4.0 Analyses of Individual Nonattainment Area

4.4 Region 4 Nonattainment Areas

4.4.1 Alabama

Alabama
Area Designations For the
24-Hour Fine Particle National Ambient Air Quality Standard

The table below identifies the counties in Alabama that EPA has designated as not attaining the 2006 24-hour fine particle ($PM_{2.5}$) standard.[1] A county (or part thereof) is designated as nonattainment if it has an air quality monitor that is violating the standard or if the county is determined to be contributing to the violation of the standard.

Area	Alabama Recommended Nonattainment Counties	EPA's Final Designated Nonattainment Counties
Birmingham, AL	Jefferson (partial)	Jefferson Shelby Walker (partial)
Gadsden, AL	None Etowah (unclassifiable)	None Etowah (unclassifiable)

Besides the counties designated nonattainment for Birmingham, EPA has designated Etowah County as unclassifiable and the remaining counties in the state as "attainment/unclassifiable." Etowah County has been designated as "unclassifiable" because: one or more of its monitors recorded a violation in 2004-2006; all monitors in the county with complete 2005-2007 data showed attainment; and one or more other monitors in the county had 2005-2007 monitoring data that was not complete and could not be used for determining compliance with the standard.

EPA Technical Analysis for Birmingham, AL

Pursuant to section 107(d) of the Clean Air Act, EPA must designate as nonattainment those areas that violate the NAAQS and those areas that contribute to violations. This technical analysis for Birmingham, AL identifies the counties with monitors that violate the 24-hour $PM_{2.5}$ standard and evaluates the counties that potentially contribute to fine particle concentrations in the area. EPA has evaluated these counties based on the weight of evidence of the following nine factors recommended in EPA guidance and any other relevant information:

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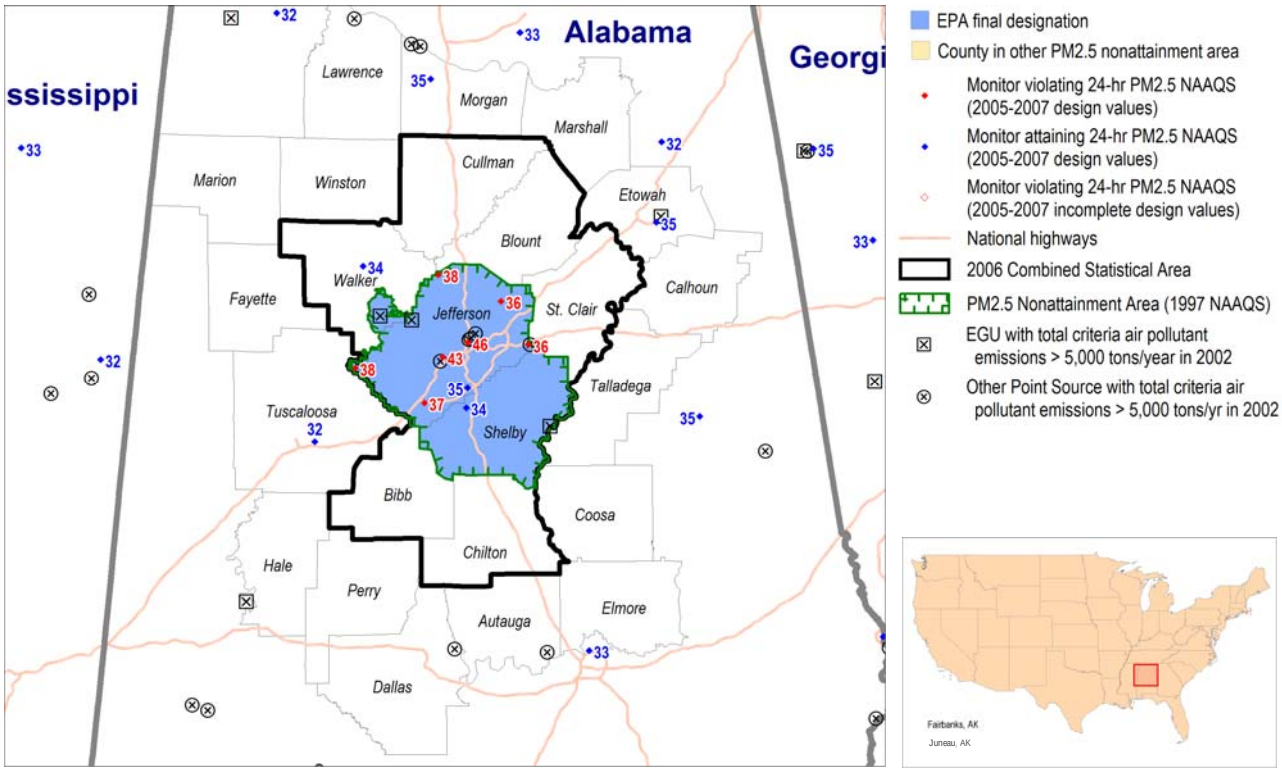
[1] EPA designated nonattainment areas for the 1997 fine particle standards in 2005. In 2006, the 24-hour $PM_{2.5}$ standard was revised from 65 micrograms per cubic meter (average of 98th percentile values for 3 consecutive years) to 35 micrograms per cubic meter; the level of the annual standard for $PM_{2.5}$ remained unchanged at 15 micrograms per cubic meter (average of annual averages for 3 consecutive years).

- pollutant emissions
- air quality data
- population density and degree of urbanization
- traffic and commuting patterns
- growth
- meteorology
- geography and topography
- jurisdictional boundaries
- level of control of emissions sources

We also used analytical tools and data such as pollution roses, fine particle composition monitoring data, back trajectory analyses, and the contributing emission score (CES) to evaluate these areas. (See additional discussion of the CES under factor 1 below.)

Figure 1 is a map of the counties in the nonattainment area and other relevant information such as the locations and design values of air quality monitors, and the metropolitan area boundary.

Figure 1. Birmingham Combined Statistical Area (CSA) and Surrounding Counties



For this area, EPA previously established $PM_{2.5}$ nonattainment boundaries for the 1997 $PM_{2.5}$ NAAQS that included 2 full and 1 partial counties, with all being located in Alabama.

In December 2007, Alabama recommended that Jefferson county be designated as "nonattainment" for the 2006 24-hour $PM_{2.5}$ standard based on air quality data from 2005-2007. These data are from Federal Reference Method (FRM) and Federal Equivalent Method (FEM) monitors located in the state. (Alabama Department of Environmental Management (ADEM) letters dated December 20, 2007, June 24, 2008, and October 2, 2008)

In August 2008, EPA notified Alabama of its intended designations. In this letter, EPA also requested that if the Alabama wished to provide comments on EPA's intended designation, it should do so by October 20, 2008. EPA stated that it would consider any additional information (e.g., on power plants or partial county areas) provided by the state in making final decisions on the designations. Alabama revised its recommendation in October 2008 to request that only a portion of Jefferson County, which includes the violating monitors, be designated as nonattainment.

Based on EPA's technical analysis described below, EPA believes that the same counties as previously designated for the 1997 annual $PM_{2.5}$ standard should be designated nonattainment for the 2006 24-hour $PM_{2.5}$ air-quality standard as part of the Birmingham nonattainment area, based upon currently available information. These counties are listed in the table below.

Birmingham	State-Recommended Nonattainment Counties	EPA-Final Designated Nonattainment Counties
Alabama	Jefferson (partial)	Jefferson Shelby Walker (Partial)

The following is a summary of the technical analysis for the Birmingham area.

Jefferson County is within the Birmingham CSA, and is part of the 1997 $PM_{2.5}$ nonattainment area. It contains three violating monitors based on 2005-2007 data, and the State of Alabama also recommended a nonattainment designation for a portion of Jefferson County. The County also contains a large power plant, and has high VOC, NO_X, SO_2, and PM emissions. Jefferson County also ranks highly for factors relating to population, traffic and commuting. Additionally, the meteorological data for the two violating monitors indicate that both Shelby and Walker Counties appear to contribute to the violating monitors in Jefferson County.

Shelby County is within the CSA, and is part of the 1997 $PM_{2.5}$ nonattainment area. The County has high VOC, NO_X, SO_2, and PM emissions, including a large power plant emitting . Shelby County also has a relatively high population, high vehicle miles traveled (VMT), and the highest number of commuters of any county besides Jefferson, indicating contribution from mobile sources in the county.

Walker County is within the CSA, and was a partial nonattainment county for the 1997 $PM_{2.5}$ designations. The County contains a power plant, and has high PM, SO_2, and NO_X emissions. However, the county does not rank highly for factors other than emissions, indicating that only the area where the power plant is located is appropriate for inclusion in the nonattainment area.

Factor 1: Emissions data

For this factor, EPA evaluated county level emission data for the following $PM_{2.5}$ components and precursor pollutants: "$PM_{2.5}$ emissions total," "$PM_{2.5}$ emissions carbon," "$PM_{2.5}$ emissions other," "SO_2," "NO_X," "VOCs," and "NH_3." "$PM_{2.5}$ emissions total" represents direct emissions of $PM_{2.5}$ and includes: "$PM_{2.5}$ emissions carbon," "$PM_{2.5}$ emissions other," primary sulfate (SO_4), and primary nitrate. (Although primary sulfate and primary nitrate, which are emitted directly from stacks rather than forming in atmospheric reactions with SO_2 and NO_X, are part of "$PM_{2.5}$ emissions total," they are not

shown in Table 1 as separate items). "$PM_{2.5}$ emissions carbon" represents the sum of organic carbon (OC) and elemental carbon (EC) emissions, and "$PM_{2.5}$ emissions other" represents other inorganic particles (crustal). Emissions of SO_2 and NO_X, which are precursors of the secondary $PM_{2.5}$ components sulfate and nitrate, are also considered. VOCs (volatile organic compounds) and NH_3 (ammonia) are also potential $PM_{2.5}$ precursors and are included for consideration.

Emissions data were derived from the 2005 National Emissions Inventory (NEI), version 1. See http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html.

EPA also considered the Contributing Emissions Score (CES) for each county. The CES is a metric that takes into consideration emissions data, meteorological data, and air quality monitoring information to provide a relative ranking of counties in and near an area. Note that this metric is not the exclusive manner for considering data for these factors. A summary of the CES is included in attachment 2, and a more detailed description can be found at http://www.epa.gov/ttn/naaqs/pm/docs/tsd_ces_methodology.pdf.

Table 1 shows emissions of $PM_{2.5}$ and precursor pollutants components (given in tons per year) and the CES for violating and potentially contributing counties in the Birmingham area. Counties that are part of the Birmingham nonattainment area for the 1997 $PM_{2.5}$ NAAQS are shown in boldface. Counties are listed in descending order by CES.

Table 1. $PM_{2.5}$ Related Emissions and Contributing Emissions Score

County	**State Recommended Nonattainment**	**CES**	**$PM_{2.5}$ emissions total (tpy)**	**$PM_{2.5}$ emissions carbon (tpy)**	**$PM_{2.5}$ emissions other (tpy)**	**SO2 (tpy)**	**NOx (tpy)**	**VOCs (tpy)**	**NH_3 (tpy)**
Jefferson	Yes	100	9914	2,122	6634	59080	57561	46828	1272
Shelby	No	39	7861	312	372	130558	36548	11542	421
Walker (partial)	No	17	3801	584	2835	84984	16552	5227	1038
St. Clair	No	5	724	906	6012	904	6291	5966	1051
Tuscaloosa	No	5	1302	658	600	4121	9597	13811	778
Blount	No	4	744	297	427	387	2500	3417	2542
Dallas	No	4	1170	378	580	5604	4359	4401	507
Talladega	No	3	1049	482	540	1068	4208	7583	570
Bibb	No	2	391	221	163	193	995	2096	144
Calhoun	No	2	1261	589	637	2177	8421	12968	888
Morgan	No	2	1706	434	1179	11358	8847	15196	1485
Chilton	No	1	602	298	290	494	2768	3889	280
Cullman	No	1	980	221	209	1041	3467	8126	6825
Elmore	No	1	767	468	593	658	3392	4540	286
Etowah	No	1	1031	349	404	11056	6182	7277	1058
Fayette	No	1	251	255	698	331	1004	2130	361
Hale	No	1	382	169	206	190	1799	2220	218
Lawrence	No	1	1000	318	554	1649	5054	4038	1659
Marshall	No	1	1060	388	621	1756	3866	9070	3483
Winston	No	1	426	221	196	423	1320	3816	1165

Autauga	No	0	796	202	431	3130	4408	9159	838
Greene	No	0	2734	101	144	45814	9072	2180	266
Marion	No	0	365	122	197	494	1927	3756	1013
Perry	No	0	320	153	162	233	579	1394	154

Note: The table may not include all counties considered in the 9-factor analysis, and that those counties not shown had no factors that indicated that they should be candidates for a nonattainment status.

Based on the data in Table 1, Jefferson, Shelby, and Walker (partial) Counties show the highest levels of SO2, NOx, and PM2.5 emissions in the Birmingham area.

Additionally, Jefferson, Shelby, and Walker (partial) counties have high CES values of 100, 39, and 17, respectively. The next highest CES for any county is 5.

Based on the emissions levels and CES values, Jefferson, Shelby and Walker (partial) Counties are candidates for a 24-hour $PM_{2.5}$ nonattainment designation.

Based on the data for this factor indicating very low emissions and CES, the counties of Autauga, Bibb, Blount, Calhoun, Chilton, Cullman, Dallas, Elmore, Etowah, Fayette, Greene, Hale, Lawrence, Marion, Marshall, Morgan, Perry, St. Clair, Talladega, Tuscaloosa, and Winston should not be considered for inclusion in the nonattainment area. These counties were also not recommended for a nonattainment designation by the State.

Factor 2: Air quality data

This factor considers the 24-hour $PM_{2.5}$ design values (in $\mu g/m^3$) for air quality monitors in counties in the Birmingham area based on data for the 2005-2007 period. A monitor's design value indicates whether that monitor attains a specified air quality standard. The 24-hour $PM_{2.5}$ standards are met when the 3-year average of a monitor's 98^{th} percentile values are 35 $\mu g/m^3$ or less. A design value is only valid if minimum data completeness criteria are met.

The 24-hour $PM_{2.5}$ design values for counties in the Birmingham area are shown in Table 2.

Table 2. Air Quality Data

County	State Recommended Nonattainment	Design Values 2004-06 ($\mu g/m^3$)	Design Values 2005-07 ($\mu g/m^3$)
Jefferson	Yes	44	44
Etowah	No	36	35
Morgan	No	31	31
Shelby	No	33	31
Talladega	No	33	32

Tuscaloosa	No	30	29
Walker	No	33	33

Jefferson County has two monitors violating the 24-hour $PM_{2.5}$ standard. Therefore, this county is included in the Birmingham nonattainment area. However, the absence of a violating monitor alone is not a sufficient reason to eliminate counties as candidates for nonattainment status. Each county has been evaluated based on the weight of evidence of the nine factors and other relevant information.

