             | <b>15.7</b>                | <b>15.2</b>                |
| Vanderburgh | Fire Station #17         | <b>15.5</b>                | <b>15.2</b>                |
| Vanderburgh | University of Evansville | <b>15.7</b>                | <b>15.5</b>                |

Evaluation:

|               |   |
|---------------|---|
| <u>County</u> | <u>Feb 15, 2004 Preliminary Designation Recommendations</u> |
| Gibson        | Attainment/Unclassifiable                                   |
| Posey         | Attainment/Unclassifiable                                   |
| Vanderburgh   | Nonattainment   |
| Warrick       | Attainment/Unclassifiable                                   |

#### Discussion:

There are three PM 2.5 monitors within the MSA and they are all located in Vanderburgh County. All three monitors in Vanderburgh County exceed the standard. Although urban growth is occurring in Warrick and Gibson counties, the majority of the region's vehicle miles traveled and traffic congestion is generated within the core urban area in Vanderburgh County. Vanderburgh County has the highest population density and maintains an in-county workforce ratio of 94%. Warrick County has the second highest population density and has an in-county workforce ratio of 51%. Posey County maintains low population density and has less of an emissions base than the other counties within the region.

Half (50%) of all of the VOCs (Volatile Organic Compounds) emitted annually within Indiana's portion of the MSA derive from Vanderburgh County. The total Nitrogen Oxide (NO<sub>x</sub>) emissions of the area derive primarily from Gibson (47%) and Warrick (28%) counties. The majority (75%) of the area's direct PM 2.5 emissions from stationary sources originate in Warrick County. The sulfur dioxide (SO<sub>2</sub>) emissions released by stationary sources within Indiana's portion of the MSA are primarily from Warrick (42%) and Gibson (52%) counties. However, based on wind rose analysis, neither county is upwind of Vanderburgh; Gibson is north of Vanderburgh and Warrick is east. Thus, neither county is likely to contribute significantly to PM 2.5 values in Vanderburgh County. Rural background monitors are located east of Warrick County in Spencer County and North of Gibson County in Knox County. To a significant degree, these monitors receive air masses that have just crossed the state line. These have design values of 14.4 and 13.9, respectively, indicating high background levels coming into the area, despite being below the standard. These values also are an indication that PM values in the neighboring counties (i.e. Warrick and Gibson) would likely be below the standard if monitors were present. The 2002 to 2003 design values have dropped and NO<sub>x</sub> emissions are expected to decrease throughout the Midwest over the next few years due to the NO<sub>x</sub> SIP Call and new federal engine and fuel standards. It is reasonable to expect the PM 2.5 design values in Vanderburgh County to continue to go down, possibly below the standard, without additional controls. Therefore, it is unnecessary to extend the restrictions that accompany a nonattainment designation to additional counties at this time.

Henderson County, Kentucky is also part of the Evansville MSA and Indiana has and will continue to communicate with the State of Kentucky concerning its status.

#### 2003 MSA Revised Boundary Definitions:

Gibson County was incorporated in the 2003 revised boundary definition for the Evansville MSA. IDEM incorporated Gibson County in its core analysis and recommends that it be designated attainment/unclassifiable.

**Central Indiana Area:**

Indiana Counties within the Area: Boone, Brown, Hamilton, Hancock, Hendricks, Johnson, Madison, Marion, Morgan, Putnam, and Shelby.

EPA Proposed 8-hour Ozone Nonattainment Area:

Boone, Hamilton, Hancock, Hendricks, Johnson, Madison, Marion, Morgan, and Shelby Counties

Monitor Values (average value in micrograms per cubic meter):

| COUNTY  | MONITOR LOCATION           | 2000-2002 AVERAGE VALUE | 2001-2003 AVERAGE VALUE |
|---------|----------------------------|-------------------------|-------------------------|
| Madison | Anderson                   | 15.0                    | 14.6*                   |
| Marion  | W. 18 <sup>th</sup> Street | 16.1                    | 15.9                    |
| Marion  | E. 30 <sup>th</sup> Street | 17.0                    | 16.2                    |
| Marion  | E. 75 <sup>th</sup> Street | 16.1                    | 15.5                    |
| Marion  | Mann Road                  | 15.1                    | 14.8                    |
| Marion  | E. Michigan Street         | 16.9                    | 16.7                    |

\*Data is considered incomplete.

