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MEMORANDUM

To: **Planning Coordinating Committee**

Date: **January 7, 2009**

From: **Kristin Heery, Ross Patronsky**

Re: **Regional Air Quality Snapshot update**

This memo serves to update the Committee on the Regional Air Quality Snapshot, scheduled to be completed spring 2009. An outline for the Snapshot is attached at the end of this memo.

The focus of this update is to review Section III of the report, which covers the region's existing air quality conditions and sources. The data used in this section were taken from annual information reported by IEPA to U.S. EPA and supplemental information supplied directly from IEPA.

The basic data reviewed are exceedances, those days on which air quality monitors show that pollution levels are higher than the National Ambient Air Quality Standards (NAAQS). These data are important because the exceedances lead to the finding of air quality nonattainment for the region. In addition to looking at current exceedances, the analysis seeks to portray current conditions of air quality over time and on a more "every day" basis – beyond what is tracked for the Clean Air Act. The focus is on ozone and particulate matter (PM) pollution.

This section of the report, Section III: Our Region's Air Quality, is divided into six subsections:

1. Standards, identifying the NAAQS for ozone and PM;
2. Data/Monitoring, describing the data sources and monitors;
3. Ozone levels and trends;
4. PM levels and trends;
5. The Air Quality Index; and
6. Regional source breakdown, describing which sources contribute to our air pollution.

Standards

NAAQS are set by regulations under the Clean Air Act; when they are not met, a region is deemed to be in nonattainment. Northeastern Illinois is in nonattainment for ozone and $PM_{2.5}$. The following are the standards for these two criteria pollutants.

Ozone

- 0.075 ppm (revised to this level in 2008)
- Measured on 8-hour average
- Violations tracked at 3-year average of 4th highest daily maximum

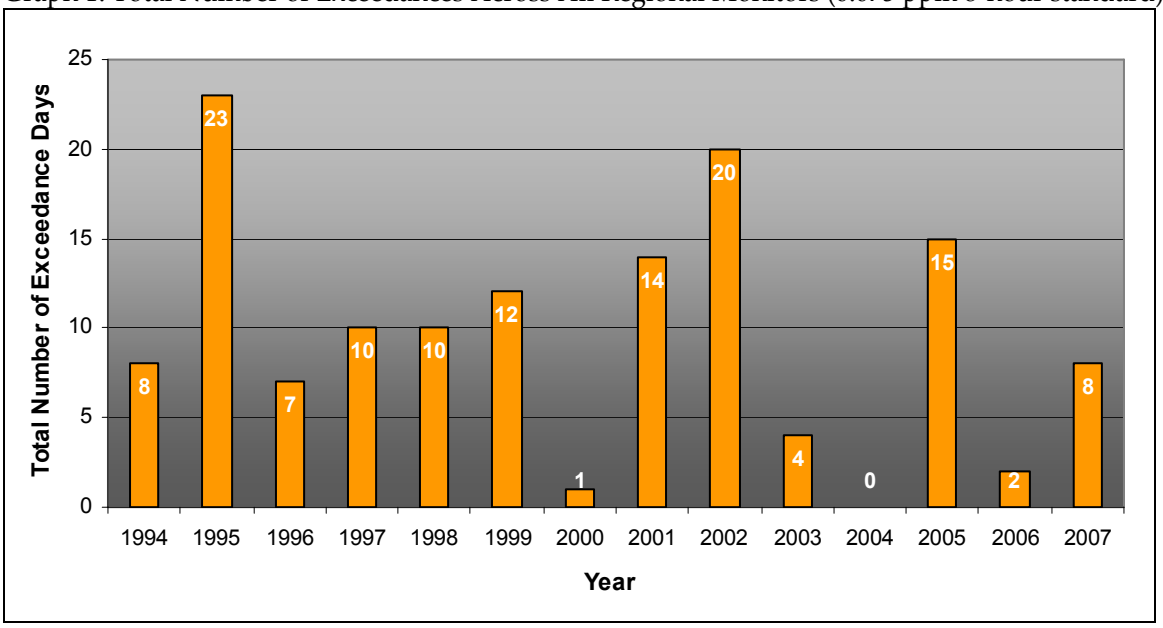
$PM_{2.5}$

- 15 µg/m³ annual mean
- 35 µg/m³ daily average

Ozone

To understand ozone levels beyond the strict regulatory context, data from all monitors across the region was downloaded and analyzed. Graph 1 represents the total number of exceedances across all regional monitors per year. The chart gives a rough idea of regional ozone exceedances, and shows a slight decrease in exceedance days over time.

