

Review of Emissions Inventory and Modeling Data Committee Work



Dan Weiss, EIMD
Committee Chair

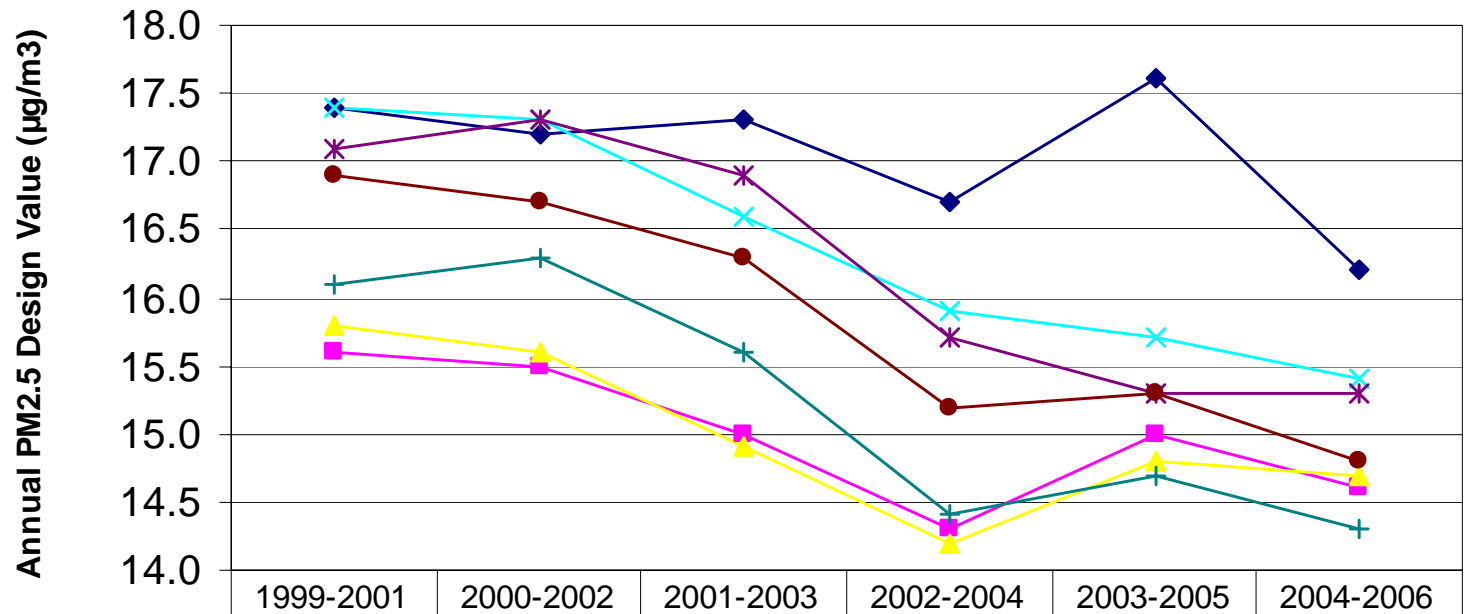
Agenda

- Purpose
- Monitoring Data
- Emissions Inventory Data
- Modeling Results
- Recommendations

Committee Purpose

- To support the Fine Particle Air Quality Task Force and its committees with the collection, distribution, and education of technical information related to PM2.5 and related precursors.
- Members:
 - Tim Corrigan, Greater Louisville, Inc.
 - Sharon Dodson, E.ON U.S.
 - Arnita Gadson, WJCCTF
 - Regina Henry, Cemex (Alt. Shannon Graves)
 - Wallace McMullen, Sierra Club
 - Pat Moran
 - Karen Scott, Regional Airport Authority (Alt. Bob Slattery)
 - Dan Weiss, Duke Energy (Chair)

Figure 6-1. Design Values for FRM Monitors in Louisville Area.