Evaluation:

| <u>County</u> | <u>Feb 15, 2004 Preliminary Designation Recommendations</u> |
|---------------|---|
| Boone         | Attainment/Unclassifiable                                   |
| Hamilton      | Attainment/Unclassifiable                                   |
| Hancock       | Attainment/Unclassifiable                                   |
| Hendricks     | Attainment/Unclassifiable                                   |
| Johnson       | Attainment/Unclassifiable                                   |
| Madison       | Attainment/Unclassifiable                                   |
| Marion        | Nonattainment   |
| Morgan        | Attainment/Unclassifiable                                   |
| Shelby        | Attainment/Unclassifiable                                   |

Discussion:

The only monitored violations of the standard within the MSA occur in Marion County. Four of the six monitors within the MSA exceed the standard. Marion County (Indianapolis) maintains the highest concentration for employment, VMT, commerce, and recreation compared to the other counties within the MSA. Mobile source emissions represent the largest portion of the VOC and NO<sub>x</sub> emissions inventories for Marion County, as well as for the MSA as a whole. The majority of the traffic congestion is limited to Marion County. A significant level of commuting occurs from the surrounding counties to Marion County, meaning that a fairly large portion of Marion County's VMT originates from the surrounding counties. The Indianapolis MSA's population density is spreading well beyond Marion County, but Marion County maintains the highest population and an in-county workforce ratio of 94%. Stationary sources within Marion County account for over half (50%) of the direct PM 2.5 emissions from stationary sources within Central Indiana and the next closest is Morgan County with 11%. Sources within

Marion County also account for 70% of the SO<sub>2</sub> emissions from stationary sources within the Central Indiana Region. It is worth noting that despite its large geographic size, the total direct PM<sub>2.5</sub> and SO<sub>2</sub> emissions inventories for stationary sources within Central Indiana are relatively small in comparison with other MSAs within the state (e.g., NW Indiana and Evansville).

Unlike ozone, PM 2.5 monitoring values indicate that PM 2.5 values decrease away from the core of the Indianapolis urban area into the suburban area. This is represented by the lower values registered at the Mann Road monitor which is Southwest of the core urban area and by the Madison County monitor which is Northeast of the core urban area. Both of these monitors register values below the standard. The monitor locations are aligned such that their readings describe the profile of PM<sub>2.5</sub> levels from the urban edges through the urban center. Recent analysis by LADCO indicates a common “cone-shaped” profile of PM 2.5 values in densely populated urban areas with the peak value at the urban center (core) and values decreasing gradually based on distance from the urban core (both upwind and downwind). The Indianapolis urban area appears to follow this profile, with the peak value being represented at the Michigan Street monitor at 16.7 µg/m<sup>3</sup> (closest monitor to the center or core of the urban area). The W. 18<sup>th</sup> Street monitor is just Northwest of the urban monitor alignment; it follows this “cone-shaped” profile as well at 15.9 µg/m<sup>3</sup>. In projecting likely monitor values through radial extrapolation (method based on PM 2.5 concentration decrease per mile from the urban center, the Michigan St. monitor in this instance), the following table illustrates that the actual and predicted monitor values indeed follow a “cone-shaped” curve.

| location          | miles | actual value | predicted value |
|-------------------|-------|--------------|-----------------|
| Michigan St.      | 0     | 16.7         | 16.7            |
| Washington Park   | 2.7   | 16.2         | 16.3            |
| W 18th            | 4.7   | 15.9         | 16              |
| 75th              | 8.2   | 15.5         | 15.5            |
| Mann Rd           | 10.3  | 14.8         | 15.2            |
| Hamilton Cty line | 11.8  |              | 14.9            |

Furthermore, the predicted values based on radial extrapolation are very consistent with the actual values for existing monitor sites. Using this same methodology, a calculation was made to determine what the likely design value would be if a monitor was located at the Hamilton County line. As the table illustrates, the projected value at the Hamilton County line is below the standard. This is significant, because if any county outside of Marion were

to have a monitored value above the standard, it would likely be Hamilton due to the fact that it is directly downwind of urban area. Since this exercise demonstrates that the likely PM 2.5 concentrations for Hamilton County are below the standard, and this represents a worst-case scenario for any of the collar counties, this analysis suggests that none of the collar counties would violate the standard if monitors were present.

As noted previously, Marion County accounts for the majority of the PM 2.5 direct and precursor emissions. Morgan County does account for a recognizable portion of the PM 2.5 and SO<sub>2</sub> emissions within the MSA, however, IDEM believes that these emissions have little to no effect on the PM<sub>2.5</sub> values in Marion County. This is supported by the fact that the closest downwind monitor to Morgan County (Mann Rd.) has the lowest PM 2.5 value in Marion County. Furthermore, we believe that including any of the collar counties in the nonattainment area would not lead to lower PM 2.5 values in Marion County. In comparing upwind background monitor values with those registered outside the core urban area, it appears that the PM 2.5 concentrations associated with urban excess is confined to central Marion County. Therefore, it is unnecessary to extend the restrictions that accompany a nonattainment designation to additional counties at this time.