Graph 1: Total Number of Exceedances Across All Regional Monitors (0.075 ppm 8-hour standard)

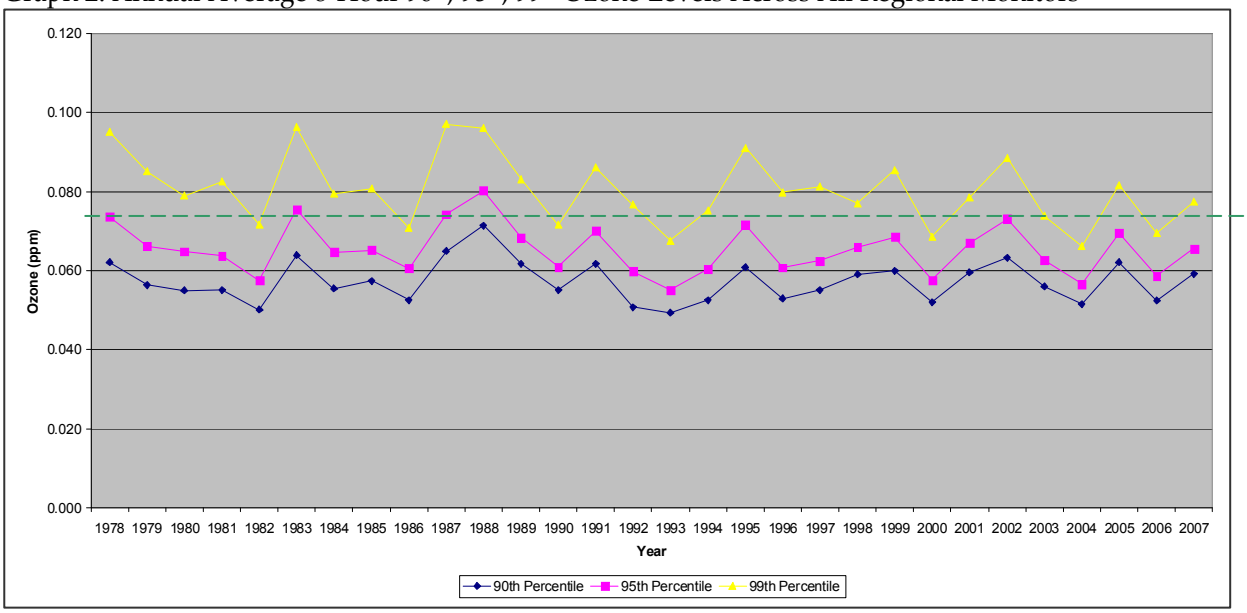


To understand ozone pollution on a more routine basis, average levels were reviewed. However, average ozone levels are affected by different photochemical processes under different weather and sunlight conditions. Separating the different situations into meaningful categories is a research issue beyond the scope of this snapshot. Therefore, Graph 2 takes a look at three divisions of regional average ozone levels – the 90th, 95th, and 99th percentiles. Because the "ozone season" is approximately 200 days per year, the 90th, 95th, and 99th percentiles are the equivalent of the worst 20, 10, and 2 days per year respectively. (The dashed green line represents 0.075 ppm, the standard.)