	1999-2001	2000-2002	2001-2003	2002-2004	2003-2005	2004-2006
◆ 18-019-0006 Clark County, IN	17.4	17.2	17.3	16.7	17.6	16.2
■ 18-043-1004 Floyd County, IN	15.6	15.5	15	14.3	15	14.6
▲ 21-029-0006 Bullitt County, KY	15.8	15.6	14.9	14.2	14.8	14.7
× 21-111-0043 Jefferson County, KY	17.4	17.3	16.6	15.9	15.7	15.4
* 21-111-0044 Jefferson County, KY	17.1	17.3	16.9	15.7	15.3	15.3
● 21-111-0048 Jefferson County, KY	16.9	16.7	16.3	15.2	15.3	14.8
+ 21-111-0051 Jefferson County, KY	16.1	16.3	15.6	14.4	14.7	14.3

* Recovery below 75% due to renovation at 21-111-0043 Southwick (KY) monitor for 2001-2003 design value

Figure 6-2. Speciation Data Collected in Louisville and Kentucky, 2002 to 2006.

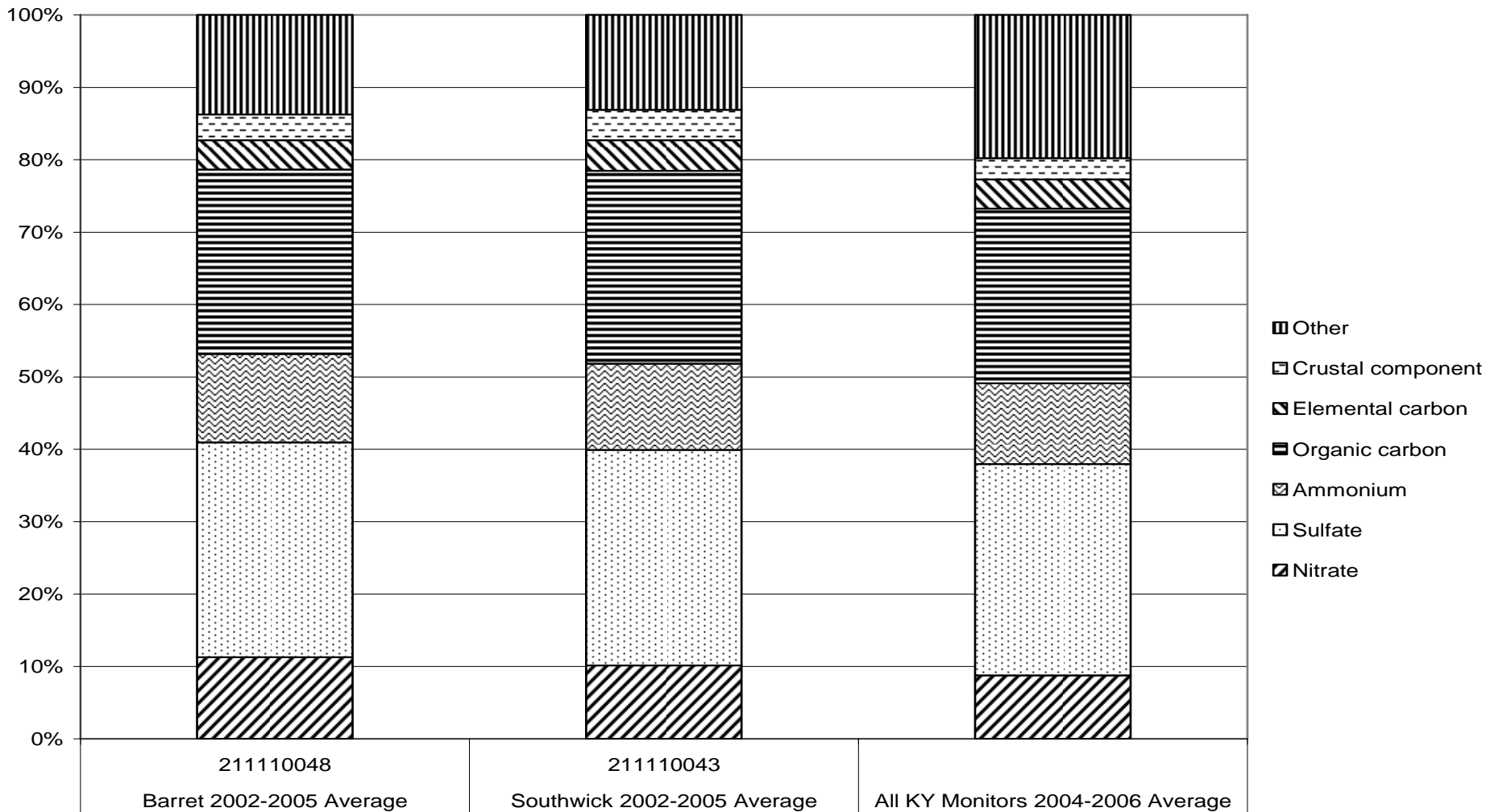


Figure 6-3. Monthly Speciation Data from Southwick Site in 2006.