#### 2003 MSA Boundary Definition:

The U.S. Office of Management and Budget published revised MSA boundary definitions on June 6, 2003. Brown and Putnam Counties were incorporated as part of the Indianapolis MSA and Madison County was excluded from the Indianapolis MSA and defined as the Anderson MSA. There are no PM 2.5 monitors in Brown or Putnam County. Both counties are fairly rural with low population density and VMT, and neither county has a significant emissions base. Therefore, Brown and Putnam Counties should be excluded from the nonattainment area as well.

According to EPA guidance, monitoring data for the Madison County site is considered incomplete, though we note that it is just one sample for one quarter short of being complete. Figure 3.1 attached to this document provides a summary of alternate methods for evaluating the captured data.

IDEM does not believe that the substitution of the quarterly maximum value (worst-case scenario) results in a PM 2.5 value representative of the PM 2.5 concentrations registered at Madison County monitor. As noted in Figure 3.1, three reasonable data analysis methods indicate that the three-year (2001-2003) average PM 2.5 value is below the standard. Additionally, since the critical value (the quarterly average value required for the three-year average to exceed the standard) for the fourth quarter of 2002 is 18.29, and no quarterly average during the three year period even approaches this critical value, we are confident in stating that the PM 2.5 concentrations in Madison County are below the standard. Also worth noting is that the three-year average value resulting from calculation scenarios A, C, and D are similar to the actual monitor value associated with neighboring Delaware County

(14.3). Since Madison County is now its own MSA, we believe it should be designated attainment and not associated with Indianapolis.

**Louisville Area:**

Indiana Counties within the Area:

Clark, Floyd, Harrison, Scott, and Washington

EPA Proposed 8-hour Ozone Nonattainment Area:

Clark and Floyd Counties

Monitor Values (average value in micrograms per cubic meter):

| COUNTY | MONITOR LOCATION | 2000-2002<br>AVERAGE VALUE | 2001-2003<br>AVERAGE VALUE |
|--------|------------------|----------------------------|----------------------------|
| Clark  | Jeffersonville   | <b>17.2</b>                | <b>16.2</b>                |
| Floyd  | New Albany       | <b>15.5</b>                | <b>14.9</b>                |

Evaluation:

| <u>County</u> | <u>Feb 15, 2004 Preliminary Designation Recommendations</u> |
|---------------|---|
| Clark         | Nonattainment   |
| Floyd         | Attainment  |
| Harrison      | Attainment/Unclassifiable                                   |
| Scott         | Attainment/Unclassifiable                                   |
| Washington    | Attainment/Unclassifiable                                   |

Discussion:

There are only two PM 2.5 monitors within Indiana’s portion of the MSA (one monitor in each Clark and Floyd Counties). The Jeffersonville site in Clark County is the only monitor in violation of the standard. Harrison and Scott Counties are predominantly rural in nature, with low to moderate population density. Because the majority of Clark and Floyd Counties are urban, the two counties account for 61% of the area’s total VOC emissions and 70% of the area’s NO<sub>x</sub> emissions. Sources within Clark and Floyd counties account for 88% of the direct PM 2.5 emissions from stationary sources, and 100% of the SO<sub>2</sub> emissions from stationary sources. There are no major stationary sources located within Harrison or Scott Counties. Scott County in particular maintains a high in-county workforce employment rate at 67%, meaning that there is not much commuting occurring between Scott County residents and the remainder of the MSA. Growth in Harrison and Scott Counties has not been significant, although there is potential for new growth in Harrison County due to recent commercial development. Currently, Harrison County accounts for 16% of the VOC emissions that comprise Indiana’s portion of the MSA and

only 12% of the NO<sub>x</sub>. Scott County only accounts for 13% of the VOC and 7% of the NO<sub>x</sub> emissions within the Indiana portion of the MSA. Harrison and Scott counties account for less than 4% of the direct PM 2.5 and SO<sub>2</sub> emissions from stationary sources within the Indiana portion of the MSA. It does not appear that emissions from Harrison or Scott Counties have a significant impact on air quality within the Louisville MSA.

The difference between the monitor values at the Jeffersonville (Clark County) site and the New Albany (Floyd County) site suggests a geographically isolated spike in PM 2.5 concentrations in Clark County. This is further exemplified by the slightly lower PM 2.5 monitor values recorded within the urban core of Louisville, as it is unusual for the highest value within the urban area to be outside of the core county (Jefferson, KY). This seems to indicate the possibility that the isolated spikes associated with the Clark County monitor may be affected by a local source or sources within Clark County. There is a power plant in Floyd County. However, it is not known whether the power plant is a significant contributor to the Jeffersonville monitor value. Additionally, this source will be regulated by future control requirements (e.g., the Interstate Air Quality Rule) regardless of Floyd County's attainment status.