As portrayed in the graph, the regional average's worst 2 days each year (the 99th percentile) are usually above the standard, which underscores why the region is in nonattainment. But

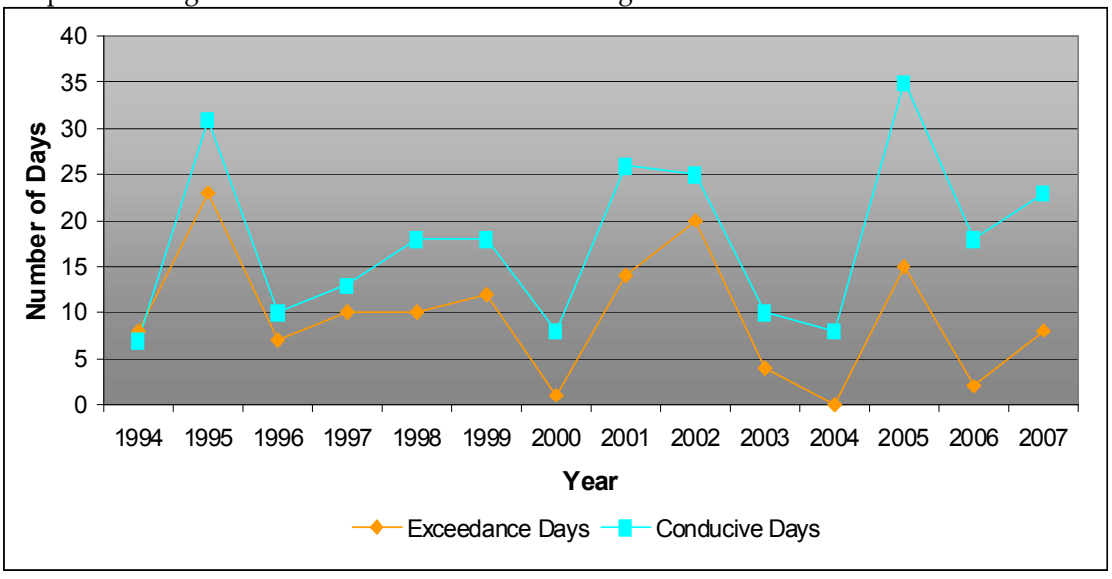
perhaps a more interesting story is that the regional average's worst 10 days per year and worst 20 days per year hover just below the standard. It is important to note that there are other factors at play in this evaluation, including background ozone precursors coming in from other regions. This issue, and how to portray it effectively, will be explored further, along with critical review by IEPA.

Graph 2: Annual Average 8-Hour 90th, 95th, 99th Ozone Levels Across All Regional Monitors



It is important to point out that ozone levels are highly related to weather. IEPA tracks "ozone conducive days" – days when weather patterns favor the chemical reaction that creates ozone from emissions. Perhaps more than any other variable, the number of conducive days plays a key role in excessive ozone levels, as evidenced in Graph 3, where the two values are clearly highly correlated.

Graph 3: Average Ozone Exceedances Across All Regional Monitors vs Number of Conducive Days