Additionally, Jefferson County is also a nonattainment candidate based on the CES score and Factor 1.

Under this factor, we also consider fine particle composition monitoring data. Air quality monitoring data on the composition of fine particle mass are available from the EPA Chemical Speciation Network and the IMPROVE monitoring network. Analysis of these data indicates that the days with the highest fine particle concentrations in the Birmingham area occur about 81% in the warm season and 19% in the cool season. In the warm season, the average chemical composition of the highest days is 54% sulfate, 51% carbon, 4% crustal, and 0% nitrate. In the cool season, the average chemical composition of the highest days is 54% carbon, 37% sulfate, 8% crustal, and 2% nitrate. These data indicate that sources of SO2, direct PM2.5, and NOx emissions contribute to violations in the area.

Note: Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) at population-oriented locations with an FRM monitor. All data from Special Purpose Monitors (SPM) using an FRM is eligible for comparison to the relevant NAAQS, subject to the requirements given in the October 17, 2006 Revision to Ambient Air Monitoring Regulations (71 FR 61236). All monitors used to provide data must meet the monitor siting and eligibility requirements given in 71 FR 61236 to 61328 in order to be acceptable for comparison to the 24-hr $PM_{2.5}$ NAAQS for designation purposes.

Factor 3: Population density and degree of urbanization (including commercial development)

Table 3 shows the 2005 population for each county in the area being evaluated, as well as the population density for each county in that area. Population data gives an indication of whether it is likely that population-based emissions might contribute to violations of the 24-hour $PM_{2.5}$ standards.

Of the CSA population, 72 percent resides in Jefferson County (656,014) and Shelby County (171,373). Bibb, Blount, Chilton, Cullman, St. Clair, and Walker Counties have a much lower population and population density than Jefferson and Shelby Counties. Based on the analysis for this factor Jefferson and Shelby Counties should be considered

for the nonattainment area. Note that Jefferson, Shelby, and Walker (partial) Counties are also high-ranking counties based on CES scores and other factors.

Table 3. Population

COUNTY	State Recommended Nonattainment	Population 2005	2005 Density per Sq Mile
Autauga	No	48,454	80
Bibb	No	21,454	34
Blount	No	55,572	85
Calhoun	No	112,242	184
Chilton	No	41,648	59
Coosa	No	11,133	17
Cullman	No	79,747	106
Dallas	No	44,178	44
Elmore	No	73,746	112
Etowah	No	102,920	187
Fayette	No	18,200	29
Hale	No	18,200	28
Jefferson	Yes	656,014	584
Lawrence	No	34,496	48
Marion	No	30,027	40
Marshall	No	85,729	138
Morgan	No	113,768	190
Perry	No	11,308	16
St. Clair	No	72,177	110
Shelby	No	171,373	212
Talladega	No	80,109	105
Tuscaloosa	No	168,396	124
Walker	No	69,980	87
Winston	No	24,504	39

Factor 4: Traffic and commuting patterns

This factor considers the number of commuters in each county who drive to another county within the Birmingham area, the percent of total commuters in each county who commute to other counties within the Birmingham area, as well as the total VMT for each county in millions of miles (see Table 4). A county with numerous commuters is generally an integral part of an urban area and is likely contributing to fine particle concentrations in the area.

Table 4. Traffic and Commuting Patterns

County	State Recommended Non-attainment	2005 VMT (millions of miles)	Number Commuting to any violating counties	Percent Commuting to any violating counties	Number Commuting into and within the statistical area	Percent Commuting into and within the statistical area
Autauga	No	491	140	1	580	3
Bibb	No	235	1,850	24	6,390	82
Blount	No	613	9,960	45	20,100	91
Calhoun	No	2621	2,880	6	1,560	3
Chilton	No	692	2,560	15	14,610	86
Coosa	No	200	130	3	260	6
Cullman	No	906	2,890	8	28,570	83
Dallas	No	380	60	0	280	2
Elmore	No	642	150	1	330	1
Etowah	No	1229	33,840	80	2,820	7
Fayette	No	229	70	1	360	5
Hale	No	219	60	1	90	2
Jefferson	Yes (partial)	8545	**265,940**	**91**	**286,250**	**98**
Lawrence	No	407	10	0	150	1
Marion	No	557	90	1	320	3
Marshall	No	753	1,310	4	1,010	3
Morgan	No	1208	1,310	4	1,010	3
Perry	No	149	70	2	410	12
Shelby	No	1640	**37,150**	**51**	**70,470**	**96**
St. Clair	No	1137	13,910	51	25,100	91
Talladega	No	849	2,420	8	4,520	14
Tuscaloosa	No	2486	4,410	6	5,300	7
Walker (partial)	No	797	**6,750**	**25**	**24,770**	**91**
Winston	No	246	430	4	1,640	16

The listing of counties on Table 5 reflects a ranking based on the number of people commuting to other counties. The counties that are in the nonattainment area for the 1997 $PM_{2.5}$ NAAQS are shown in boldface.

Jefferson County has 59 percent of the VMT in the CSA and more than 260,000 commuters. Shelby county has the next highest level of commuting of any county, with 37,000 commuters to Jefferson county and 70,000 in the overall metro area. Although a relatively high percentage of commuters in Blount and St. Clair Counties travel into and within the statistical area, their commuting levels are well below those of Shelby county, and they only contribute four and eight percent of the VMT in the CSA, respectively. Regarding Walker County, about 25% of the commuters travel to Jefferson county, but Walker county ranks relatively low in terms of total numbers of commuters and VMT (5% of VMT in the CSA). Etowah County is being evaluated in the Gadsden, AL area because it is a separate statistical area. Based on the analysis for this factor, Jefferson and Shelby Counties should be considered for the nonattainment area.

Jefferson and Shelby Counties are also high-ranking counties based on CES scores and other factors.

Note: The 2005 VMT data used for tables 4 and 5 of the technical analysis have been derived using methodology such as that described in "Documentation for the 2005 Mobile National Emissions Inventory, Version 2," December 2008, prepared for the Emission Inventory Group, U.S. EPA. This document may be found at: ftp://ftp.epa.gov/EmisInventory/2005_nei/mobile_sector/documentation/2005_mobile_nei_version_2_report.pdf.

Factor 5: Growth rates and patterns

This factor considers population growth from 2000-2005, and growth in VMT for 1996-2005 for counties in the Birmingham area, as well as patterns of population and VMT growth. A county with rapid population or VMT growth is generally an integral part of an urban area and likely to be contributing to fine particle concentrations in the area.

Table 5 below shows population, population growth, VMT and VMT growth for counties that are included in the Birmingham area. Counties are listed in descending order based on VMT growth between 1996 and 2005.

Table 5. Population and VMT Values and Percent Change.

Location	Population (2005)	Population Density (2005)	Population % change (2000 - 2005)	2005 VMT (millions of miles)	VMT % change (1996 to 2005)
Calhoun	112,242	184	1	2621	81
Marion	30,027	40	(4)	557	72
Coosa	11,133	17	(6)	200	41
Fayette	18,200	29	(1)	229	38
Bibb	21,454	34	8	235	36
Perry	11,308	16	(4)	149	36
Hale	18,200	28	0	219	29
Tuscaloosa	168,396	124	2	2486	26
St. Clair	72,177	110	11	1137	23
Lawrence	34,496	48	(1)	407	9
Shelby	**171,373**	212	**19**	1640	**8**
Blount	55,572	85	8	613	8
Chilton	41,648	59	5	692	7
Jefferson	**656,014**	584	**(1)**	8545	**5**
Walker	**69,980**	87	**(1)**	797	**4**
Winston	24,504	39	(2)	246	0
Autauga	48,454	80	10	491	(2)
Etowah	102,920	187	0	1229	(4)
Marshall	85,729	138	4	753	(5)

Talladega	80,109	105	0	849	(9)
Dallas	44,178	44	(4)	380	(13)
Elmore	73,746	112	11	642	(14)
Cullman	79,747	106	3	906	(17)
Morgan	113,768	190	2	1208	(20)

Jefferson County had a decrease of one percent in population growth from 2000-2005, while Shelby County had the highest population growth from 2000-2005 (19 percent). Elmore and St. Clair Counties had some of the higher population growths (11 percent each) in the CSA; however, their 2005 populations of 73,746 and 72,177 are small compared to that of the entire CSA (1,167,965) or to either Jefferson County (656,014) or Shelby County (171,373). Several smaller counties had high rates of VMT growth.

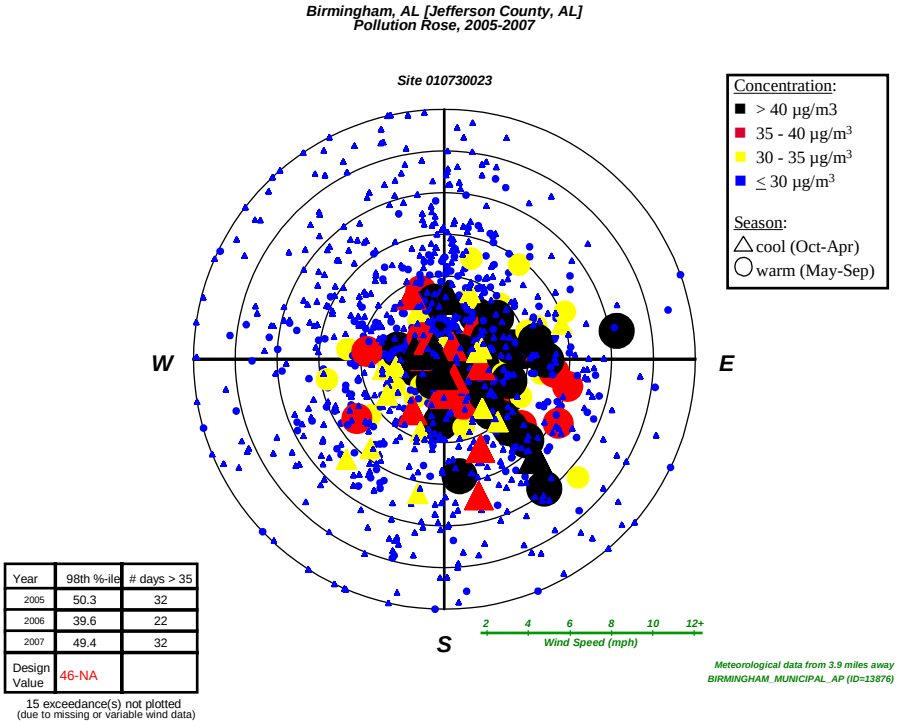
Based on the analysis for this factor Shelby County ranks the highest and should be considered for the nonattainment area. While Jefferson County did not show an increase in population from 2000-2005, it still showed a fairly significant growth in absolute VMT and it has the largest population of the counties considered. Jefferson, Shelby, and Walker (partial) Counties are also nonattainment candidates based on CES scores and other factors.

Factor 6: Meteorology (weather/transport patterns)

For this factor, EPA considered data from National Weather Service instruments in the area. Wind direction and wind speed data for 2004-2006 were analyzed, with an emphasis on "high $PM_{2.5}$ days" for each of two seasons (an October-April "cold" season and a May-September "warm" season). These high days are defined as days where any FRM or FEM air quality monitors had 24-hour $PM_{2.5}$ concentrations above 95% on a frequency distribution curve of $PM_{2.5}$ 24-hour values.

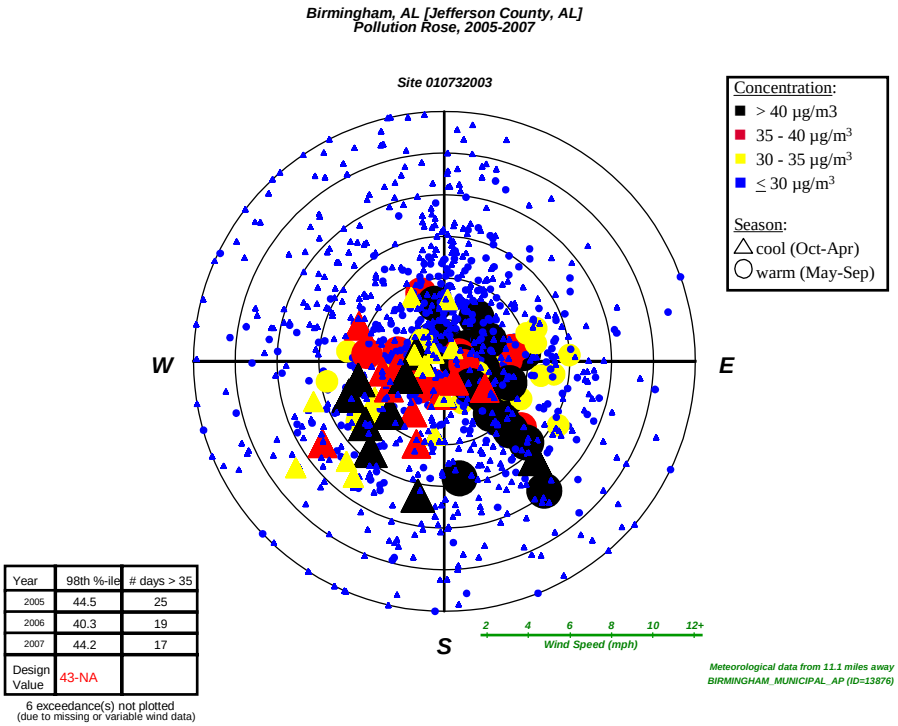
For each air quality monitoring site, EPA developed a "pollution rose" to understand the prevailing wind direction and wind speed on the days with highest fine particle concentrations. The figure identifies 24-hour $PM_{2.5}$ values by color; days exceeding 35 ug/m3 are denoted with a red or black icon. A dot indicates the day occurred in the warm season; a triangle indicates the day occurred in the cool season. The center of the figure indicates the location of the air quality monitoring site, and the location of the icon in relation to the center indicates the direction from which the wind was blowing on that day. An icon that is close to the center indicates a low average wind speed on that day. Higher wind speeds are indicated when the icon is further away from the center.

Figure 2. Jefferson County, AL Pollution Roses



Year	98th %-ile	# days > 35
2005	50.3	32
2006	39.6	22
2007	49.4	32
Design Value	46-NA	

15 exceedance(s) not plotted
(due to missing or variable wind data)



Year	98th %-ile	# days > 35
2005	44.5	25
2006	40.3	19
2007	44.2	17
Design Value	43-NA	

6 exceedance(s) not plotted
(due to missing or variable wind data)

These pollution roses show that elevated $PM_{2.5}$ levels at the violating monitors also originate from multiple directions throughout the year, and thus, cannot be attributed to one prevailing wind direction. Based on analysis of this factor, EPA concludes that Shelby and Walker (partial) Counties do contribute to the violating monitors in Jefferson County.