Air quality in Floyd County meets the PM 2.5 standard. According to recent EPA modeling, the entire Louisville region will attain the PM 2.5 standard upon the implementation of the Interstate Air Quality Rule. Therefore, it is unnecessary to extend the restrictions that accompany a nonattainment designation to Floyd County at this time. Thus, IDEM recommends that Clark County be designated nonattainment and Floyd County be designated attainment.

Since it does not appear that Harrison and Scott Counties contribute to PM 2.5 values in the Louisville MSA, IDEM recommends Harrison and Scott Counties be designated attainment/unclassifiable.

#### 2003 MSA Boundary Definition:

The U.S. Office of Management and Budget published revised MSA boundary definitions on June 6, 2003. As a result, Scott County is no longer part of the MSA, however, Washington County has been incorporated into the revised boundary definition for the Louisville MSA. The total population of Washington County is just under 29,000, with an annual growth rate of 2%, compared to a total population of 172,000 in Clark and Floyd Counties. Washington County has an insignificant emissions base (i.e. 2% of regional direct PM<sub>2.5</sub> emissions and 0% of regional SO<sub>2</sub> emissions), low population density and low concentrations of VMT. There are no PM 2.5 monitors in Washington County. IDEM recommends that Washington County be designated attainment/unclassifiable.

**Northwest Indiana:**

Indiana Counties within the Area:

Jasper, Lake, Newton, and Porter.

EPA Proposed 8-hour Ozone Nonattainment Area:

Lake and Porter Counties

Monitor Values (average value in micrograms per cubic meter):

| COUNTY | MONITOR LOCATION                | 2000-2002<br>AVERAGE VALUE | 2001-2003<br>AVERAGE VALUE |
|--------|---------------------------------|----------------------------|----------------------------|
| Lake   | East Chicago                    | 15.6                       | 15.2                       |
| Lake   | Gary Federal Building           | 16.1*                      |                            |
| Lake   | Gary Ivanhoe School             | 15.2                       | 14.8                       |
| Lake   | Hammond Purdue Univ<br>Calumet  | 15.0                       | 14.9                       |
| Lake   | Hammond Robertsdale<br>Clark HS | 14.9                       | 14.9                       |
| Lake   | Highland                        | 14.6                       | 14.6                       |
| Porter | Dunes Lake Shore                | 13.5                       | 13.4                       |
| Porter | Ogden Dunes WWTP                | 14.3                       | 13.8                       |

\* 1999 – 2001 Average

Evaluation:

| <u>County</u> | <u>Feb 15, 2004 Preliminary Designation Recommendations</u> |
|---------------|---|
| Jasper        | Attainment/Unclassified                                     |
| Lake          | Nonattainment   |
| Newton        | Attainment/Unclassified                                     |
| Porter        | Attainment  |

Discussion:

The only monitored violation of the standard within the CMSA occurs in Lake County, at one of the five monitors (East Chicago). Due to on-site electrical work associated with refurbishing, the monitor at the Gary Federal Building was shut down on September 20, 2002 making that year incomplete, however, the 1999 through 2001 data were compared against the standard. Once refurbishing of the Gary Federal Building is complete, it is uncertain as to whether the PM 2.5 monitor will be reactivated. Nevertheless, there are a number of PM 2.5 monitoring sites nearby providing data representative of the area.

Lake and Porter Counties comprise the Gary PMSA, which is Indiana’s portion of the greater Chicago CMSA. Lake County accounts for the greatest level of employment and commerce within the region. Lake County also maintains the highest population and an in-county workforce ratio of 83%. Lake County does have a greater amount of VMT

compared to Porter County. Over 25,000 people drive into or through Lake County from Porter County to work. This accounts for a very small portion of Lake County's total VMT. Lake County accounts for three times more total VOC and 30% more total NO<sub>x</sub> than Porter County. Also, Lake County accounts for 70% of the total direct PM 2.5 emitted by stationary sources and 60% of the SO<sub>2</sub> emitted by stationary sources.