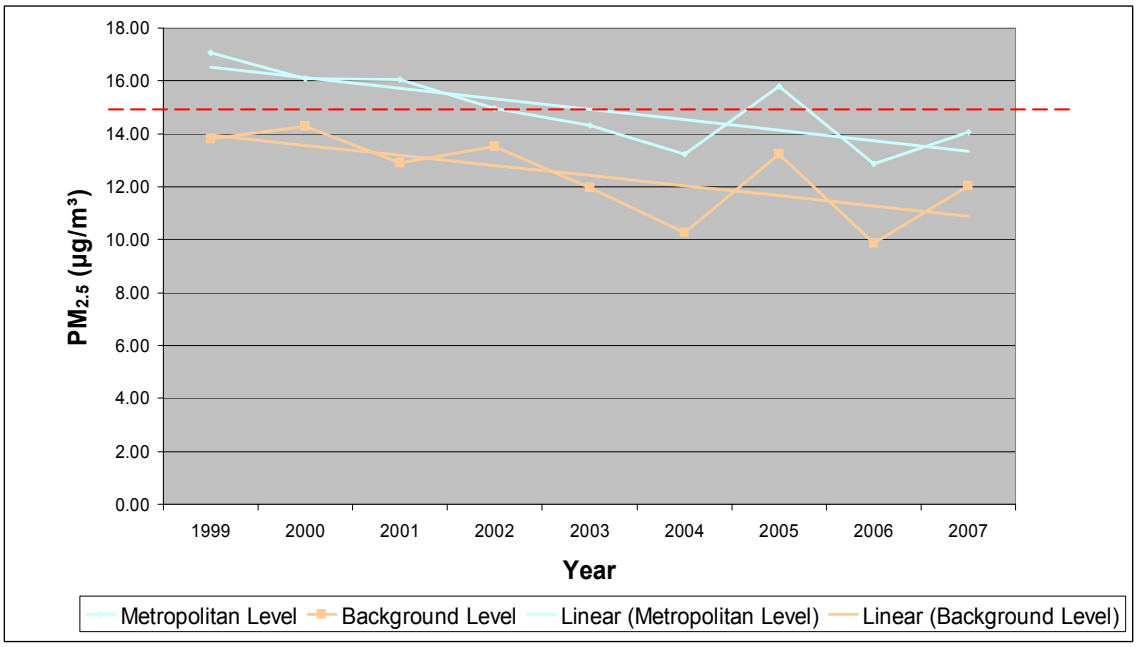


Particulate Matter ($PM_{2.5}$)

To understand $PM_{2.5}$ levels beyond the regulations, data from all the monitors across the region was downloaded and analyzed. However, $PM_{2.5}$ has only been monitored for the last ten years, with the standard just going into effect in 2004, after their initial promulgation in 1997. 24-hour exceedance data is only available for 2007 because it is the first time our region didn't meet the 24-hour standard. For this year, the data showed a regional average of about 3 days exceeding the 24-hour $PM_{2.5}$ standard per monitor across the region.

A better understanding of $PM_{2.5}$ is revealed when evaluating the annual concentration, averaged across all regional monitors. This is plotted in Graph 4, along with a plot line of the background level of $PM_{2.5}$ (as measured by a monitor in southwestern Will County). This graph shows a clear downward trend, indicating that the annual average $PM_{2.5}$ levels are improving. (The dashed red line is 15 $\mu g/m^3$, the standard.)

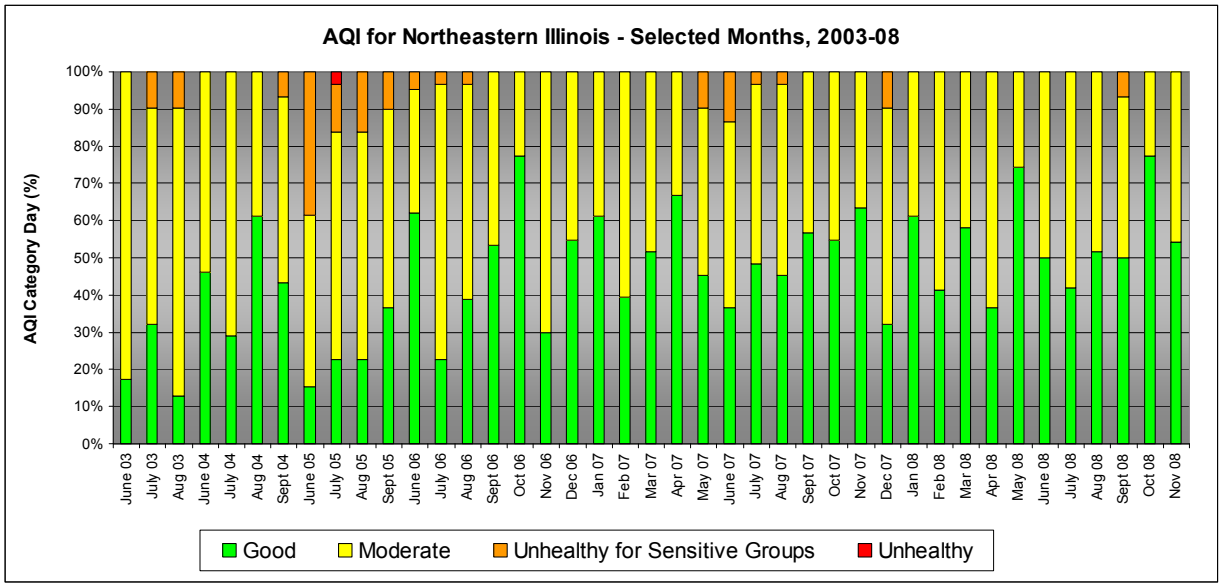
Graph 4: Annual Average $PM_{2.5}$ Across All Regional Monitors, Annual Average Background Level