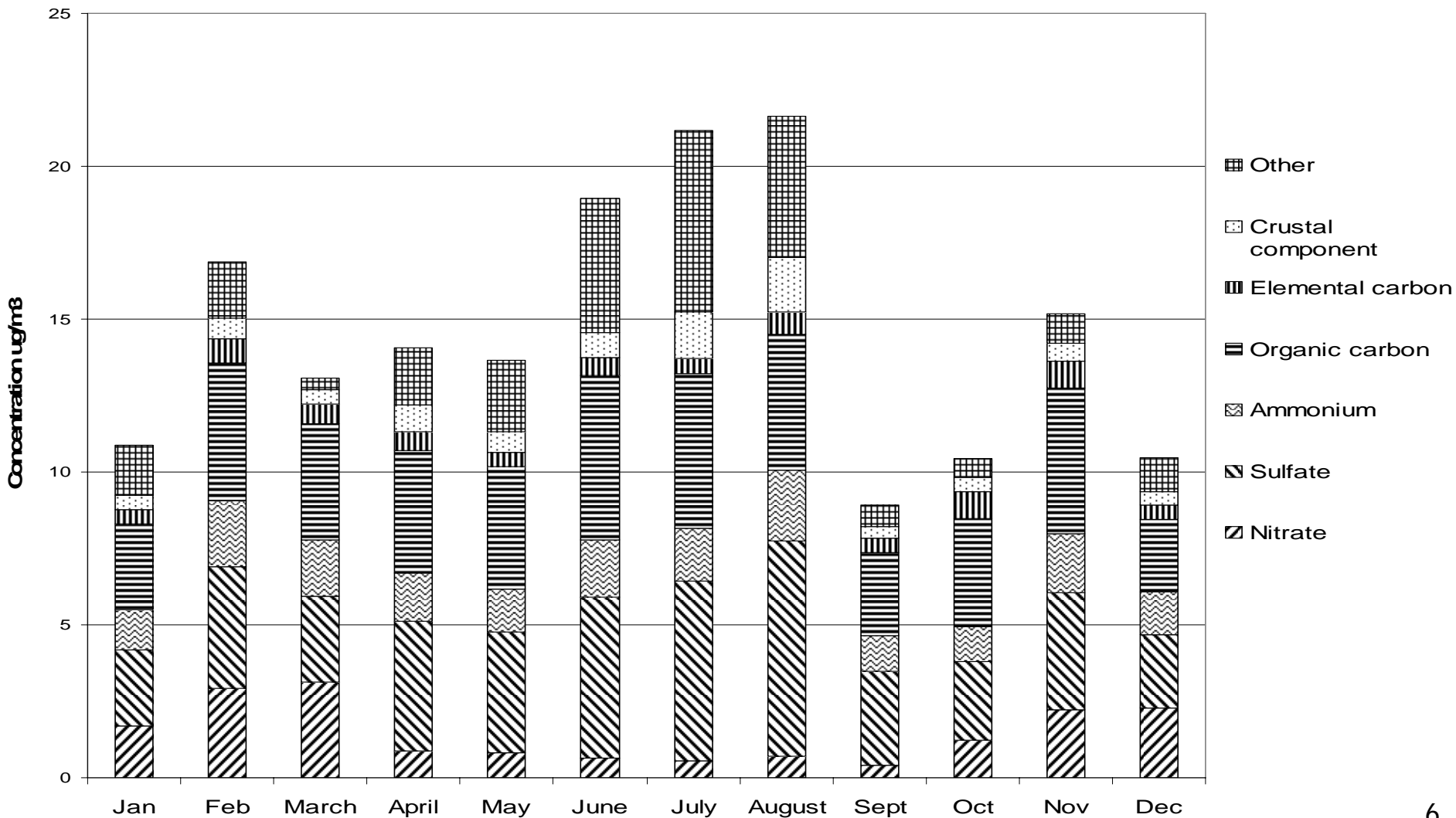
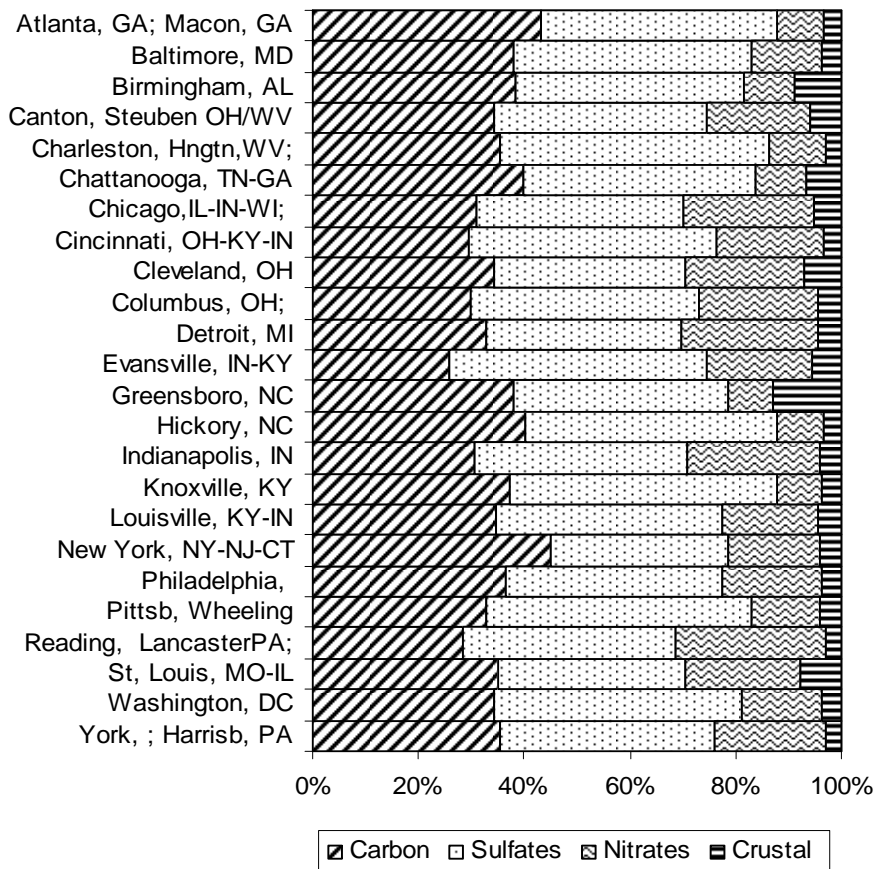