Only one monitor in the three-county Northwest Indiana Region violates the standard. The values in these northern Indiana areas, unlike ozone, are significantly lower than those found in south and central Indiana areas. Although these counties have high PM2.5 direct emissions, this does not translate to high monitor readings, indicating that direct PM2.5 emissions are not a significant contributor to the local values. Wind rose analysis indicates that Porter County is not a contributor to Lake County PM 2.5 values. Since Porter County is upwind of LaPorte County, and LaPorte County's monitor values are well below the standard, Porter County does not appear to be contributing to PM 2.5 values anywhere within the region. With a high value of only 15.2 µg/m<sup>3</sup>, it is reasonable to assume that Lake County should attain the standard with the implementation of regional controls. However, if local controls are necessary, the implementation of local controls beyond Lake County will not impact PM 2.5 values within Lake County. Therefore, IDEM recommends that Lake County be designated attainment, and Porter County attainment.

#### 2003 MSA Boundary Definition:

The U.S. Office of Management and Budget published revised MSA boundary definitions on June 6, 2003. As a result, Jasper and Newton Counties have been incorporated into the revised boundary definition for the Chicago CMSA (Gary PMSA). The total population of Newton County is just over 15,000, and the total population of Jasper County is just over 30,000. Total NO<sub>x</sub> and VOC emissions released in Jasper are 32,000 tons combined while total NO<sub>x</sub> and VOC emissions released within Newton County are less than 3,000 tons for each pollutant, compared to 20,000 tons of VOC and 49,000 tons of NO<sub>x</sub> (79,000 combined) emitted within Lake and Porter Counties. Newton County accounts for 0% of the direct PM 2.5 and SO<sub>2</sub> emissions released by stationary sources within the region. Jasper County accounts for just 8% of the direct PM 2.5 and 32% of the SO<sub>2</sub> emissions released by stationary sources within the new PMSA. Jasper and Newton Counties both have low population density and low concentrations of VMT. There are no PM 2.5 monitors in Jasper or Newton Counties. IDEM recommends that Jasper and Newton Counties be designated attainment/unclassifiable.

#### **Michigan City/LaPorte Area:**

Indiana Counties within the Area:

LaPorte

EPA Proposed 8-hour Ozone Nonattainment Area:

LaPorte

Monitor Values (average value in micrograms per cubic meter):

| COUNTY  | MONITOR LOCATION | 2000-2002<br>AVERAGE VALUE | 2001-2003<br>AVERAGE VALUE |
|---------|------------------|----------------------------|----------------------------|
| LaPorte | Michigan City    | <b>13.6</b>                | <b>13.4</b>                |
| LaPorte | LaPorte          | <b>13.4</b>                | <b>13.6</b>                |

Evaluation:

County                      February 15, 2004 Designation Recommendation  
 LaPorte                      Attainment

Discussion:

LaPorte County monitor values are well below the standard. Based on monitor values within its neighboring counties of Porter and St. Joseph, it does not appear that LaPorte County is contributing to any nearby areas with violating monitors. Therefore, IDEM recommends that LaPorte County be designated attainment.

**South Bend/Elkhart/Goshen Area:**

Indiana Counties within the Area:

Elkhart MSA:              Elkhart County  
 South Bend MSA:      St. Joseph County

EPA Proposed 8-hour Ozone Nonattainment Area:

Elkhart and St. Joseph Counties

Monitor Values (average value in micrograms per cubic meter):

| COUNTY     | MONITOR LOCATION                       | 2000-2002<br>AVERAGE VALUE | 2001-2003<br>AVERAGE VALUE |
|------------|--|----------------------------|----------------------------|
| Elkhart    | Elkhart Pierre Moran School            | <b>15.5</b>                | <b>15.2</b>                |
| St. Joseph | South Bend Children's Hospital Grounds | <b>14.4</b>                | <b>14.3</b>                |
| St. Joseph | South Bend Lasalle High School         | <b>14.1</b>                | <b>14.0</b>                |
| St. Joseph | South Bend Nuner Elementary School     | <b>14.0</b>                | <b>14.0</b>                |

Evaluation:

County                      Feb 15, 2004 Preliminary Designation Recommendations  
 Elkhart                      Nonattainment  
 St. Joseph                      Attainment

Discussion:

The monitor located in Elkhart County is the only monitor within the region that exceeds the standard. Values for all three monitors located within St. Joseph County are well below the standard. Elkhart County accounts for the majority of the region's NO<sub>x</sub> and VOC emissions from stationary sources. St. Joseph County accounts for 46% of the direct PM 2.5 and 98% (4,731 tons) of the SO<sub>2</sub> emissions from stationary sources. A relatively equal amount of traffic volume and congestion occurs in St. Joseph and Elkhart Counties. St. Joseph County maintains the highest population and an in-county workforce ratio of 94%. Elkhart County's growth rate is twice that of St. Joseph County and it maintains an in-county workforce ratio of 90%. St. Joseph and Elkhart Counties are under the jurisdiction of a single Metropolitan Planning Organization and are within the same Transportation Management Area.