The Air Quality Index

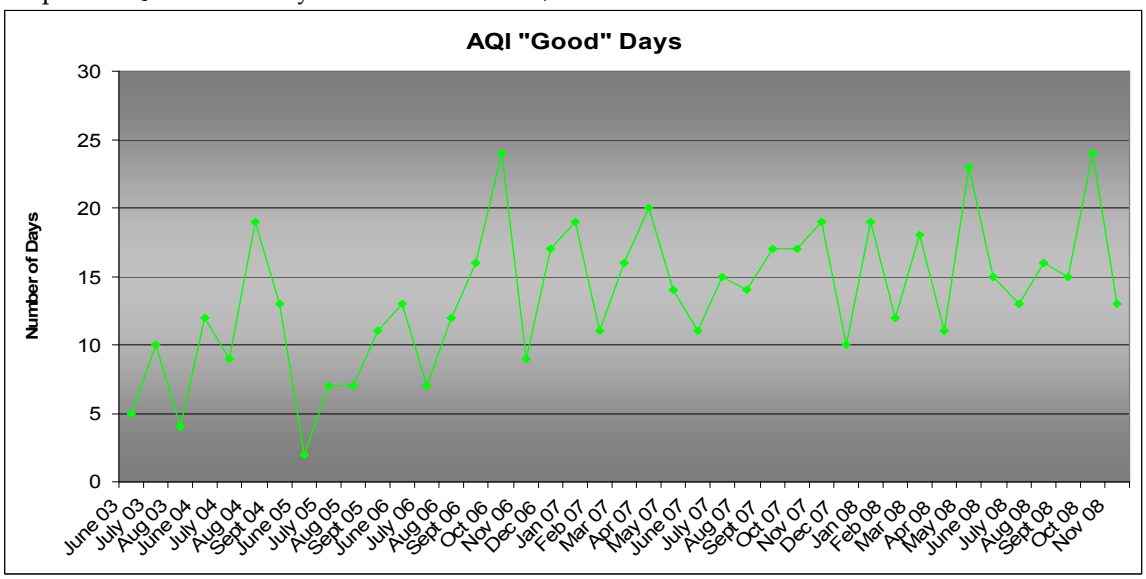
Because of the challenges with averaging regional air quality data, another avenue for understanding the region's "every-day" air quality is looking at the Air Quality Index (AQI). The AQI is a national index for reporting daily air quality in a color-coded, user-friendly way. Although the data has been transformed into an index, it provides a picture of the number of "good" and "moderate" days compared to "unhealthy for sensitive groups" and "unhealthy" days over time. (Fortunately, the region has no AQI days of "very unhealthy" or "hazardous" on record.) This is shown in Graph 5, below. Graphically, it is clear that the vast majority of days in northeastern Illinois have an AQI less than 100, registering as "good" or "moderate."

Graph 5: AQI for Northeastern Illinois – Selected Months, 2003-2008



Another way of looking at this information was to track just the good days, shown below in Graph 6. This graph shows a slight upward trend of increasing numbers of good days over time. However, AQI data is not as complete as other IEPA sources, as it is relatively new to track it year-round. Both of these graphs display information only for selected months in which data were available, and in a relatively short time frame of just five years.