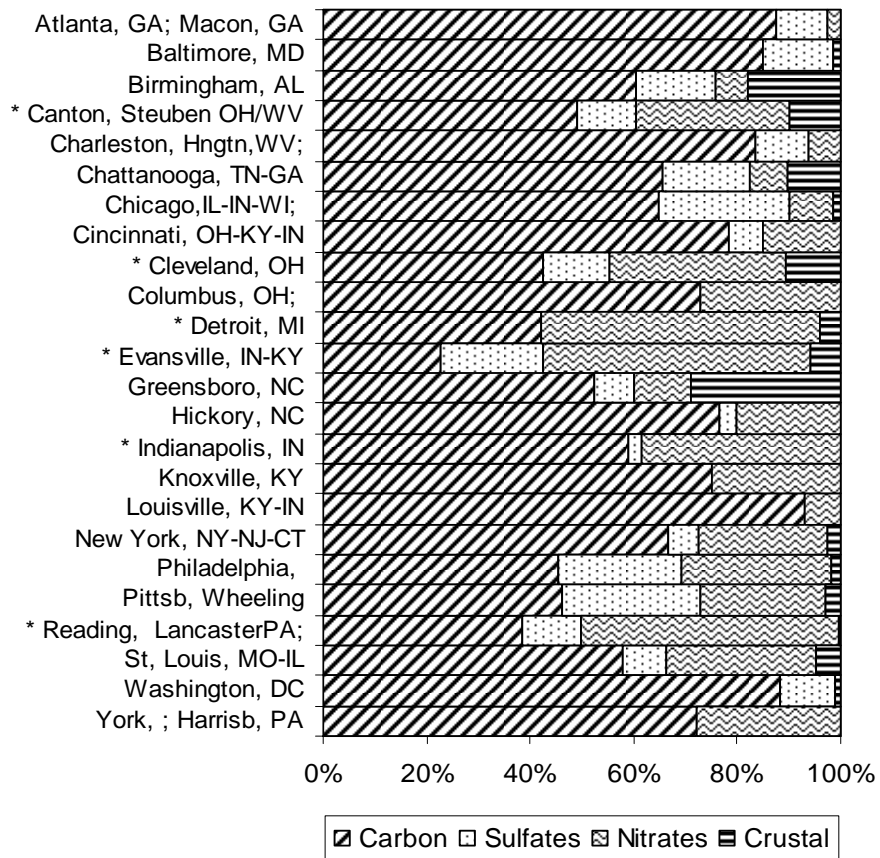