The Elkhart monitor value of 15.2 µg/m<sup>3</sup> is marginally above the standard. It is reasonable to assume that regional controls such as the NO<sub>x</sub> SIP call and low sulfur fuels will likely reduce PM 2.5 concentrations to enable Elkhart County to attain the standard in a timely manner. Although emissions from St. Joseph County may slightly impact PM 2.5 values in Elkhart County, IDEM does not feel that there is a significant impact. Additionally, it does not appear that there will be a need for local controls in either St. Joseph or Elkhart Counties. Therefore, IDEM recommends that Elkhart County be designated nonattainment and St. Joseph County attainment.

**Other Counties:**

Counties Affected:

Dubois County

Monitor Values (average value in micrograms per cubic meter):

| COUNTY | MONITOR LOCATION | 2000-2002<br>AVERAGE VALUE | 2001-2003<br>AVERAGE VALUE |
|--------|------------------|----------------------------|----------------------------|
| Dubois | Jasper           | <b>16.7</b>                | <b>16.2</b>                |

Evaluation:

County  
Dubois

Feb 15, 2004 Preliminary Designation Recommendations  
Nonattainment

Discussion:

The lone monitor located in Dubois County exceeds the standard. Dubois County is rural and it maintains very low population density. Dubois County also maintains a high in-county workforce ratio of 94%. The VOC inventory for stationary sources in Dubois County is rather significant, however, the NO<sub>x</sub>, direct PM 2.5, and SO<sub>2</sub> inventories are relatively small (insignificant). The PM 2.5 background monitor in Spencer County (upwind of Dubois County) does maintain annual monitor values below the standard, suggesting that there may be more of a local than regional effect on values registered at the Dubois County site. There is a concentration of wood furniture manufacturers in Dubois County in the vicinity of the monitor site. However, it is unclear at this time whether

emissions from these industries contribute significantly to PM 2.5 monitor values in Dubois County.

**Other Potentially Affected Areas:**

**Cincinnati Area**

Counties Affected:

Cincinnati Area: Dearborn and Ohio Counties

EPA Proposed 8-hour Ozone Nonattainment Area:

Cincinnati Area: Dearborn County

Monitor Values : No monitor in Dearborn or Ohio Counties

Evaluation:

| <u>County</u> | <u>Feb 15, 2004 Preliminary Designation Recommendations</u> |
|---------------|---|
| Dearborn      | Attainment/Unclassifiable                                   |
| Franklin      | Attainment/Unclassifiable                                   |
| Ohio          | Attainment/Unclassifiable                                   |

Discussion:

There are no PM 2.5 monitors in Dearborn or Ohio County. There is only one significant stationary source in Indiana's portion of the Cincinnati Consolidated MSA (CMSA), which is the Tanners Creek power plant. Dearborn and Ohio Counties combined account for just 2.33% of the total population within the CMSA. The Tanners Creek power plant has reduced its emissions in recent years by installing permanent combustion controls to address requirements associated with Title IV and the NO<sub>x</sub> SIP Call. This facility has installed low-NO<sub>x</sub> burners on three of its four units, and over-fire air on the fourth, largest unit. From 1999 to 2002, annual NO<sub>x</sub> emissions from this facility have been reduced by over 20,000 tons (60% decrease).

If monitors were located in Dearborn or Ohio County, it is reasonable to assume that the values would be consistent with background values elsewhere in the state and Midwest. Therefore, IDEM does not believe that PM 2.5 concentrations exceed the standard in Dearborn or Ohio County. Additionally, based on analysis of similar urban areas, IDEM does not believe that emissions from Dearborn and Ohio Counties contribute significantly to PM 2.5 values elsewhere in the Cincinnati CMSA. For example, Morgan County is an upwind county within the Indianapolis MSA and it contains a power plant. The closest downwind monitor within the core county (Marion) maintains a value below the standard, illustrating that emissions from Morgan County are unlikely contributing to the values in Marion County. IDEM feels it reasonable to assume that the same would stand true with regard to Dearborn and Ohio Counties' impact on values within the Cincinnati CMSA. Furthermore, since urban excess seems to be apparent in the core of the Cincinnati CMSA, and neither Dearborn or Ohio Counties are in the core, nor contribute significantly to the

urban excess, IDEM recommends that Dearborn and Ohio Counties be designated attainment/unclassifiable.

Franklin County was added to the Cincinnati CMSA following the 2000 Census. This is a rural county with low population density and VMT, and an insignificant emissions base. Therefore, IDEM recommends that Franklin County be designated attainment/unclassifiable as well.