Graph 6: AQI "Good" Days – Selected Months, 2003-2008



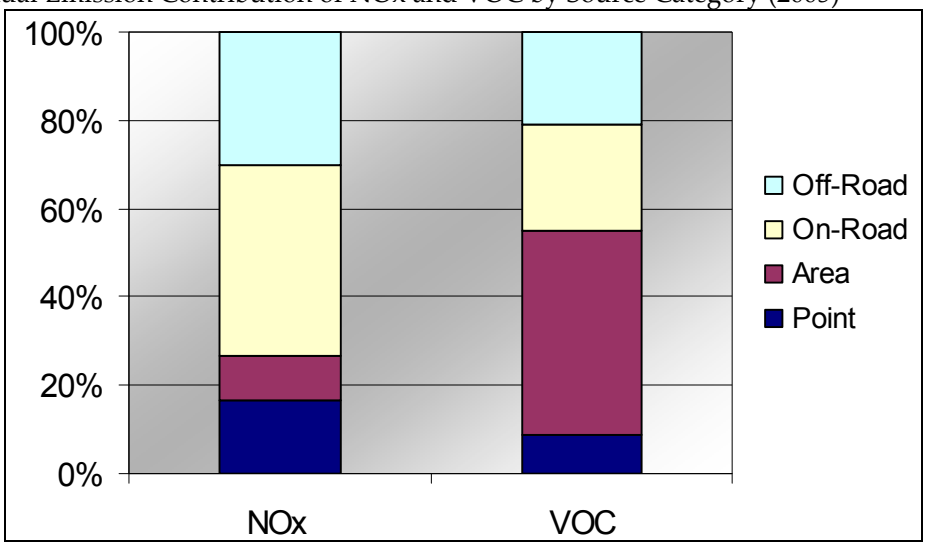
Regional Source Breakdown

In addition to evaluating the region's current air quality, it is important to evaluate the regional sources impacting it. IEPA measures the sources in four categories:

- Point – large, stationary emitters such as power plants, chemical producers, and manufacturing plants;
- Area – small, stationary emitters (< 25 tons/year) such as dry cleaners, gas stations, bakeries, or motor vehicle refinishers;
- On-Road – mobile emitters such as cars, trucks, and buses; and
- Off-Road – mobile emitters such as gas-powered lawn and farm equipment, construction equipment, boats, planes, and trains.

IEPA estimates the amount of ozone precursors (NOx and VOC) these sources emit periodically in the Chicago Nonattainment Area. They currently have data for the 2005, but have also have measurements from 1990, 1996, and 2002 for comparison. The following graph displays the percentage of air pollution emitted by each category for 2005.

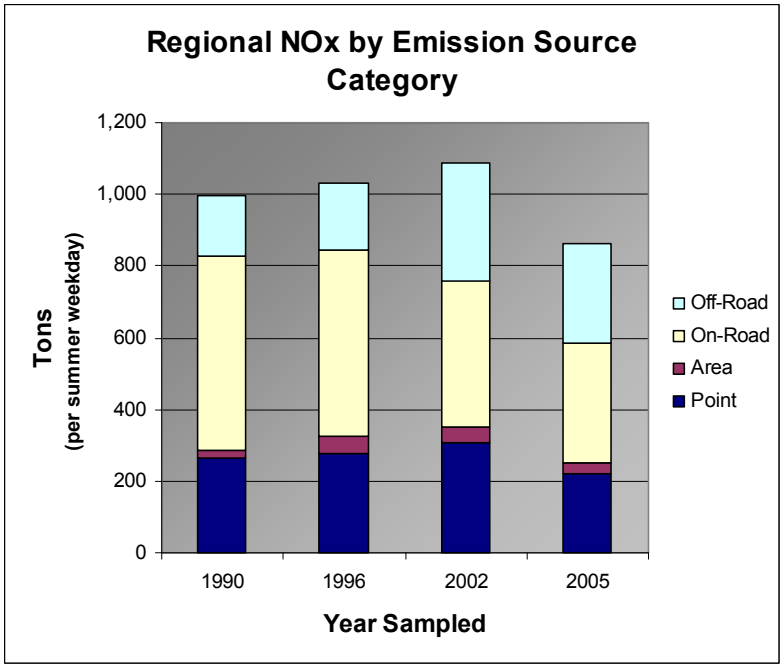
Graph 5: Annual Emission Contribution of NOx and VOC by Source Category (2005)