Figure 6-4. PM2.5 Composition and Estimated Urban Excess for U.S. Cities.

Estimated PM2.5 Composition



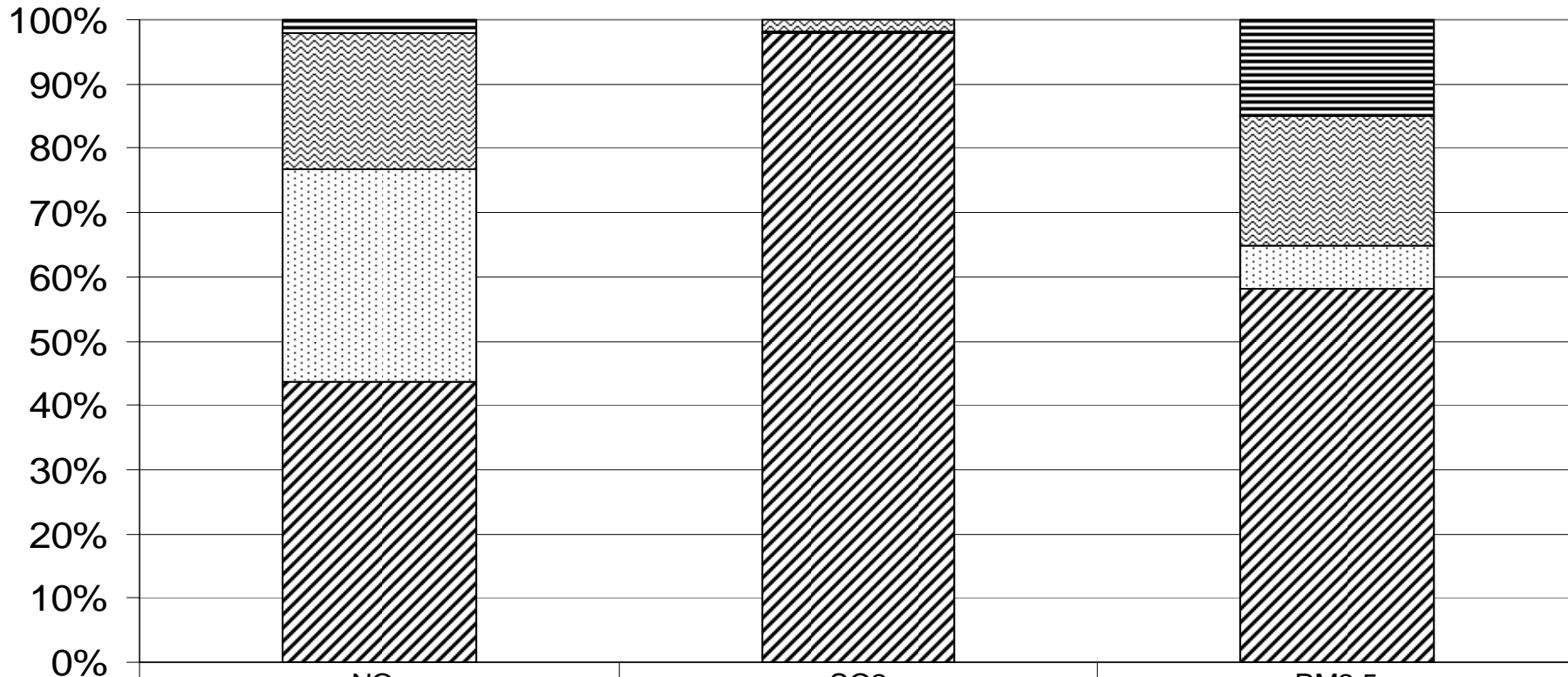
Estimated Urban Excess



Based on constructed mass (not SANDWICH), 2003

*Indicates areas with > 30% UE nitrates

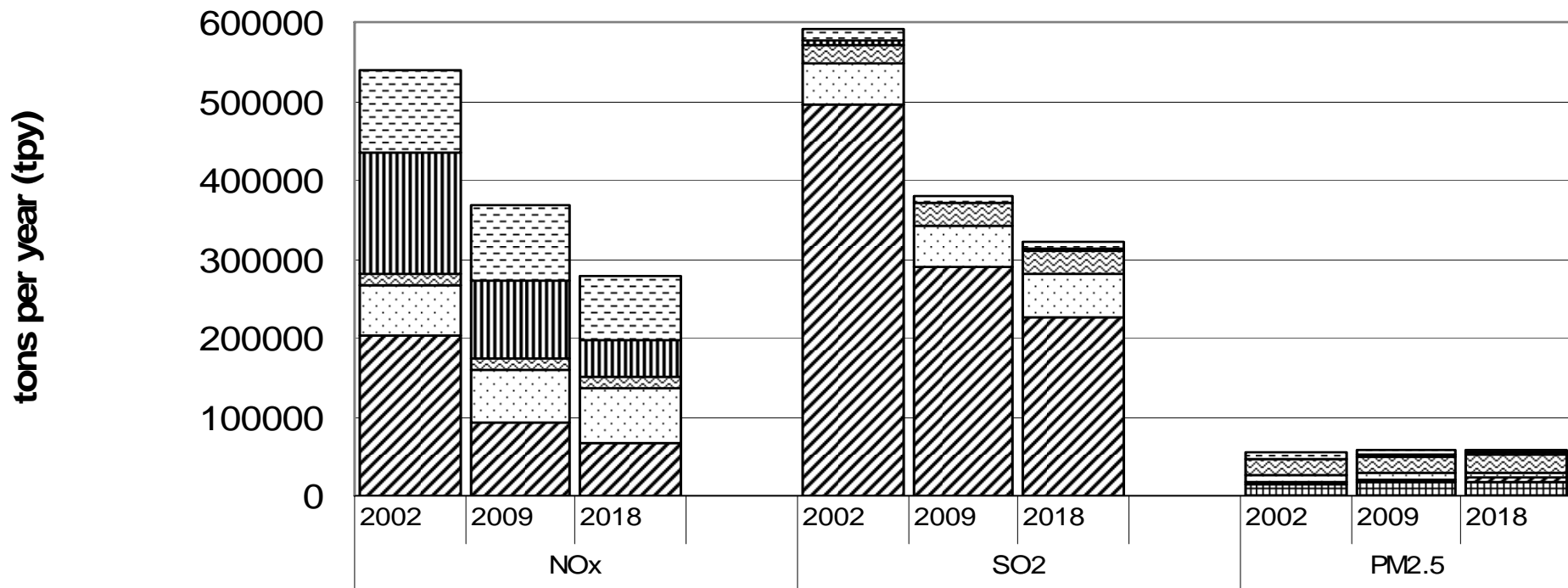
Figure 6-5. Source Apportionment, by Percent, of Total Emissions in Jefferson County, KY, Based on APCD 2005 Emissions Inventory Data



	NOx	SO2	PM2.5
Area	1272.6	0.0	645.9
Nonroad	12404.4	790.2	877.5
Mobile	19682.0	213.1	291.0
Stationary	25745.0	45313.1	2517.7