**Fort Wayne Area:**

Fort Wayne Area: Adams, Allen, DeKalb, Huntington, Wells, Whitley Counties

EPA Proposed 8-hour Ozone Nonattainment Area:

Fort Wayne Area: Allen, Huntington Counties

Monitor Values (average value in micrograms per cubic meter):

| COUNTY | MONITOR LOCATION             | 2000-2002<br>AVERAGE VALUE | 2001-2003<br>AVERAGE VALUE |
|--------|------------------------------|----------------------------|----------------------------|
| Allen  | Fort Wayne Beacon St         | <b>14.8</b>                | <b>14.3</b>                |
| Allen  | Fort Wayne Taylor University | <b>14.2</b>                | <b>14.0</b>                |

Evaluation:

| <u>County</u> | <u>Feb 15, 2004 Preliminary Designation Recommendations</u> |
|---------------|---|
| Adams         | Attainment/Unclassifiable                                   |
| Allen         | Attainment  |
| DeKalb        | Attainment/Unclassifiable                                   |
| Wells         | Attainment/Unclassifiable                                   |
| Whitley       | Attainment/Unclassifiable                                   |

Discussion:

The only monitors within the Fort Wayne MSA are located in the Fort Wayne Urban Area. All values for 2000-2002 and 2001-2003 are below the standard. Since it is reasonable to assume that the highest values within the MSA would occur where urban excess is most likely, and those values are below the standard, IDEM believes that the entire MSA is in compliance with the PM 2.5 standard. Therefore, IDEM recommends that Allen County be designated attainment, and the remaining counties within the MSA be designated attainment/unclassifiable.

**Kokomo Area:**

Counties Affected:

Kokomo Area: Howard and Tipton Counties

EPA Proposed 8-hour Ozone Nonattainment Area:

None: Kokomo Area is Attainment

Monitor Values (average value in micrograms per cubic meter):

| COUNTY | MONITOR LOCATION | 2000-2002<br>AVERAGE VALUE | 2001-2003<br>AVERAGE VALUE |
|--------|------------------|----------------------------|----------------------------|
| Howard | Kokomo           | <b>15.1</b>                | <b>14.7</b>                |

Evaluation:

|               |   |
|---------------|---|
| <u>County</u> | <u>Feb 15, 2004 Preliminary Designation Recommendations</u> |
| Howard        | Attainment  |
| Tipton        | Attainment/Unclassifiable                                   |

Discussion:

Based on 2000-2002 data, the monitor located in Howard County marginally exceeded the standard. However, the year 2000 represented the highest annual average for many sites in Indiana and weighted the 2000-2002 average adversely. The 2001-2003 average PM 2.5 value for the Howard County monitor is below the standard and consistent with values registered at background sites. Therefore, IDEM recommends that Howard and Tipton Counties be designated attainment and attainment/unclassifiable respectively.

**Lafayette Area:**

Counties Affected:

Lafayette Area: Tippecanoe and Carroll Counties

EPA Proposed 8-hour Ozone Nonattainment Area:

None: Lafayette is attainment

Monitor Values (average value in micrograms per cubic meter):

| COUNTY     | MONITOR LOCATION  | 2000-2002<br>AVERAGE VALUE | 2001-2003<br>AVERAGE VALUE |
|------------|-------------------|----------------------------|----------------------------|
| Tippecanoe | Fire Station      | <b>15.4*</b>               |                            |
| Tippecanoe | 3401 Greenbush St | <b>14.1*</b>               | <b>14.0*</b>               |
| Tippecanoe | Scenario A**      | <b>15.2</b>                | <b>14.7</b>                |
| Tippecanoe | Scenario B        | <b>14.8</b>                | <b>14.3</b>                |
| Tippecanoe | Scenario C        | <b>14.9</b>                | <b>14.3</b>                |
| Tippecanoe | Scenario D        | <b>14.9</b>                | <b>14.3</b>                |
| Tippecanoe | Scenario E        | <b>14.7</b>                | <b>14.2</b>                |

\* The monitor was moved in 2002. These are the averages at each location; this data is incomplete.

\*\* These are different scenarios for filling in the missing data (see below for details).

Evaluation:

|               |   |
|---------------|---|
| <u>County</u> | <u>Feb 15, 2004 Preliminary Designation Recommendations</u> |
| Tippecanoe    | Attainment/Unclassifiable                                   |
| Carroll       | Attainment/Unclassifiable                                   |

Discussion:

According to EPA guidance, the monitoring data for the Lafayette monitor site is incomplete. Furthermore, since the capture rate for the third quarter of 2002 is less than 50%, a quarterly maximum substitution is not advisable. Although a three-year average based on complete data will not be available until at least the close of 2005, IDEM has summarized alternate methods for evaluating the captured data in Figure 3.2 (attached to this document).