Jefferson and Shelby Counties are also nonattainment area candidates based on CES scores and multiple other factors. Walker (partial) County is a nonattainment candidate based on this factor as well as high emissions and CES score.

Note: the meteorology factor is also considered in each county's CES because the method for deriving this metric included an analysis of trajectories of air masses for high $PM_{2.5}$ days.

Factor 7: Geography/topography (mountain ranges or other air basin boundaries)

The geography/topography analysis looks at physical features of the land that might have an effect on the air shed and, therefore, on the distribution of $PM_{2.5}$ over the Birmingham area.

The Birmingham area does not have any geographical or topographical barriers significantly limiting air-pollution transport within its air shed. Therefore, the absence of geographical and topographical barriers in this area supports the conclusion that emissions from Shelby and Walker (partial) Counties can be contributing to the violations in the Birmingham area.

Factor 8: Jurisdictional boundaries (e.g., existing PM and ozone areas)

In evaluating the jurisdictional boundary factor, EPA gave special consideration to areas that were already designated nonattainment in 2005 for violating the 1997 fine particle standards. Analysis of chemical composition data in this area indicates that the same components that make up most of the $PM_{2.5}$ mass in the area on an annual average basis (sulfate and direct $PM_{2.5}$ carbon) also are key contributors to the $PM_{2.5}$ mass on days exceeding the 24-hour $PM_{2.5}$ standard. These data indicate that the same source categories that contribute to violations of the annual standard also contribute to exceedances of the 24-hour standard.

Birmingham, with a 2005-2007 design value of 18.9 ug/m3, still has not attained the annual PM2.5 standards. Thus, EPA has generally concluded that counties that were designated as having emissions sources contributing to fine particle concentrations which continue to exceed the 1997 standards also contribute to fine particle concentrations on the highest days. For this reason, EPA believes that for most existing nonattainment areas, the nonattainment area for the 2006 24-hour standard should be the same. Consideration also should be given to existing boundaries and organizations as they may

facilitate air quality planning and the implementation of control measures to attain the standard. Areas already designated as nonattainment represent important boundaries for state air quality planning.

The Birmingham 1997 $PM_{2.5}$ nonattainment area consists of Jefferson, Shelby and Walker (partial) Counties. To the degree appropriate, based upon violations and contributions to violations of the ozone and PM2.5 NAAQS in a particular area, EPA believes it may be helpful for air planning purposes and for attainment of both NAAQS, for there to be some consistency between ozone and PM2.5 nonattainment area boundaries. Jefferson and Shelby Counties were also included in the ozone nonattainment area associated with the Birmingham area. Comparison of ozone and prior PM 2.5 nonattainment areas with potential $PM_{2.5}$ nonattainment areas, therefore, gives added weight to designation of Jefferson, Shelby and Walker (partial) Counties

Factor 9: Level of control of emission sources

Under this factor, the existing level of control of emission sources is taken into consideration. The emissions data used by EPA in this technical analysis and provided in Table 1 (under Factor 1) represent emissions levels taking into account any control strategies implemented in the Birmingham area before 2005 on stationary, mobile, and area sources. Data are presented for $PM_{2.5}$ components that are directly emitted (carbonaceous $PM_{2.5}$ and crustal $PM_{2.5}$) and for pollutants which react in the atmosphere to form fine particles (e.g. SO_2, NO_X, VOC, and ammonia).

In considering county-level emissions, EPA used data from the 2005 National Emissions Inventory, the most updated version of the national inventory available at the beginning of the designations process in late 2007. However, EPA recognized that for certain counties, emissions may have changed since 2005. For example, certain power plants or large sources of emissions in or near this area may have installed emission controls or otherwise significantly reduced emissions since 2005. Some states provided updated information on emissions and emission controls in their comments to EPA. EPA considered such additional information in making final designation decisions.

With regard to nearby power plants, EPA considered information about whether a specific plant installed federally enforceable emission controls by December 2008 resulting in significant emissions reductions. A control requirement is considered to be federally-enforceable if it is required by a state regulation adopted in a state implementation plan, if it is included in a federally-enforceable Title V operating permit, or if it is required by a consent decree which also requires the controls to be included in federally enforceable permit upon termination of the consent decree. In making final decisions, EPA also considered whether a facility would continue to emit pollutants which contribute to $PM_{2.5}$ exceedances even after emission controls are operational.

In its October 2, 2008, letter, Alabama submitted additional information regarding emission controls from the Alabama Power Company – Plant Gorgas in Walker County.

Flue gas desulfurization scrubbers were added to three units since 2005, now providing SO_2 controls for over 80% of the plant's power generation capacity. The Alabama Power Company – Plant Gaston in Shelby County also plans to add a scrubber to its largest unit in 2010.

Regarding Walker County, we find that although the new scrubbers have provided for certain reductions in SO_2 emissions in 2008, there remain two unscrubbed units at Gorgas with emissions in the range of 20,000 tons of SO_2 annually. Based upon emissions, location and meteorology, EPA concludes that these large emissions from the Gorgas facility continue to contribute to the violating monitor. Regarding Shelby County, the EC Gaston power plant currently emits about 140,000 tons of SO2 and about 20,000 tons of NOx. Any reductions in emissions achieved by controls installed in 2010 are not considered timely for the purpose of these designations. Although EPA agrees that these new and future emissions controls will have a positive impact on air quality in the Birmingham area, we do not agree that this information warrants the exclusion of Walker and Shelby Counties. Under the Act EPA must consider current emissions and control levels when determining appropriate nonattainment boundaries.

Conclusion

In October 2008, Alabama modified its request for Jefferson County to include only a portion of the County, rather than the entire County, as the nonattainment area. In support of this request, Alabama asked that EPA consider an air quality study commissioned in 2005 by the State and the Jefferson County Department of Health, claiming that this study indicates the clear existence of a local emissions influence on the violating monitors. However, Alabama further explained that this study concluded that there is a well-defined local source influence in addition to a regional component of the annual $PM_{2.5}$ concentrations measured at the violating monitors, as well as contributions from the transportation sector, including on-road diesel, heavy-duty diesel equipment, and switcher locomotives. The State was recently awarded funding through the Diesel Emissions Reduction Act of 2005. The partial boundary for Jefferson County requested by the State captures all three violating monitors in the Birmingham area.

Again, EPA agrees with the facts presented by Alabama regarding the nature of emissions in Jefferson County, but disagrees with the conclusion that these facts demonstrate that a boundary smaller than that for the existing annual $PM_{2.5}$ standard is warranted. In fact, the study cited by the State in support of their request acknowledges contributions to the violating monitor from sources both inside and outside of the requested partial boundary, and including both local and area-wide stationary and mobile sources of emissions throughout Jefferson County.

EPA concludes that the appropriate nonattainment boundary for the Birmingham area includes Jefferson, Shelby, and Walker (partial) Counties based on analysis of all of the above factors and analytic tools. Specifically, Jefferson County contains three violating monitors, has a number of industrial sources with high emissions that impact those

violating monitors, and additional factors indicating it further contributes to its own exceedances, such as high population density and degree of urbanization, and significant VMT and commuting. Shelby County should be included in the nonattainment area because of a number of factors indicating a substantial degree of contribution to PM2.5 24-hour exceedances, including high emissions that impact the violating monitors supported by meteorological information, high population, significant commuting and VMT, and a high rate of growth. Inclusion of part of Walker County in the nonattainment area is supported by the high level of emissions from the Gorgas power plant and meteorological information.

In addition to this technical support document, EPA also responded in detail to all of the points made by Alabama in its October 2, 2008 letter. Additional information regarding responses to specific State comments can be found in EPA's Response to State Comments document at http://www.epa.gov/pmdesignations/2006standards/tech.htm.

EPA Technical Analysis for Gadsden, AL

Pursuant to section 107(d) of the Clean Air Act, EPA must designate as nonattainment those areas that violate the NAAQS and those areas that contribute to violations. This technical analysis for the Gadsden area identifies the counties with monitors that violate the 24-hour $PM_{2.5}$ standard and evaluates the counties that potentially contribute to fine particle concentrations in the area. EPA has evaluated these counties based on the weight of evidence of the following nine factors recommended in EPA guidance and any other relevant information:

- pollutant emissions
- air quality data
- population density and degree of urbanization
- traffic and commuting patterns
- growth
- meteorology
- geography and topography
- jurisdictional boundaries
- level of control of emissions sources

We also used analytical tools and data such as pollution roses, fine particle composition monitoring data, back trajectory analyses, and the contributing emission score (CES) to evaluate these areas. (See additional discussion of the CES under factor 1 below.)

Figure 1 is a map of the counties in the nonattainment area and other relevant information such as the locations and design values of air quality monitors, and the metropolitan area boundary.

Figure 1. Gadsden, AL MSA

No map for Gadsden without CES bars; not sure what we want to put here,

In June 2008, Alabama recommended that Etowah County be designated as "unclassifiable" for the 2006 24-hour $PM_{2.5}$ standard based on air quality data from 2005-2007. These data are from Federal Reference Method (FRM) and Federal Equivalent Method (FEM) monitors located in the state. (ADEM letters received December 20, 2007, June 24, 2008, and October 2, 2008.)

In August 2008, EPA notified Alabama of its intent to designate Etowah county as unclassifiable. A county is designated as "unclassifiable" if one or more of its monitors recorded a violation in 2004-2006; all monitors in the county with complete 2005-2007 data showed attainment; and one or more other monitors in the county had 2005-2007 monitoring data that was not complete and could not be used for determining compliance with the standard. In the letter, EPA also requested that if the Alabama wished to provide comments on EPA's intended designation, it should do so by October 20, 2008. EPA stated that it would consider any additional information (e.g., on power plants or partial county areas) provided by the State in making final decisions on the designations.

Based on EPA's technical analysis described below and currently available information, EPA has designated Etowah County in the State of Alabama as unclassifiable for the 24-hour $PM_{2.5}$ air-quality standard. See the table below.

Gadsden	State-Recommended Nonattainment Counties	EPA-Final Designated Nonattainment Counties
Alabama	Etowah (unclassifiable)	Etowah (unclassifiable)

The following is a technical analysis for the Gadsden area.

Factor 1: Emissions data

For this factor, EPA evaluated county level emission data for the following $PM_{2.5}$ components and precursor pollutants: "$PM_{2.5}$ emissions total," "$PM_{2.5}$ emissions carbon," "$PM_{2.5}$ emissions other," "SO_2," "NO_X," "VOCs," and "NH_3." "$PM_{2.5}$ emissions total" represents direct emissions of $PM_{2.5}$ and includes: "$PM_{2.5}$ emissions carbon," "$PM_{2.5}$ emissions other," primary sulfate (SO_4), and primary nitrate. (Although primary sulfate and primary nitrate, which are emitted directly from stacks rather than forming in atmospheric reactions with SO_2 and NO_X, are part of "$PM_{2.5}$ emissions total," they are not shown in Table 1 as separate items). "$PM_{2.5}$ emissions carbon" represents the sum of organic carbon (OC) and elemental carbon (EC) emissions, and "$PM_{2.5}$ emissions other" represents other inorganic particles (crustal). Emissions of SO_2 and NO_X, which are

precursors of the secondary $PM_{2.5}$ components sulfate and nitrate, are also considered. VOCs (volatile organic compounds) and NH_3 (ammonia) are also potential $PM_{2.5}$ precursors and are included for consideration.

Emissions data were derived from the 2005 National Emissions Inventory (NEI), version 1. See http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html.
EPA also considered the Contributing Emissions Score (CES) for each county. The CES is a metric that takes into consideration emissions data, meteorological data, and air quality monitoring information to provide a relative ranking of counties in and near an area. Note that this metric is not the exclusive manner for considering data for these factors. A summary of the CES is included in attachment 2, and a more detailed description can be found at http://www.epa.gov/ttn/naaqs/pm/docs/tsd_ces_methodology.pdf.

Table 1 shows emissions of $PM_{2.5}$ and precursor pollutants components (given in tons per year) and the CES for violating and potentially contributing counties in the Gadsden area. Counties are listed in descending order by CES.

Table 1. $PM_{2.5}$ Related Emissions and Contributing Emissions Score

County	State Recommended Nonattainment	CES	$PM_{2.5}$ emissions total (tpy)	$PM_{2.5}$ emissions carbon (tpy)	$PM_{2.5}$ emissions other (tpy)	SO_2 (tpy)	NO_X (tpy)	VOCs (tpy)	NH_3 (tpy)
Etowah	No	100	1,031	255	777	11,056	6,182	7,277	1,058
Calhoun	No	83	1,261	589	672	2,177	8,421	12,968	888
Marshall	No	30	1,060	388	672	1,756	3,866	9,070	3,483
St. Clair	No	30	724	312	412	904	6,291	5,966	1,051
Blount	No	25	744	297	448	387	2,500	3,417	2,542
Cherokee	No	23	611	240	371	215	1,263	3,546	551
DeKalb	No	20	973	390	583	858	3,299	7,280	5,978

Based on high emissions levels and CES value, Etowah County would be a candidate for a 24-hour nonattainment designation. Additionally, Calhoun County cannot be excluded from contributing emissions as measured by the monitor in Etowah County. Based on emissions levels and CES values, both Etowah and Calhoun Counties would be candidates for a 24-hour $PM_{2.5}$ nonattainment designation and, therefore, require further analysis. However, based on incomplete data from the year 2007, EPA is designating Etowah County as unclassifiable for the 24-hour $PM_{2.5}$ standard.

Factor 2: Air quality data

This factor considers the 24-hour $PM_{2.5}$ design values (in $\mu g/m^3$) for air quality monitors in counties in the Gadsden area based on data for the 2005-2007 period. A monitor's design value indicates whether that monitor attains a specified air quality standard. The 24-hour $PM_{2.5}$ standards are met when the 3-year average of a monitor's 98^{th} percentile

values are 35 $\mu g/m^3$ or less. A design value is only valid if minimum data completeness criteria are met.

The 24-hour $PM_{2.5}$ design values for counties in the Gadsden area are shown in Table 2.

Table 2. Air Quality Data

County	State Recommended Nonattainment	Design Values 2004-06 ($\mu g/m^3$)	Design Values 2005-07 ($\mu g/m^3$)
Etowah	No	36	incomplete
Calhoun	No	-	-
Marshall	No	-	-
St. Clair	No	-	-
Blount	No	-	-
Cherokee	No	-	-
DeKalb	No	32	31

Air quality data for the monitor in Etowah County is incomplete for the 2005-2007 period. Due to monitor malfunction, data completeness for the first quarter in 2007 was 42%, while the second quarter showed 65% data completeness. The data for the Etowah County monitor met completeness criteria for 2005, 2006, and the last two quarters of 2007. As a result, a design value can not be calculated for the 2005 - 2007 period.

Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) at population-oriented locations with an FRM monitor. All data from Special Purpose Monitors (SPM) using an FRM is eligible for comparison to the relevant NAAQS, subject to the requirements given in the October 17, 2006 Revision to Ambient Air Monitoring Regulations (71 FR 61236). All monitors used to provide data must meet the monitor sitting and eligibility requirements given in 71 FR 61236 to 61328 in order to be acceptable for comparison to the 24-hr $PM_{2.5}$ NAAQS for designation purposes.

Factor 3: Population density and degree of urbanization (including commercial development)

Table 3 shows the 2005 population for each county in the area being evaluated, as well as the population density for each county in that area. Population data gives an indication of whether it is likely that population-based emissions might contribute to violations of the 24-hour $PM_{2.5}$ standards.

The population and population densities for Etowah and Calhoun Counties are the highest in the area, consistent with Factor 1 (emissions) and the CES scores for those counties. Again, both Etowah and Calhoun rank high for this factor, but due to incomplete data the area is being designated unclassifiable.

Table 3. Population

County	State Recommended Nonattainment	2005 Population	2005 Population Density (pop/sq mi)
Etowah	No	102,920	187
Calhoun	No	112,242	184
Marshall	No	85,729	138
St. Clair	No	72,177	110
Blount	No	55,572	85
Cherokee	No	24,592	41
DeKalb	No	67,365	87

Factor 4: Traffic and commuting patterns

This factor considers the number of commuters in each county who drive to another county within the Gadsden area, the percent of total commuters in each county who commute to other counties within the Gadsden area, as well as the total Vehicle Miles Traveled (VMT) for each county in millions of miles (see Table 4). A county with numerous commuters is generally an integral part of an urban area and is likely contributing to fine particle concentrations in the area.

Table 4. Traffic and Commuting Patterns

County	State Recommended Non-attainment	2005 VMT (millions of miles)	Number Commuting to any violating counties	Percent Commuting to any violating counties	Number Commuting into and within the statistical area	Percent Commuting into and within the statistical area
Etowah	No	1,229	32,180	76	32,180	76
Calhoun	No	2,621	2,030	4	2,030	4
Marshall	No	753	1,030	3	1,030	3
St. Clair	No	1,137	1,040	4	1,040	4
Blount	No	613	300	1	300	1
Cherokee	No	308	510	5	510	5
DeKalb	No	903	410	1	410	1

The listing of counties on Table 4 reflects a ranking based on the number of people commuting to other counties. Although Calhoun County has more total commuters, very few of them commute into Etowah County, which has the potentially violating monitor.

The traffic and commuting patterns for Etowah County are the highest in the area, consistent with Factors 1, 2, 3, 4, and 9, and the CES score for that county. Again, Etowah ranks high for this factor, but due to incomplete data the area is being designated unclassifiable.

Note: The 2005 VMT data used for tables 4 and 5 of the technical analysis have been derived using methodology such as that described in "Documentation for the 2005 Mobile National Emissions Inventory, Version 2," December 2008, prepared for the Emission Inventory Group, U.S. EPA. This document may be found at: ftp://ftp.epa.gov/EmisInventory/2005_nei/mobile_sector/documentation/2005_mobile_nei_version_2_report.pdf.

Factor 5: Growth rates and patterns

This factor considers population growth for 2000-2005 and growth in VMT for 1996-2005 for counties in Gadsden area, as well as patterns of population and VMT growth. A county with rapid population or VMT growth is generally an integral part of an urban area and likely to be contributing to fine particle concentrations in the area.

Table 5 below shows population, population growth, VMT and VMT growth for counties that are included in the Gadsden area. Counties are listed in descending order based on VMT growth between 1996 and 2005.

Table 5. Population and VMT Values and Percent Change.

Location	Population (2005)	Population Density (2005)	Population % change (2000 - 2005)	2005 VMT (millions of miles)	VMT % change (1996 to 2005)
Calhoun	112,242	184	1	2,621	81
Cherokee	24,592	41	2	308	33
St. Clair	72,177	110	11	1,137	23
Blount	55,572	85	8	613	8
DeKalb	67,365	87	4	903	(3)
Etowah	102,920	**187**	0	1,229	(4)
Marshall	85,729	138	4	753	(5)

Overall population growth between 1999 and 2005 was low for the Gadsden area, with St. Clair and Blount Counties having the highest growth. However, Calhoun, Cherokee, and St. Clair Counties had sizable increases in VMT from 1999 and 2005, increases greater than Etowah County.

High-ranking counties based on this factor are not consistent with the counties that are nonattainment area candidates based on other factors and CESs. However, due to incomplete data the area is being designated unclassifiable.

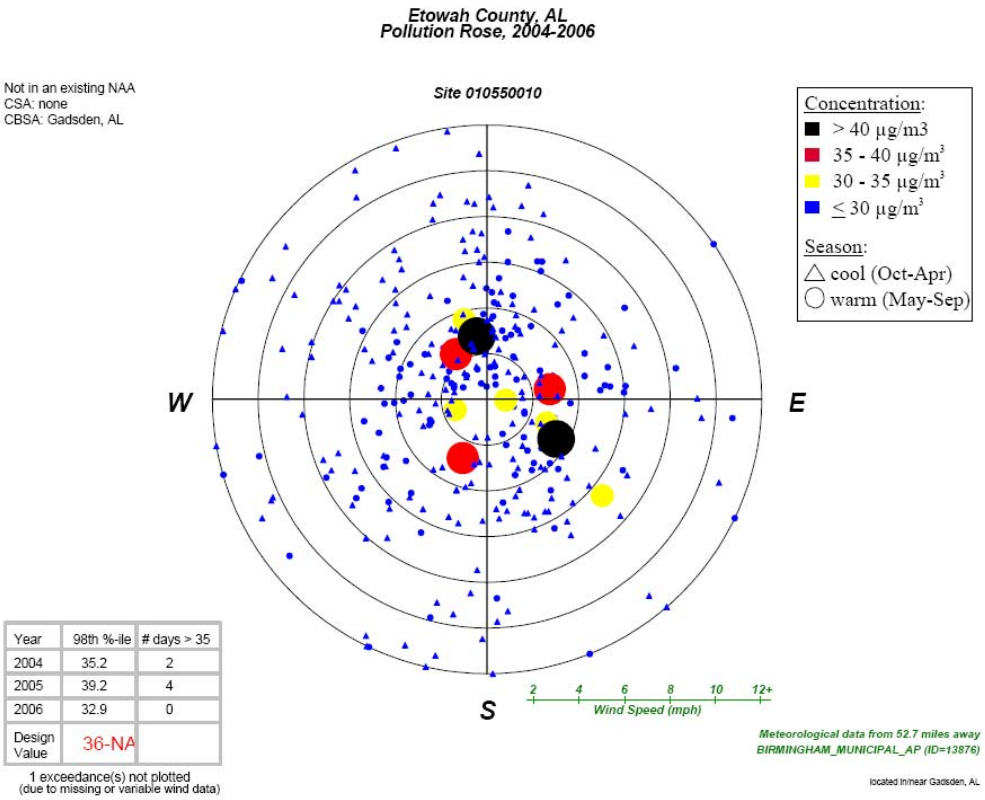
Factor 6: Meteorology (weather/transport patterns)

For this factor, EPA considered data from National Weather Service instruments in the area. Wind direction and wind speed data for 2004-2006 were analyzed, with an emphasis on "high $PM_{2.5}$ days" for each of two seasons (an October-April "cold" season and a May-September "warm" season). These high days are defined as days where any

FRM or FEM air quality monitors had 24-hour $PM_{2.5}$ concentrations above 95% on a frequency distribution curve of $PM_{2.5}$ 24-hour values.

For each air quality monitoring site, EPA developed a "pollution rose" to understand the prevailing wind direction and wind speed on the days with highest fine particle concentrations. The figure identifies 24-hour $PM_{2.5}$ values by color; days exceeding 35 ug/m3 are denoted with a red or black icon. A dot indicates the day occurred in the warm season; a triangle indicates the day occurred in the cool season. The center of the figure indicates the location of the air quality monitoring site, and the location of the icon in relation to the center indicates the direction from which the wind was blowing on that day. An icon that is close to the center indicates a low average wind speed on that day. Higher wind speeds are indicated when the icon is further away from the center.

Figure 2. Etowah County, AL Pollution Rose



As shown in the pollution rose in Figure 2, on high $PM_{2.5}$ days prevailing surface winds can come from any direction.

Note: the meteorology factor is also considered in each county's CES because the method for deriving this metric included an analysis of trajectories of air masses for high $PM_{2.5}$ days.

Factor 7: Geography/topography (mountain ranges or other air basin boundaries)

The geography/topography analysis looks at physical features of the land that might have an effect on the air shed and, therefore, on the distribution of $PM_{2.5}$ over the Gadsden area.

The Gadsden area does not have any geographical or topographical barriers significantly limiting air-pollution transport within its air shed. Therefore, this factor did not play a significant role in the decision-making process.

Factor 8: Jurisdictional boundaries (e.g., existing PM and ozone areas)

The Gadsden area is not an existing nonattainment area for PM2.5 or ozone.

Factor 9: Level of control of emission sources

Under this factor, the existing level of control of emission sources is taken into consideration. The emissions data used by EPA in this technical analysis and provided in Table 1 (under Factor 1) represent emissions levels taking into account any control strategies implemented in the Gadsden area before 2005 on stationary, mobile, and area sources. Data are presented for $PM_{2.5}$ components that are directly emitted (carbonaceous $PM_{2.5}$ and crustal $PM_{2.5}$) and for pollutants which react in the atmosphere to form fine particles (e.g. SO_2, NO_X , VOC, and ammonia).

Although Calhoun County has similar overall emissions of NO_X and direct PM to Etowah County, SO_2 emissions are much lower due to lack of an EGU. In their recommendation submittal, Alabama asserts that Calhoun's emissions are impacted by area and mobile sources more than any large point sources. Alabama also believes that national mobile source measures that are currently being implemented will reduce Calhoun's emissions significantly.

Conclusion

The data collected in Etowah County in 2007 have been determined to be incomplete. Due to monitor malfunctions, the first and second quarters of 2007 were incomplete, with only 42 percent and 65 percent of the samples collected, respectively. The data for the final two quarters were at acceptable levels of completeness, making for an overall

annual average completeness of 70 percent in 2007. Because of the malfunctioning monitors in the first half of 2007, the State of Alabama and EPA have determined the data from 2007 to be unusable for the purpose of designations, and therefore, EPA has determined that an unclassifiable designation is appropriate for Etowah County. Additional documentation on the incomplete data for Etowah County is included in Alabama's June 24, 2008 submission. Once the monitor has three consecutive years of complete data, EPA in conjunction with the State will reassess the situation. Data for the factors discussed above suggest that Calhoun and Etowah Counties are important counties for nonattainment consideration in the event the Gadsden area violates the PM2.5 standard in the future.

Additional information regarding responses to specific State comments can be found in EPA's Response to State Comments document at http://www.epa.gov/pmdesignations/2006standards/tech.htm.

Attachment 2

Description of the Contributing Emissions Score

The CES is a metric that takes into consideration emissions data, meteorological data, and air quality monitoring information to provide a relative ranking of counties in and near an area. Using this methodology, scores were developed for each county in and around the relevant metro area. The county with the highest contribution potential was assigned a score of 100, and other county scores were adjusted in relation to the highest county. The CES represents the relative maximum influence that emissions in that county have on a violating county. The CES, which reflects consideration of multiple factors, should be considered in evaluating the weight of evidence supporting designation decisions for each area.

The CES for each county was derived by incorporating the following significant information and variables that impact $PM_{2.5}$ transport:

- Major $PM_{2.5}$ components: total carbon (organic carbon (OC) and elemental carbon (EC)), SO_2, NO_X, and inorganic particles (crustal).
- $PM_{2.5}$ emissions for the highest (generally top 5%) $PM_{2.5}$ emission days (herein called "high days") for each of two seasons, cold (Oct-Apr) and warm (May-Sept)
- Meteorology on high days using the NOAA HYSPLIT model for determining trajectories of air masses for specified days
- The "urban increment" of a violating monitor, which is the urban $PM_{2.5}$ concentration that is in addition to a regional background $PM_{2.5}$ concentration, determined for each $PM_{2.5}$ component
- Distance from each potentially contributing county to a violating county or counties

A more detailed description of the CES can be found at http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html#C.

Attachment 3

$PM_{2.5}$ Exceptional Events Technical Support Document

U.S. Environmental Protection Agency Region 4

State of Alabama
&
Jefferson County, Alabama

2007

Exceptional Event Technical Support Document

U.S. Environmental Protection Agency Region 4

Introduction

This document provides U.S Environmental Protection Agency (EPA) Region 4 rationale for concurrence or non-concurrence with an exceptional event flag on the 24-hr average $PM_{2.5}$ concentration recorded at various Air Quality System (AQS) sites within the Alabama Department of Environmental Management (ADEM) and the Jefferson County Department of Health (JCDH) Ambient Air Monitoring Networks.

According to §50.1(j):

> "*Exceptional event* means an event that affects air quality, is not reasonably controllable or preventable, is an event caused by human activity that is unlikely to recur at a particular location or a natural event, and is determined by the Administrator in accordance with 40 CFR 50.14 to be an exceptional event. It does not include stagnation of air masses or meteorological inversions, a meteorological event involving high temperatures or lack of precipitation, or air pollution relating to source noncompliance."

§50.14(b)(2) also states:

> EPA shall exclude data from use in determinations of exceedances and NAAQS violations where a State demonstrates to EPA's satisfaction that emissions from fireworks displays caused a specific air pollution concentration in excess of one or more national ambient air quality standards at a particular air quality monitoring location and otherwise satisfies the requirements of this section. Such data will be treated in the same manner as exceptional events under this rule, provided a State demonstrates that such use of fireworks is significantly integral to traditional national, ethnic, or other cultural events including, but not limited to July Fourth celebrations which satisfy the requirements of this section."

Finally, §50.14(c)(3)(iii) states:

> The demonstration to justify data exclusion shall provide evidence that:
>
> (A) The event satisfies the criteria set forth in 40 CFR 50.1(j);
>
> (B) There is a clear causal relationship between the measurement under consideration and the event that is claimed to have affected the air quality in the area;
>
> (C) The event is associated with a measured concentration in excess of normal historical fluctuations, including background; and
>
> (D) There would have been no exceedance or violation but for the event.