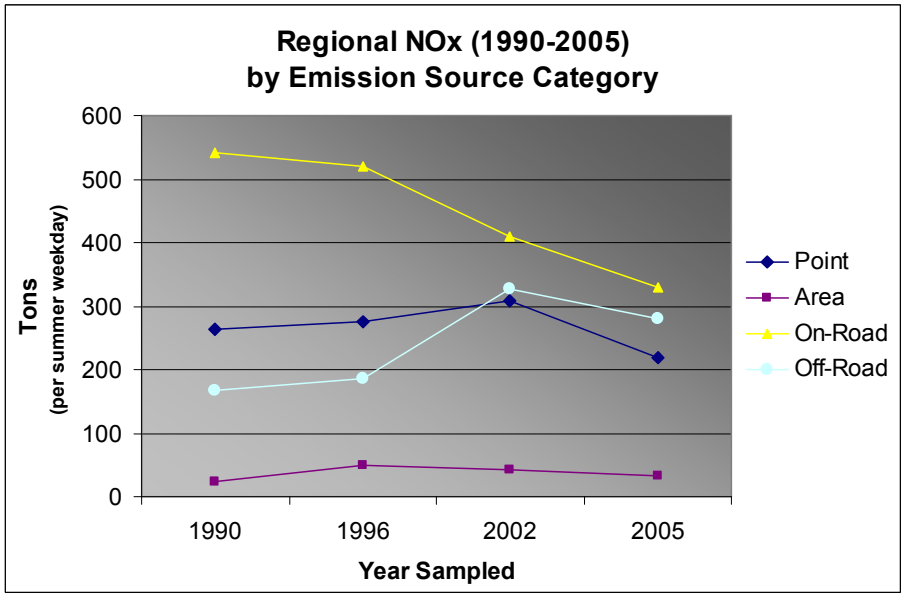


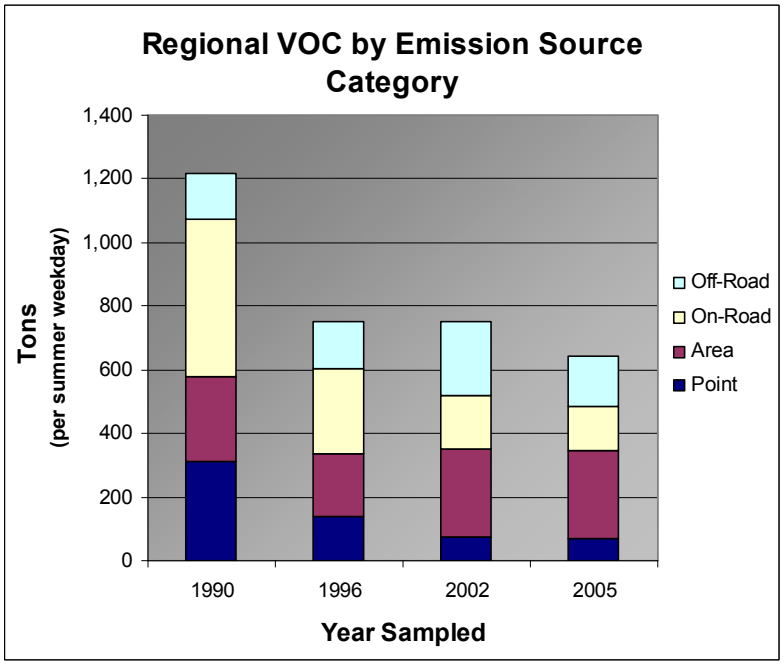
The change in NOx and VOC emitted by these sources over time is portrayed in the following four charts (next page).