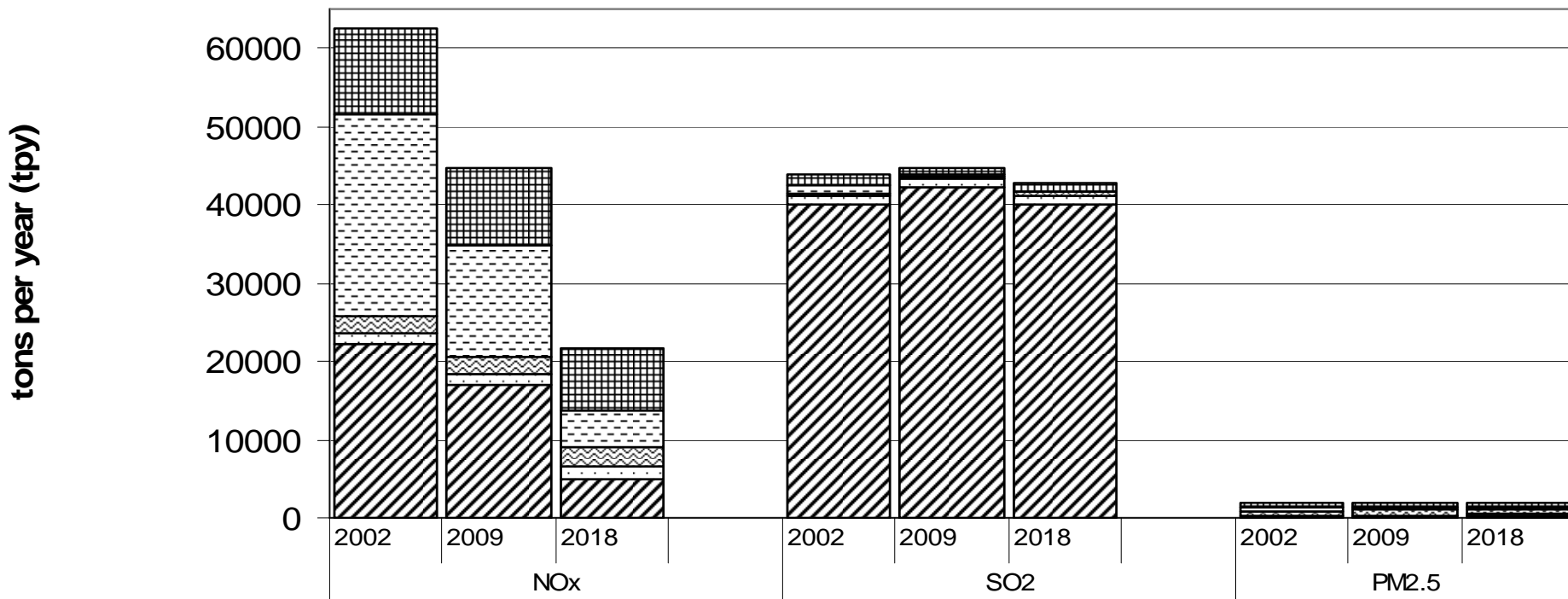
*Data in table reported as tons per year (tpy)

Figure 6-7. ASIP 2002, 2009, and 2018 Emissions for the state of Kentucky.



	NOx			SO2			PM2.5		
	2002	2009	2018	2002	2009	2018	2002	2009	2018
NonRoad Mobile	104570	94752	79391	14043	9180	8591	6045	5203	4256
Mobile	154633	100025	46992	6237	750	693	2666	1898	1157
Industrial	12203	12962	15277	24359	26945	31146	19256	20260	23147
Other Fuel Combustion	65712	66860	70083	51472	52555	53718	8814	8180	7695
Electric Generating Units	201928	91587	64377	495152	290192	226062	2847	4269	4433
Miscellaneous	354	1116	1143	91	300	309	14147	17418	17865

Figure 6-8. ASIP 2002, 2009, and 2018 Emissions for Jefferson County, Kentucky.



	NOx			SO2			PM2.5		
	2002	2009	2018	2002	2009	2018	2002	2009	2018
NonRoad Mobile	10989	9785	7865	1428	921	859	720	649	566
Mobile	25548	14335	4840	904	110	87	364	238	136
Industrial	2358	2018	2466	355	386	473	558	613	736
Other Fuel Combustion	1470	1500	1554	1211	1173	1209	100	84	89
Electric Generating Units	22084	16954	4898	39915	42127	40032	166	197	202
Miscellaneous	0	0	0	0	0	0	101	111	127

Table 6-2. Future Design Values for Local Monitors.