Each PM2.5 24-hr average concentration requested for exclusion was first evaluated against these criteria using a two-step analysis. This analysis was designed to compare the requested value to historical values observed at the site and determine whether the concentration was an exceedance of the 24-hr PM 2.5 NAAQS and whether any exceedances could have been caused by the flagged event.

Step 1: Monthly Average Comparison

Using 24-hr PM2.5 data from AQS for 2004-2007, a comparison three-year monthly average was calculated. The three-year monthly average concentration was calculated excluding data from the year in which the data in question was collected. For example, a requested value in May 2006 was compared to the average of all the samples collected at the site during May 2004, May 2005, and May 2007. If the three-year average was greater than the annual PM2.5 NAAQS (15 µg/m3) and the requested value was less than the 24-hr PM2.5 NAAQS (35 µg/m3), then EPA concurrence was generally not given to the requested value. This is because in this situation, it would be very difficult to demonstrate that "there would have been no exceedance or violation but for the event" as required by §50.14(c)(3)(iii)(D) because the normally expected concentration at the site (the three-year monthly mean concentration) is in violation of the NAAQS. EPA uses this as an aid, not as a determinative tool, to identify which events may qualify as an exceptional event.

Step 2: Monthly 84th Percentile Comparison

Using 24-hr PM2.5 data from AQS for 2004-2007, a comparison three-year upper 84th percentile was calculated for the month in which the requested value was collected. The three-year monthly 84th percentile was calculated excluding data from the year in which the data in question was collected. For example, a requested value in May 2006 was compared to the upper 84th percentile calculated from of all the samples collected at the site during May 2004, May 2005, and May 2007. The calculated three-year monthly upper 84th percentile was considered to represent the range of normally expected high values at that site due to normal local and background sources. If the requested value was below the calculated three-year monthly upper 84th percentile, EPA concurrence was generally not given to the requested value. This is because in EPA's judgment there is insufficient evidence to demonstrate that the NAAQS exceedance was caused by the suspected event as required by §50.14(c)(3)(iii)(D) and not by normal local and background sources at the site.

If a requested value did not pass one of the above steps, and the State did not submit compelling evidence to demonstrate that the event satisfied the exceptional event criteria, then EPA concurrence was generally not given to the exceptional event flag on the requested value. The two-step analysis is used as an aid, not as a determinative tool, to help decide which values were more likely to meet the requirements of the

Exceptional Events Rule. The values that did pass all of the above steps were then evaluated against the requirements of §50.14(c)(3)(iii).

Summary of maps and graphs used

A variety of maps and graphs were used in this document. Unless otherwise noted, these products were obtained from the DATAFED Data Views Catalog, which can be accessed at http://datafedwiki.wustl.edu/index.php/Data_Views_Catalog. This includes maps using data from AQS, the National Aeronautics and Space Administration (NASA), and the Navy Aerosol Analysis and Prediction System (NAAPS). Some of the wind trajectories used in this document were obtained using the National Oceanic and Atmospheric Administration (NOAA) Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) utility, which can be accessed at http://www.arl.noaa.gov/ready/hysplit4.html. Also, unless otherwise noted, all ambient air monitoring data used in this analysis was obtained from the EPA AQS database. The state utilized data from research monitors as well. The **S**outh **E**astern **A**erosol **R**esearch and **CH**aracterization Study (SEARCH), is part of a public-private collaboration with EPRI (Electric Power Research Institute) and Southern Company. These sites are not part of the State or local program's ambient air monitoring network and the data are only made available on Atmospheric Research's web-site, http://www.atmospheric-research.com/studies/SEARCH/index.html. These SEARCH sites are also not used in the determination of compliance with any ambient air quality standard. However, these sites operate every day and are useful for filling in the gaps where a state or local program's own speciation monitor has no data available.

The following discussion will demonstrate that the 24-hr average $PM_{2.5}$ concentration observed at various ADEM and JCDH network monitoring sites on the following dates meet or fails to meet criteria of the Exceptional Events rule. All measured ambient air concentrations were the result of the wildfires in South Georgia and North Florida. A brief description follows.

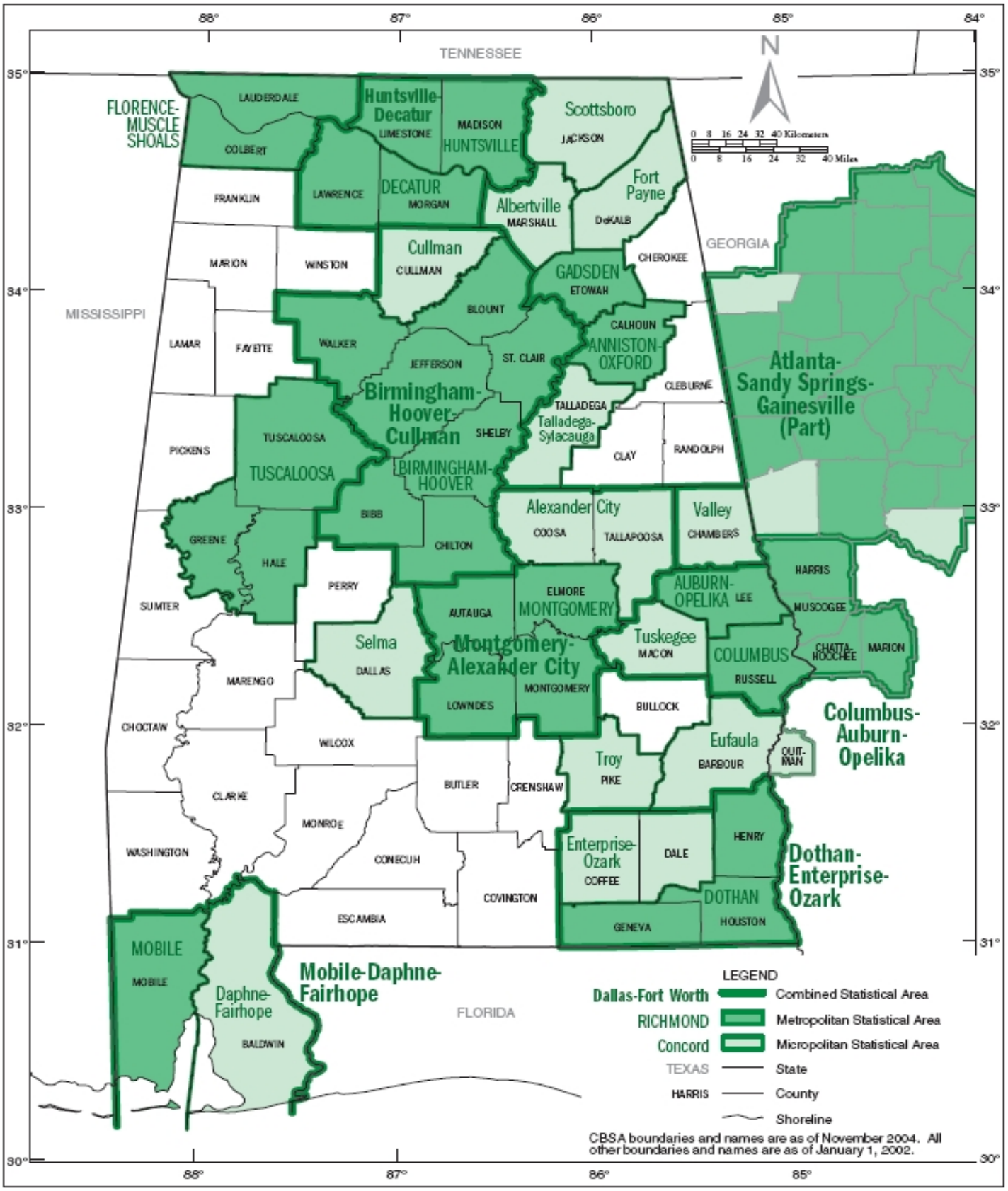
The Bugaboo Scrub Fire (aka. Big Turnaround fire) (Figure 1a) was a wildfire that raged from April to June in 2007 and ultimately became the largest fire in the history of both Georgia and Florida. The Bugaboo, which was not actually named until it had blazed for nearly a month, started in the Okefenokee Swamp, most of which is located in Georgia. It was previously known as the Sweat Farm Road Fire (Figure 1b), which merged with the Big Turnaround Complex fire.

Figure 1a – Big Turnaround fire April 29, 2007 Blaine Eckberg, USFWS

Figure 1b- Georgia Forestry Commission - Aerial View of Sweat Farm Road Fire on April 28, 2007.

For more information, please see the introduction to the final demonstration by the ADEM entitled, "Exceptional Event Demonstration to Justify Data Exclusion for the Impacts of the Georgia/Florida Wildfires on Air Quality in Alabama during May and June 2007" dated 06/13/2008.

Global Criteria: To meet criteria "A" and "B" above, in all instances in this TSD, ADEM and JCDH provided PM2.5 speciation and meteorological documentation (including graphs, charts and various types of satellite pictures) along with statistical analysis of their data. The EPA Region 4 believes the information is sufficient to make a reasonable determination. Due to the amount of acreage consumed from these wildfires, copious smoke from May through the first week of June made its way around the region in many cases causing very large increases in the 24 hour PM2.5 mass at many sites. Criteria "C" and "D" will be discussed separately for each area.



U.S. DEPARTMENT OF COMMERCE Economics and Statistics Administration U.S. Census Bureau

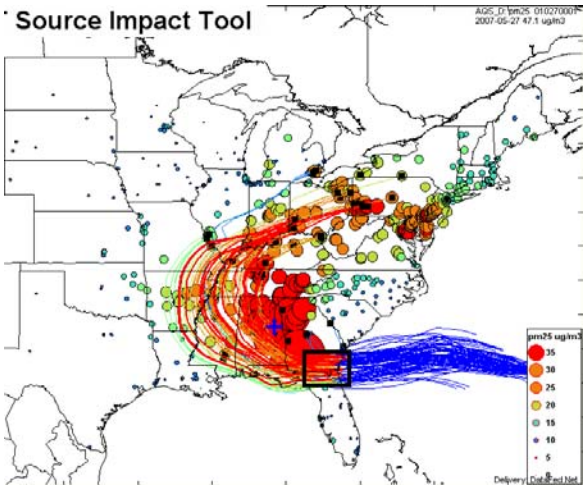
EXCEEDANCE EVENT: Georgia/Florida Wildfires

Exceedance Date(s): May 27 and May 30, 2007
MSA or County: Clay County, Alabama
Event Description: Georgia/Florida Wildfires

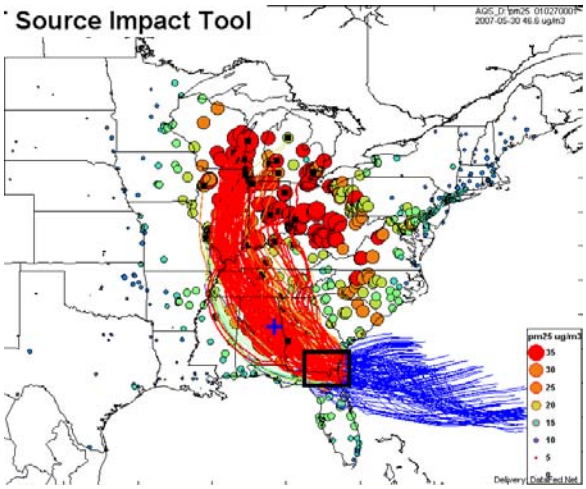
Detailed Discussion of Evidence
(C) Comparison of background levels

AQS	DATE	Monthly Mean	84th Percentile	95th Percentile	Exceedance Concentration	EPA Concurrence
01-027-0001	May 27	14.8	20.6	22.0	47.1	YES
01-027-0001	May 30	14.8	20.6	22.0	46.6	YES

The first two maps show wind trajectories and measured concentrations. Blue lines indicate air mass movement into the box and the red lines indicate where the air mass goes afterwards. A blue "+" identifies the monitor. Figures 1j and 1m in the appendix show the dispersion of PM2.5 as a result of the measured concentrations. And finally, figures 2d, 2e, 3d and 3e in the appendix show the organic carbon and sulfate dispersion.



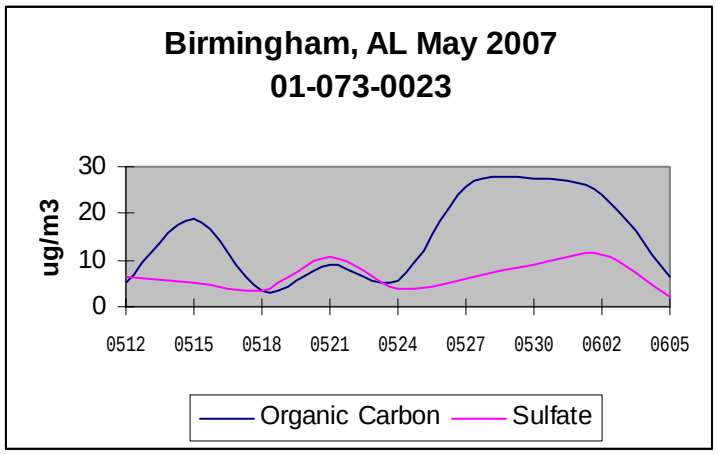
May 27, 2007



May 30, 2007

See sections 1, 2 and 3 in the appendix for other pertinent information.

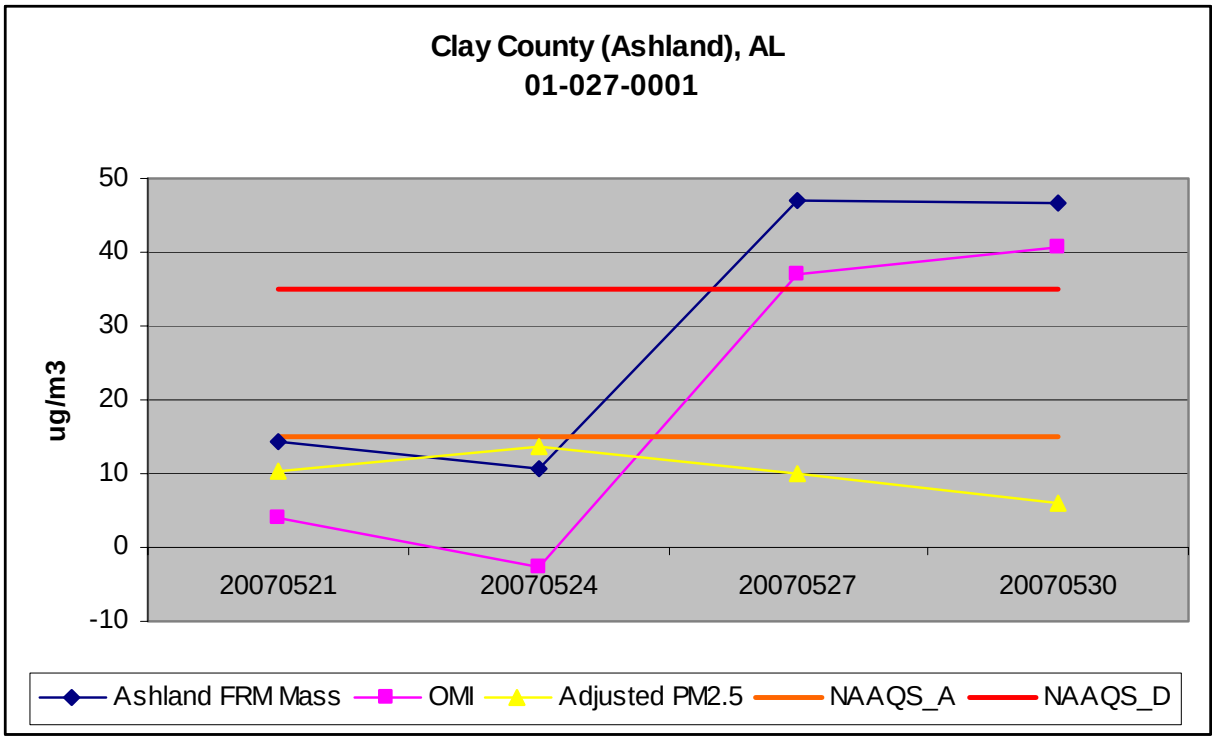
(D) Demonstration of No Exceedance "But For"...