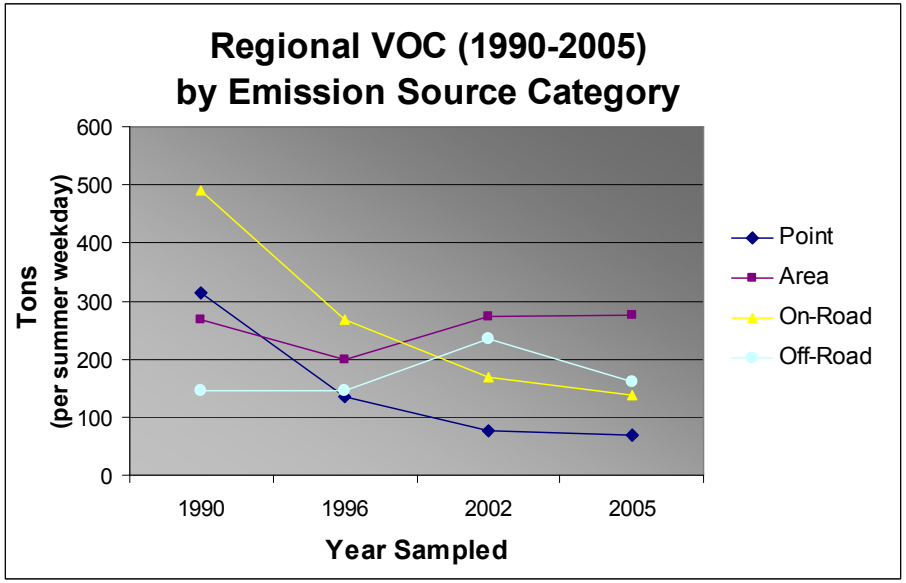
The first two charts show NOx source data. The first, displaying the total amounts of NOx by source – in 1990, 1996, 2002, and 2006 – indicates how there has been a small decrease in total NOx over time. The second NOx chart displays the change in the amount contributed by each source over time, highlighting how on-road and point sources have declined.

The second two charts portray VOC source data. The first, displaying the total amount of VOC by source – in 1990, 1996, 2002, and 2006 – show significant progress in reducing VOCs overall. The second VOC chart displays the change in each source category, again highlighting the significant decrease in on-road and point source VOC emissions since 1990.


Regional NOx by Emission Source Category
Tons (per summer weekday)
1,200
1,000
800
600
400
200
0
1990
1996
2002
2005
Year Sampled
Off-Road
On-Road
Area
Point


Regional NOx (1990-2005) by Emission Source Category
Tons (per summer weekday)
600
500
400
300
200
100
0
1990
1996
2002
2005
Year Sampled
Point
Area
On-Road
Off-Road


Regional VOC by Emission Source Category
Tons (per summer weekday)
1,400
1,200
1,000
800
600
400
200
0
1990
1996
2002
2005
Year Sampled
Off-Road
On-Road
Area
Point


Regional VOC (1990-2005) by Emission Source Category
Tons (per summer weekday)
600
500
400
300
200
100
0
1990
1996
2002
2005
Year Sampled
Point
Area
On-Road
Off-Road

Preliminary Conclusions/Next Steps

- The region is in nonattainment for the Clean Air Act, but is making progress.
- It is difficult to determine the "every day" ozone conditions, which may not register as exceedances, but hover just below the standard.
- Much of our regional pollution is blowing in from outside the region.
- According to the source breakdown, it will important to investigate all contributors to air pollution – especially area and off-road mobile sources, which haven't shown as much progress.
- The recommendations section will consider what the region can do above and beyond actions mandated under the Clean Air Act.

Regional Air Quality Snapshot – Working Outline

I. Introduction
   a. What is air quality?
   b. Why is air quality an important issue in our region?
   c. How does air quality fit into *GO TO 2040*?

II. Air Pollution Sources/Effects
   a. Sources
      i. Point
      ii. Area
      iii. Mobile – on-road and off-road
   b. Effects
      i. Health (primary)
      ii. Environment/Property (secondary)
      iii. Other

III. Our Region's Air Quality
   a. Standards
   b. Data/Monitors
   c. Pollutants – exceedances and "every day"
      i. Ozone
      ii. PM
   d. Regional Source Breakdown
      i. NOx
      ii. VOC
   e. LADCO mega-region

IV. Current Regulatory Actions
   a. Federal
      i. Clean Air Act
      ii. SAFETEA-LU
      iii. National Environmental Policy Act (NEPA)
      iv. Energy Policy
   b. State
      i. State Implementation Plan (SIP)
      ii. Permitting
      iii. Emission Reduction Market System (ERMS)
      iv. Conformity
      v. Inspection and Maintenance
      vi. Monitoring and Reporting
   c. Regional/Local
      i. CMAP
      ii. Lake Michigan Air Directors Consortium (LADCO)
      iii. Local

V. Current Voluntary/Additional Efforts
   a. Federal
   b. State
   c. Regional/Local

7. Proposed Strategies/Conclusions