As illustrated by each of the data analysis methods in Figure 3.2, the three-year average PM 2.5 value (2001-2003) for the Lafayette monitor site is likely below the standard. Additionally, since the critical value (the quarterly average value required for the three-year average to exceed the standard) for the third quarter of 2002 is 22.44, and no quarterly average during the three year period even approaches this critical value, we are confident in stating that the PM 2.5 concentrations in Tippecanoe County are below the standard. Therefore, IDEM recommends that Tippecanoe, along with Benton and Carroll Counties be designated attainment/unclassifiable.

**Muncie Area:**

Counties Affected:

Muncie Area: Delaware County

EPA Proposed 8-hour Ozone Nonattainment Area:

Muncie Area: Delaware County

Monitor Values (average value in micrograms per cubic meter):

| COUNTY   | MONITOR LOCATION    | 2000-2002<br>AVERAGE VALUE | 2001-2003<br>AVERAGE VALUE |
|----------|---------------------|----------------------------|----------------------------|
| Delaware | Muncie, Scenario A* | <b>15.1</b>                | <b>14.3</b>                |
| Delaware | Scenario B          | <b>16.0</b>                | <b>16.1</b>                |
| Delaware | Scenario C          | <b>15.0</b>                | <b>14.5</b>                |
| Delaware | Scenario D          | <b>14.6</b>                | <b>13.6</b>                |

|          |            |      |      |
|----------|------------|------|------|
| Delaware | Scenario E | 14.8 | 14.0 |
| Delaware | Scenario F | 14.7 | 13.8 |

\* This monitor data is incomplete; it is missing the required amount of data in two different quarters. These are scenarios for filling in the missing data (see below for more details).

Evaluation:

County                      Feb 15, 2004 Preliminary Designation Recommendations  
Delaware                      Attainment

Discussion:

According to EPA guidance, the monitoring data for the Delaware County site is incomplete. Figure 3.3 (attached to this document) provides a summary of alternate methods for evaluating the captured data.

IDEM does not believe that the substitution of the quarterly maximum value (worst-case scenario) results in a PM 2.5 value representative of the PM 2.5 concentrations registered at the Delaware County monitor. As noted in Figure 3.3, four reasonable data analysis methods indicate that the three-year average PM 2.5 value is below the standard. Additionally, in using the highest first quarter value among 2000 and 2002 as a substitution for either first quarter 2001 or first quarter 2002, the critical value (the quarterly average value required for the three-year average to exceed the standard) for either quarter is 20.74. No quarterly average during the three year period even approaches this critical value, so we are confident in stating that the PM 2.5 concentrations in Delaware County are below the standard. Also worth noting is that the three-year average value resulting from calculation scenarios A, C, and D are similar to the actual monitor value associated with neighboring Madison County (14.6).

IDEM believes that a recommendation for Delaware County to be designated attainment is consistent with monitored PM 2.5 values within the area.

**Terre Haute Area:**

Counties Affected:

Terre Haute Area: Clay, Sullivan, Vermillion and Vigo Counties

EPA Proposed 8-hour Ozone Nonattainment Area:

Terre Haute Area: Vigo County

Monitor Values (average value in micrograms per cubic meter):

| COUNTY | MONITOR LOCATION | 2000-2002<br>AVERAGE VALUE | 2001-2003<br>AVERAGE VALUE |
|--------|------------------|----------------------------|----------------------------|
|--------|------------------|----------------------------|----------------------------|

|      |                            |      |      |
|------|----------------------------|------|------|
| Vigo | Terre Haute                | 15.2 | 14.6 |
| Vigo | Terre Haute Devaney School | 13.5 | 13.4 |

Evaluation:

| <u>County</u> | <u>Feb 15, 2004 Preliminary Designation Recommendations</u> |
|---------------|---|
| Sullivan      | Attainment/Unclassifiable                                   |
| Vermillion    | Attainment/Unclassifiable                                   |
| Vigo          | Attainment  |
| Clay          | Attainment/Unclassifiable                                   |

Discussion:

Based on 2000-2002 monitoring data, one of the two monitors located in Vigo County exceeded the standard. However, the year 2000 represented the highest annual average for many sites in Indiana and weighted the 2000-2002 average adversely. The 2001-2003 average PM 2.5 values for Vigo County monitors are below the standard and consistent with values registered at nearby background sites. Therefore, IDEM recommends that Vigo County be designated attainment and the remaining counties within the MSA be designated attainment/unclassifiable.