There are no speciation data for this site. As the data show, the measured concentrations for these two days are about 25 ug/m3 above the 'extreme high' value as depicted by the 95th percentile (or two standard deviations) and 27 ug/m3 above the 'normal high' value as depicted by the 84th percentile (or one standard deviation). Although there are no speciation data available in Clay County, this area is adjacent to the Birmingham MSA where speciation data are available. We will assume that the smoke impacts are relatively similar on these days as wind trajectories show similar impacts on both Clay county and Birmingham. In order to quantify the impacts of the fire on observed PM2.5 concentrations, speciation data collected at the North Birmingham site (01-073-0023) were used to approximate the organic mass increment of the observed PM2.5 mass that was caused by the wildfire. The organic mass increment was calculated using the following equation, adapted from Turpin and Lim (2001).

$$\boldsymbol{OMI} = (OC_{observed} - OC_{average}) \times 2.0 \qquad \text{(Eq. 2)}$$

Where OMI is the organic mass increment due to smoke from the wildire, $OC_{observed}$ is the observed organic carbon mass, and $OC_{average}$ is the average organic carbon mass observed at the site during the month of May, and separately for June, for 2004-2006. A multiplier of 2.0 is used to approximate the total PM2.5 mass associated with smoke from wildfires (Turpin and Lim 2001). In order to approximate the PM2.5 concentration that would have been observed but for the fire, the OMI was subtracted from the observed 24-hr average PM2.5 concentration. This procedure was then repeated for each day that PM2.5 speciation data was collected during these two months to compare impacts of smoke on different days. The results of this analysis are shown in the graph below. This graph shows the calculated OMI and the adjusted PM2.5 mass (Observed PM2.5 – OMI). In this particular case, the OMI was calculated from the North Birmingham site, shown above, which is the closest site with speciation data. The graph below demonstrates that without the PM2.5 mass emitted by the fire on these two days, there would have been no exceedance but for the wildfire. EPA concurrence was given to both values requested for this event.


Clay County (Ashland), AL
01-027-0001
ug/m3
50
40
30
20
10
0
-10
20070521
20070524
20070527
20070530
Ashland FRM Mass
OMI
Adjusted PM2.5
NAAQS_A
NAAQS_D

EXCEEDANCE EVENT: **Georgia/Florida Wildfires**

Exceedance Date: May 15, 27, 30, and June 2, 2007
MSA: Muscle Shoals, Colbert Co., Alabama
Event Description: Georgia/Florida Wildfires

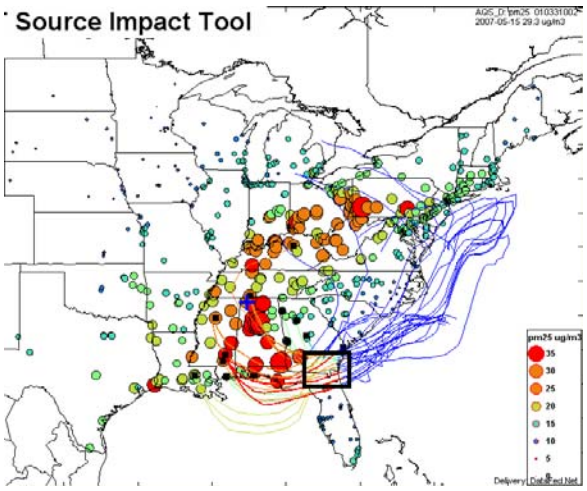
Detailed Discussion of Evidence

(C) Comparison of background levels

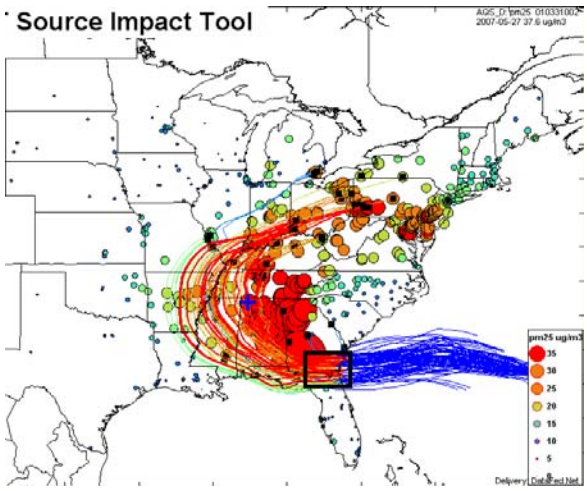
AQS	DATE	Monthly Mean	84th Percentile	95th Percentile	Exceedance Concentration	EPA Concurrence
01-033-1002	May 15	12.8	18.2	23.6	29.3	YES
	May 27	12.8	18.2	23.6	37.6	YES
	May 30	12.8	18.2	23.6	28.3	YES
	June 2	15.6	21.7	25.8	39.8	YES

site-specific information used in analysis ($\mu g/m^3$)

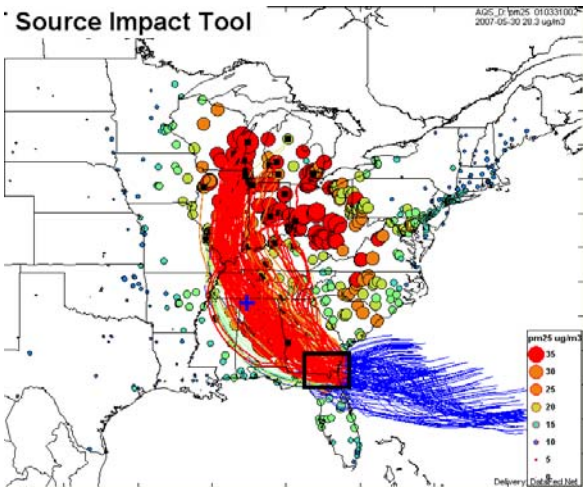
The first four maps show wind trajectories and measured concentrations. Blue lines indicate air mass movement into the box and the red lines indicate where the air mass goes afterwards. A blue "+" identifies the monitor. Figures 1d, 1j, 1m and 1p in the appendix show the dispersion of PM2.5 as a result of the measured concentrations. Unfortunately, the organic carbon and sulfate maps were unavailable on www.datafed.net for June 2, 2007. See figures 2a, 2d, 2e, 3a, 3d and 3e for organic carbon and sulfate impacts, respectively.



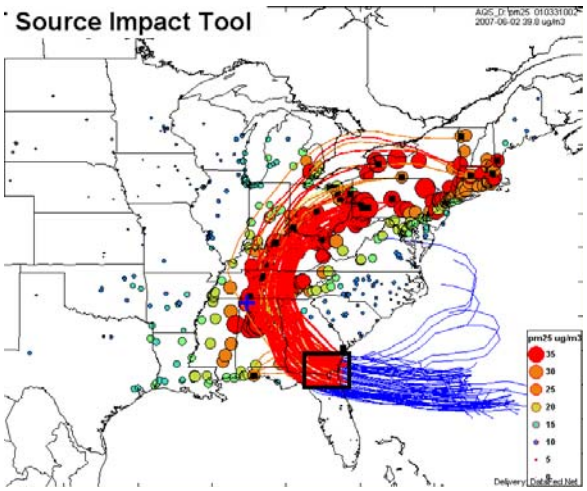
May 15, 2007



May 27, 2007



May 30, 2007



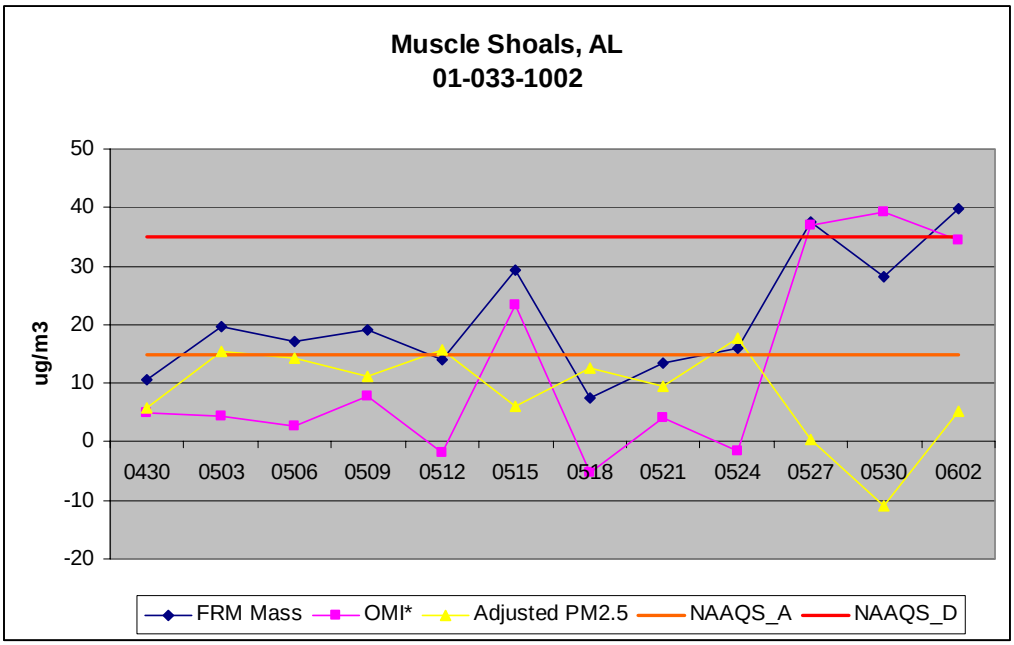
June 2, 2007

(D) Demonstration of No Exceedance "But For"…

Although there are no speciation data available in Muscle Shoals, this area is near two MSAs in the state where speciation data are available. We will assume that the smoke impacts are relatively similar on these days as wind trajectories show. In order to quantify the impacts of the fire on observed PM2.5 concentrations, speciation data collected at both Birmingham sites and the Huntsville speciation site were used to approximate the organic mass increment of the observed PM2.5 mass that was caused by the wildfire. The organic mass increment was calculated using the following equation, adapted from Turpin and Lim (2001).

$$\boldsymbol{OMI} = (OC_{observed} - OC_{average}) \times 2.0 \qquad \text{(Eq. 2)}$$

Where OMI is the organic mass increment due to smoke from the wildire, $OC_{observed}$ is the observed organic carbon mass, and $OC_{average}$ is the average organic carbon mass observed at the site during the month of May, and separately for June, for 2004-2006. A multiplier of 2.0 is used to approximate the total PM2.5 mass associated with smoke from wildfires (Turpin and Lim 2001). In order to approximate the PM2.5 concentration that would have been observed but for the fire, the OMI was subtracted from the observed 24-hr average PM2.5 concentration. This procedure was then repeated for each day that PM2.5 speciation data was collected during these two months to compare impacts of smoke on different days. The results of this analysis are shown in the graph below. The graph below shows the calculated OMI and the adjusted PM2.5 mass (Observed PM2.5 – OMI). In this particular case, the OMI was calculated by using the average OMI across all three sites. The graph below demonstrates that without the PM2.5 mass emitted by the fire on these four days, there would have been no exceedance but for the wildfire. EPA concurrence was given to all four values requested for this event.


Muscle Shoals, AL
01-033-1002
ug/m3
50
40
30
20
10
0
-10
-20
0430
0503
0506
0509
0512
0515
0518
0521
0524
0527
0530
0602
FRM Mass
OMI*
Adjusted PM2.5
NAAQS_A
NAAQS_D

EXCEEDANCE EVENT: Georgia/Florida Wildfires

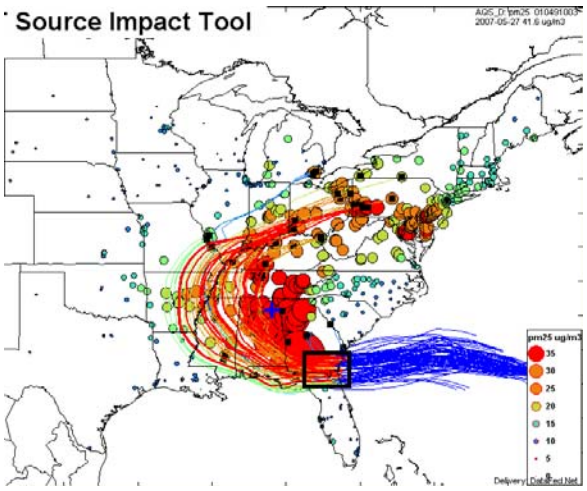
Exceedance Date: May 27 and 30, 2007
MSA: Crossville, DeKalb Co., Alabama
Event Description: Georgia/Florida Wildfires

Detailed Discussion of Evidence

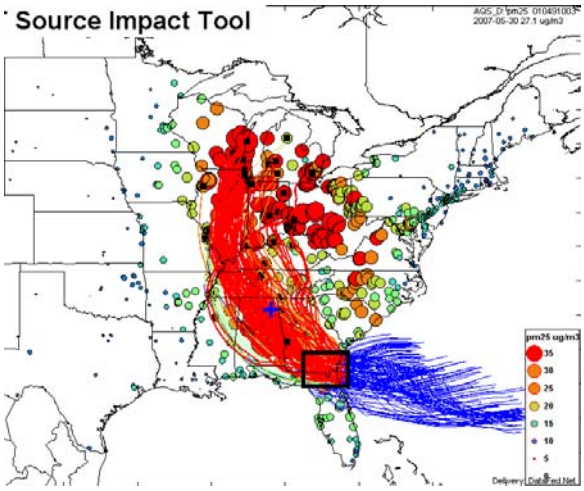
(C) Comparison of background levels

AQS	DATE	Monthly Mean	84th Percentile	95th Percentile	Exceedance Concentration	EPA Concurrence
01-049-1003	May 27	15.0	20.9	24.8	41.6	YES
	May 30	15.0	20.9	24.8	27.1	YES

The first two maps show wind trajectories and measured concentrations. Blue lines indicate air mass movement into the box and the red lines indicate where the air mass goes afterwards. A blue "+" identifies the monitor. Figures 1j and 1m (in the appendix) show the dispersion of PM2.5 as a result of the measured concentrations. And finally, figures 2d and 2e show the large concentration of organic carbon as a result of the smoke from the wildfires.