Monitor	LADCO 2009 DVF	LADCO 2018 DVF	ASIP 2009 DVF	ASIP 2018 DVF
180190006 Clark County, IN	13.6	13.2	15.0	
180431004 Floyd County, IN	12.1	11.5	13-13.9	
210290006 Bullitt County, KY	12.4	12.0	13-13.9	
211110043 Jefferson County, KY	12.8	12.1	14.9	
211110044 Jefferson County, KY	12.8	12.4	14.9	
211110048 Jefferson County, KY	12.5	12.1	14.9	

***ASIP data not available at this time**

6.4.1 Information Needs

- The scientific and regulatory communities understanding of PM2.5 emissions, atmospheric reactions and modeling capabilities is not as mature as other criteria pollutants such as ozone.
- The ability to accurately and precisely estimate PM2.5 primary emissions has improved since 2002 but more work is needed to improve emissions estimates.
- The following recommendations address improvements necessary in modeling and monitoring of PM2.5 to more accurately reflect an area's issues and to identify appropriate control strategies.

Recommendations

- **Recommendation 1:** *The agency should work with EPA, the states of Kentucky and Indiana and local sources to improve methods to estimate local sources of PM2.5 emissions.*
- **Recommendation 2:** *The agency should work with EPA and the states of Kentucky and Indiana to continue to fund existing, as well as increase the number of, speciated PM2.5 monitors in the area so as to better understand the local and regional contributors of PM2.5.*
- **Recommendation 3:** *The agency should work with EPA, the regional modeling groups and local sources to conduct updated and more detailed regional as well as more detailed local modeling studies to gain a better understanding of the relative impact and timing of regional and local emissions reductions beyond On-The-Books controls on local PM2.5 concentrations after 2009.*

6.4.2 Data Collection Process

- The EIMD committee did not have sufficient time during this process to collect, analyze and synthesize all the data that it would have liked to in an effort to gain a full understanding of the relative contributors of PM2.5 levels in the region.
- The committee did not have time to investigate any projected emissions or modeling information beyond annual information in the Louisville nonattainment area.

Recommendation

- **Recommendation 4:** *In future SIP Task Force planning groups the Emissions Inventory and Modeling Committee should start its deliberations months before other committees in order to have sufficient time to collect, analyze and synthesize needed information.*

6.4.3 Interpretation of Data

- Source apportionment and urban excess data presented to the committee suggests that by 2009, organic carbon and sulfates will be the two largest chemical constituents found in annual monitored PM_{2.5} locally.
- While regional modeling predicts that the Louisville nonattainment area will reach the current annual standard of 15 µg/m³ by the 2010 deadline, the majority opinion of the Health Committee recommended that a goal more stringent than the current annual PM_{2.5} standard is necessary to protect public health in our community.
- They suggested a range of 10 to 12 µg/m³ is an appropriate health-based goal to be reached by 2018.
- Based on this information, the EIMD committee recommended starting points for implementation of control measures that may help the Louisville nonattainment area reach a more stringent health-based goal.

Recommendations

- **Recommendation 5:** *Based on the data reviewed, and the Health Committee recommendations, the EIMD committee recommends that the District pursue strategies to reduce the PM2.5 precursor emissions from major regional sources within a range of 150 miles, so as to reach design values below 12 by 2018.*
- **Recommendation 6:** *Based on current monitoring and modeling data from local and regional sources the data suggests that an important component of direct PM2.5 is local organic carbon. This suggests that pursuing local measures to reduce emissions of organic carbon may be worthwhile. The data also suggests that local SO2 precursor emissions have less effect on the local PM2.5 contribution in the area; therefore measures for reducing sulfate contributions from source outside the local area may be worthwhile.*
- **Recommendation 7:** *The EIMD committee recommends giving the LADCO projected design value as much, or more, weight as the ASIP projections, because the LADCO modeling is based on 2005 inventory data, vs. 2002 for ASIP.*