May 27, 2007



May 30, 2007

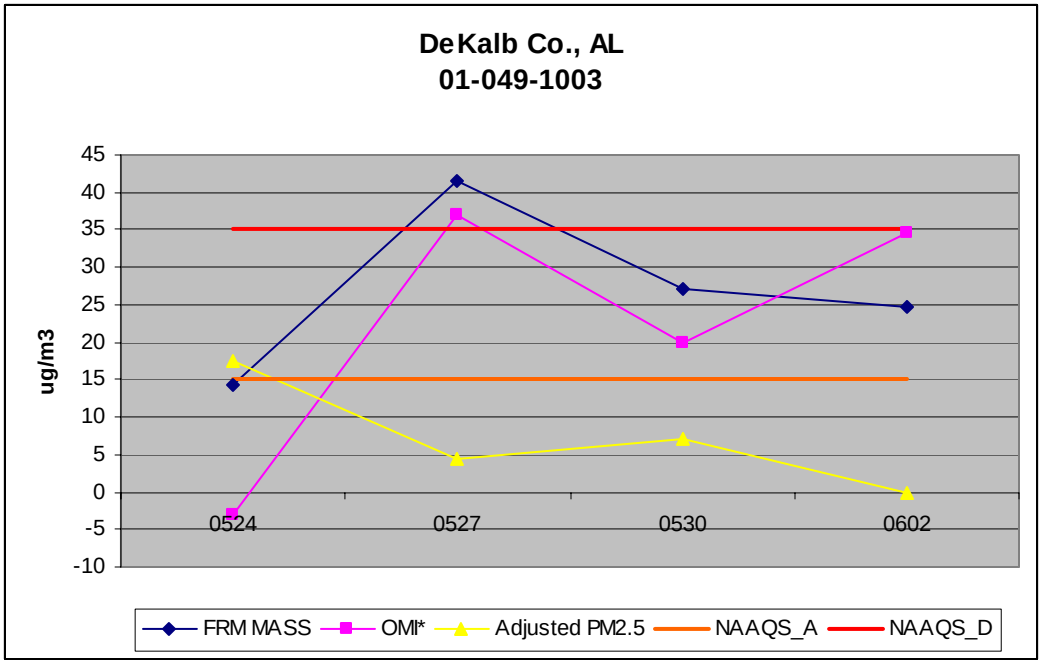
(D) Demonstration of No Exceedance "But For"...

There are no speciation data for this site. As the FRM data show, the measured concentrations for these two days are about 2.5 -17 ug/m3 above the 'extreme high' value as depicted by the 95th percentile (or two standard deviations) and 6-20 ug/m3 above the 'normal high' value as depicted by the 84th percentile (or one standard deviation). Although there are no speciation data available in DeKalb County, Alabama, this area is near two MSAs in the state and one in Georgia where speciation data are available. We will assume that the smoke impacts are relatively similar on these days as wind trajectories show similar impacts on these areas. In order to quantify the

impacts of the fire on observed PM2.5 concentrations, speciation data collected at both Birmingham sites, the Huntsville speciation site and the Rome, Georgia site were used to approximate the organic mass increment of the observed PM2.5 mass that was caused by the wildfire. The organic mass increment was calculated using the following equation, adapted from Turpin and Lim (2001).

$$\boldsymbol{OMI} = (OC_{observed} - OC_{average}) \times 2.0 \qquad \text{(Eq. 2)}$$

Where OMI is the organic mass increment due to smoke from the wildire, $OC_{observed}$ is the observed organic carbon mass, and $OC_{average}$ is the average organic carbon mass observed across all sites mentioned above during the month of May, and separately for June, for 2004-2006. A multiplier of 2.0 is used to approximate the total PM2.5 mass associated with smoke from wildfires (Turpin and Lim 2001). In order to approximate the PM2.5 concentration that would have been observed but for the fire, the OMI was subtracted from the observed 24-hr average PM2.5 concentration. This procedure was then repeated for each day that PM2.5 speciation data was collected during these two months to compare impacts of smoke on different days. The results of this analysis are shown in the graph below. The graph below shows the calculated OMI and the adjusted PM2.5 mass (Observed PM2.5 – OMI). In this particular case, the OMI was calculated by using the average OMI across all four sites. The graph below demonstrates that without the PM2.5 mass emitted by the fire on both days, there would have been no exceedance but for the wildfire. EPA concurrence was given to both values requested for this event.



EXCEEDANCE EVENT: **Georgia/Florida Wildfires**

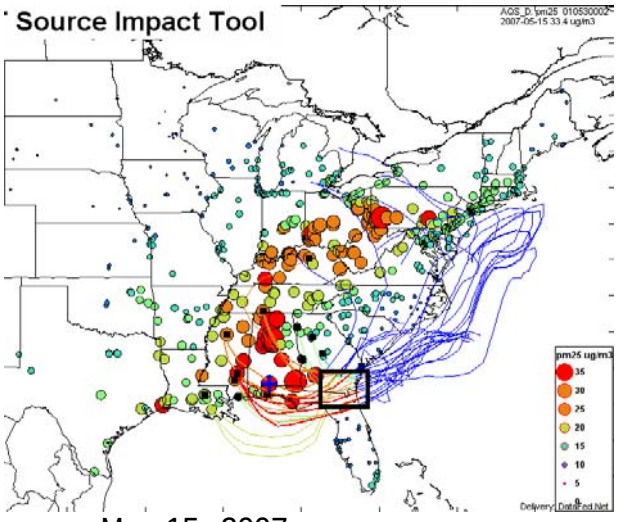
Exceedance Date: May 15, 21, and 24, 2007
MSA: Brewton, Escambia Co., Alabama
Event Description: Georgia/Florida Wildfires

Detailed Discussion of Evidence

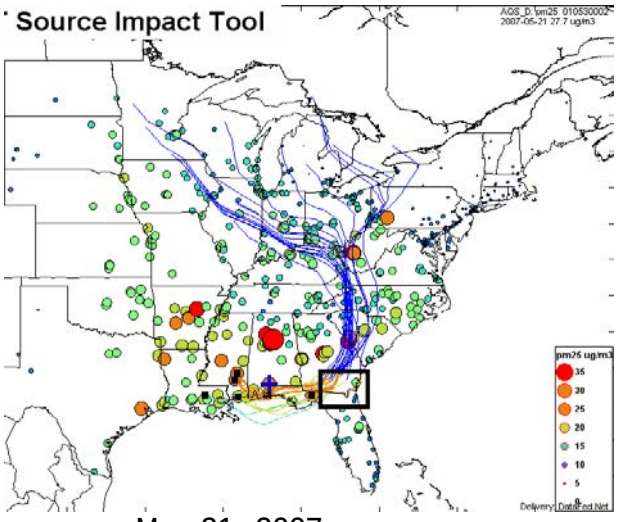
(C) Comparison of background levels

AQS	DATE	Monthly Mean	84th Percentile	95th Percentile	Exceedance Concentration	EPA Concurrence
01-053-0002	May 15	14.5	20.9	23.7	33.4	YES
	May 21	12.8	18.2	23.6	27.7	YES
	May 24	12.8	18.2	23.6	50.1	YES

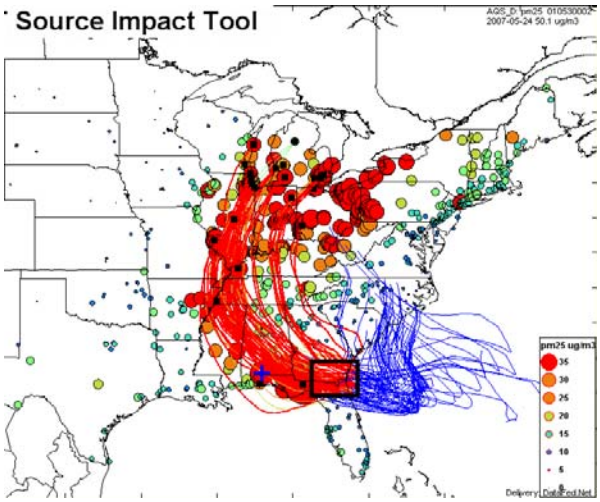
The first three maps show wind trajectories and measured concentrations. Blue lines indicate air mass movement into the box and the different colored lines indicate where the air mass goes afterwards. A blue "+" identifies the monitor. Figures 1d, 1e, and 1h in the Appendix show the dispersion of PM2.5 as a result of the measured concentrations. Figures 2a, 2b and 2c in the appendix show the organic carbon impact. Unfortunately, the organic carbon maps were unavailable on datafed.net for May 24, 2007. However, available speciation data from Montgomery, AL (closest site with speciation data) show a large impact of organic carbon relative to sulfates on May 24, 2007.



May 15, 2007



May 21, 2007

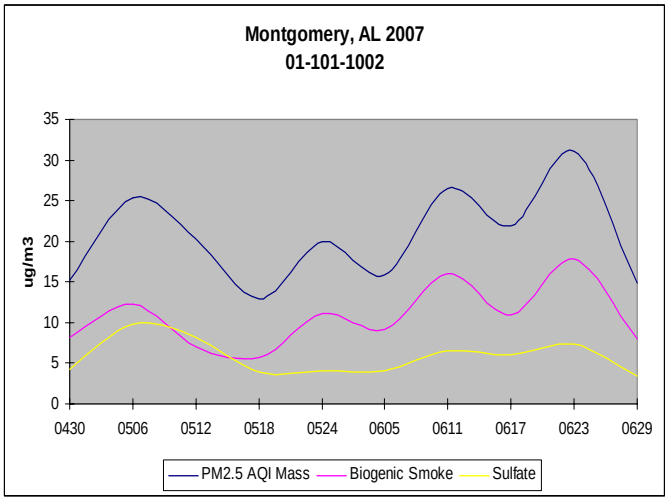


May 24, 2007

(D) Demonstration of No Exceedance "But For"...

There are no speciation data for this site. As the FRM data show, the measured concentrations for these three days are about 4 - 26 ug/m3 above the 'extreme high' value as depicted by the 95th percentile (or two standard deviations) and 9-32 ug/m3 above the 'normal high' value as depicted by the 84th percentile (or one standard deviation). Also, speciation data from Montgomery, Alabama show high impacts of organic carbon on May 24.

We believe, however, that based on historical averages and additional evidence presented, there is enough evidence to state that an exceedance would not have occurred on these days 'but for' the impacts due to the south Georgia wildfires. EPA Region 4 concurs with these days.



EXCEEDANCE EVENT: **Georgia/Florida Wildfires**

Exceedance Date: May 5, 22, 26-28, 30-31 and June 1-2, 2007
MSA: Gadsden, Etowah Co., Alabama
Event Description: Georgia/Florida Wildfires

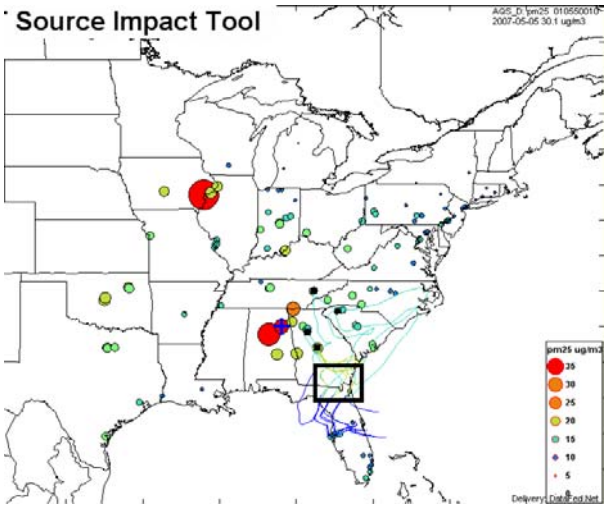
Detailed Discussion of Evidence

(C) Comparison of background levels

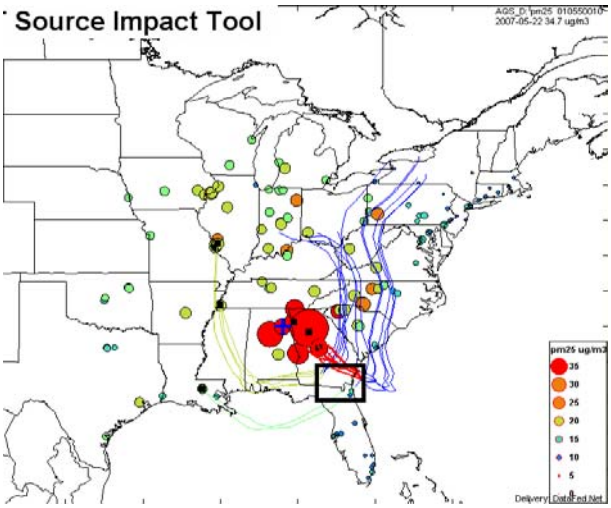
AQS	DATE	Monthly Mean	84th Percentile	95th Percentile	Exceedance Concentration	EPA Concurrence
01-055-0010	May 5	15.4	20.9	22.9	30.1	NO[1]
	May 22	15.4	20.9	22.9	34.7	NO[1]
	May 26	15.4	20.9	22.9	53.4	YES
	May 27	15.4	20.9	22.9	53.1	YES
	May 28	15.4	20.9	22.9	45.9	YES
	May 30	15.4	20.9	22.9	37.0	YES
	May 31	15.4	20.9	22.9	30.0	NO[1]
	June 1	17.9	24.7	25.7	42.9	YES
	June 2	17.9	24.7	25.7	30.3	NO[1]

Notes: [1]Three-year monthly average above 15µg/m3

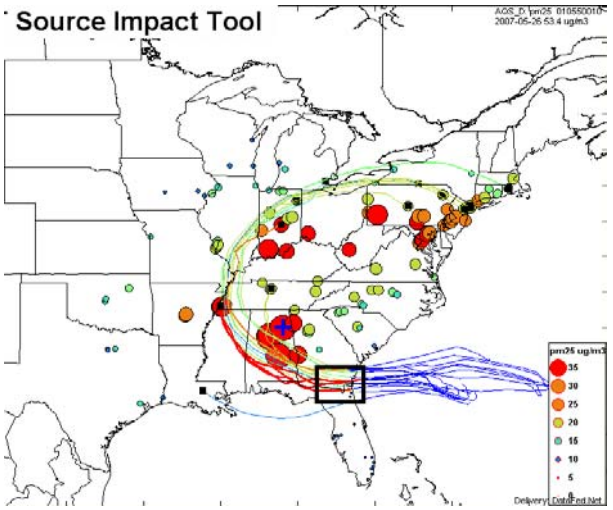
The maps shown below depict wind trajectories and measured concentrations. Blue lines indicate air mass movement into the box and the different colored lines indicate where the air mass goes afterwards. A blue "+" identifies the monitor. Figures 1c, 1f, 1i, 1j, 1k, 1m, 1n, 1o, and 1p in the Appendix show the dispersion of PM2.5 as a result of the measured concentrations. Figures 2d and 2e in the appendix show the organic carbon impact on May 27 and May 30, respectively. Unfortunately, the organic carbon maps were unavailable on www.datafed.net for the other days. However, speciation data from surrounding sites are available from Birmingham and Huntsville, Alabama, as well as Rome, Georgia (shown below).



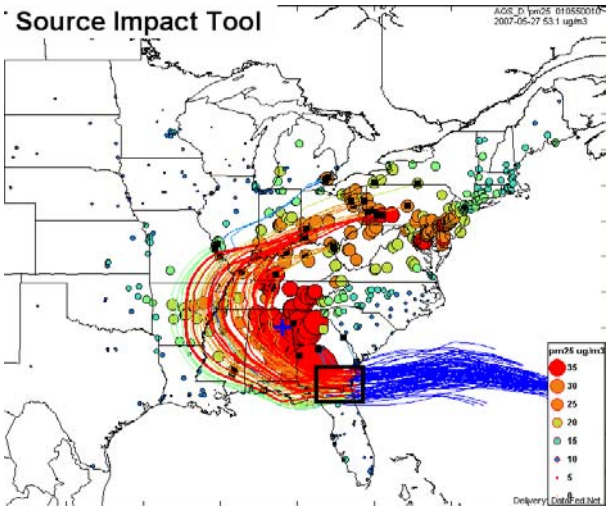
May 5, 2007



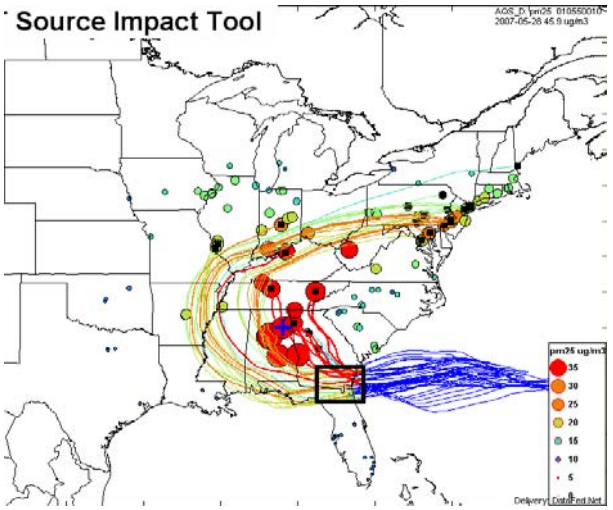
May 22, 2007



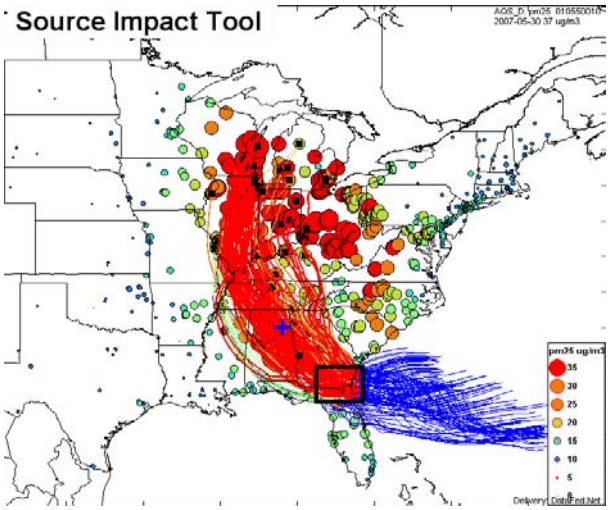
May 26, 2007



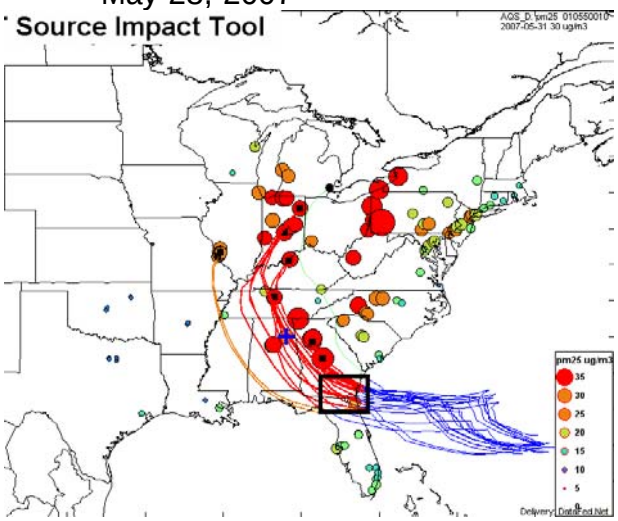
May 27, 2007



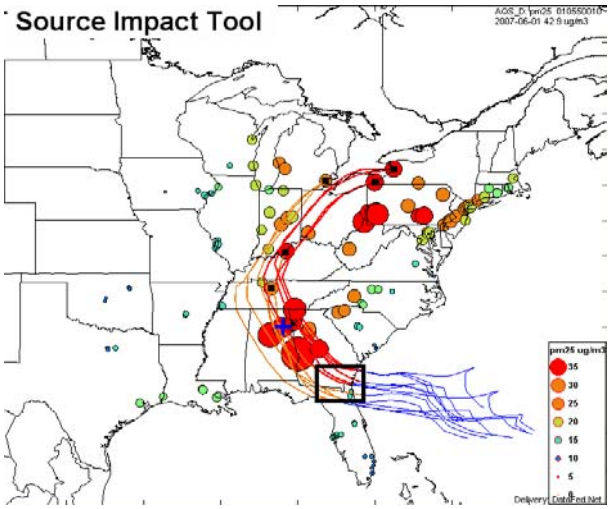
May 28, 2007



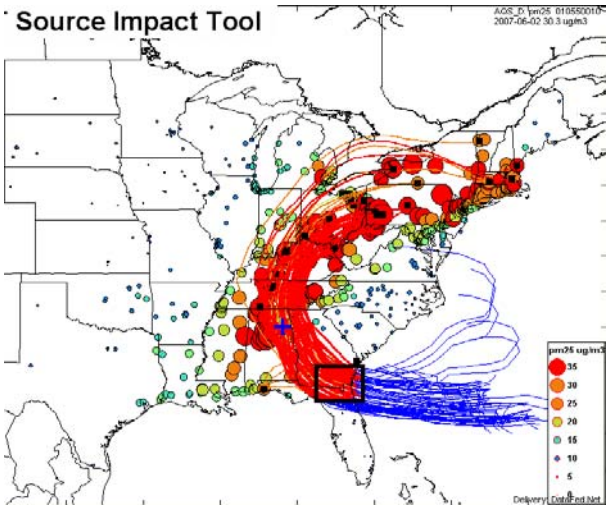
May 30, 2007



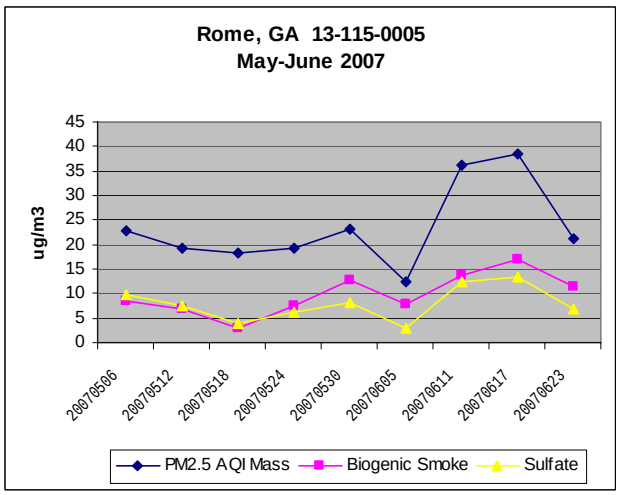
May 31, 2007

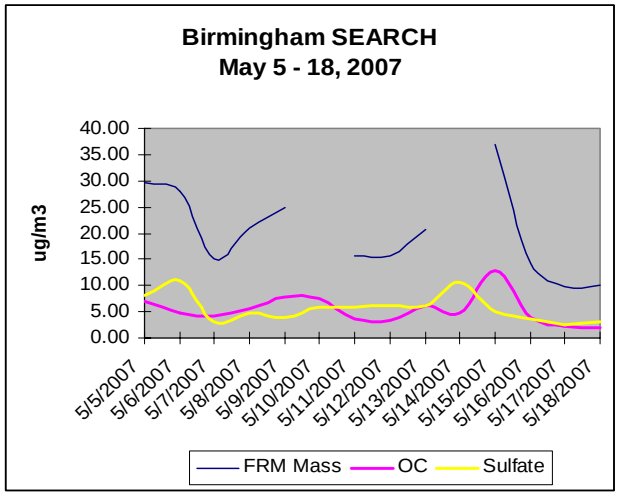


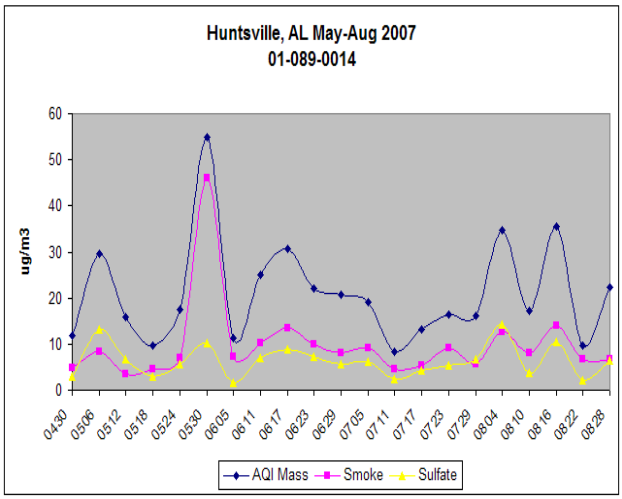
June 1, 2007

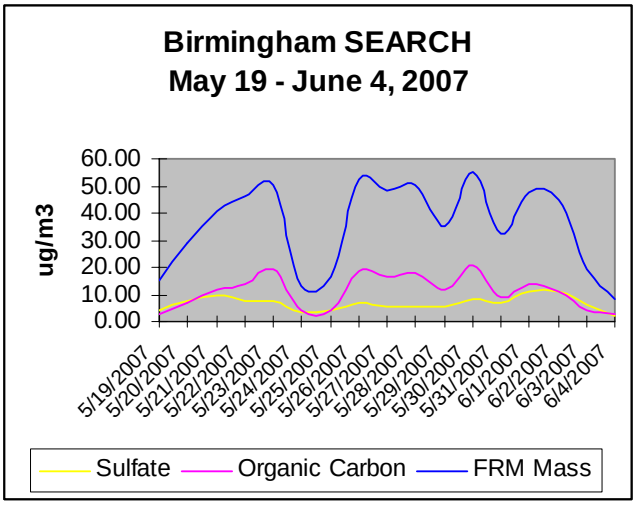


June 2, 2007





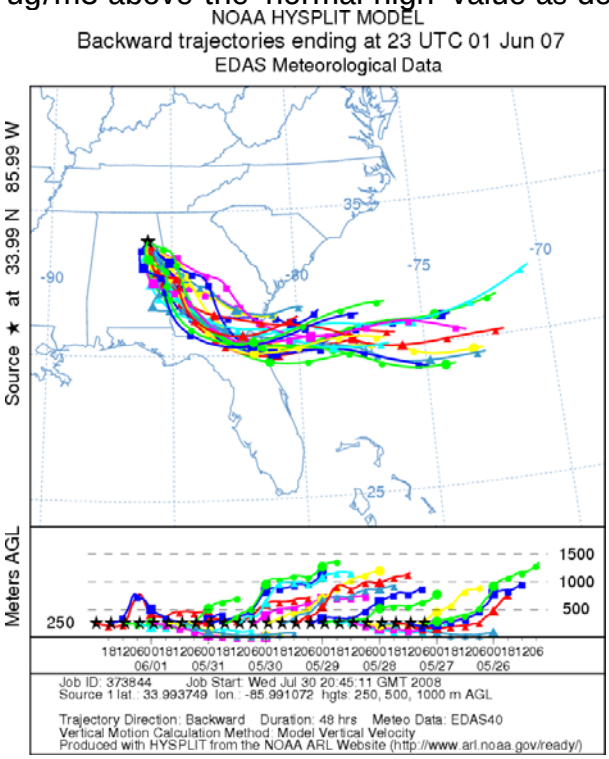




(D) Demonstration of No Exceedance "But For"…

There are no speciation data for this site. Since the historical monthly means as calculated exceed the annual standard already without the presence of an exceptional event, only values above the 24hr NAAQS of 35ug/m3 will be considered for concurrence unless the state provided compelling evidence to show that an exceptional event occurred. EPA Region 4 does not concur on the following days and no further evaluation is necessary: May 5, 22, 31, and June 2, 2007.

As the FRM data show, the measured concentrations for those days exceeding the 24hr NAAQS (May 26-28, 30 and June 1, 2007), are about 15-31 ug/m3 above the 'extreme high' value as depicted by the 95th percentile (or two standard deviations) and 16-33 ug/m3 above the 'normal high' value as depicted by the 84th percentile (or one standard deviation). Also, speciation data from nearby sites show high impacts of organic carbon on May 26-30 and remains inconclusive for May 31-June 2, 2007. However, strong evidence from the NOAA HYSPLIT model for June 1, 2007, suggest direct air movement from the source of the wildfires days earlier to Gadsden. Source impact trajectories above show potential fire impact on most flagged days. The most direct transport days were 5/26 ,5/27, 5/28, 5/30, and 6/01.



We believe, that based on historical averages and additional evidence presented, there is enough evidence to state that an exceedance would not have occurred on the following days 'but for' the impacts due to the south Georgia wildfires: May 26-28, 30 and June 1, 2007. EPA Region 4 concurs with these days.

EXCEEDANCE EVENT: Georgia/Florida Wildfires

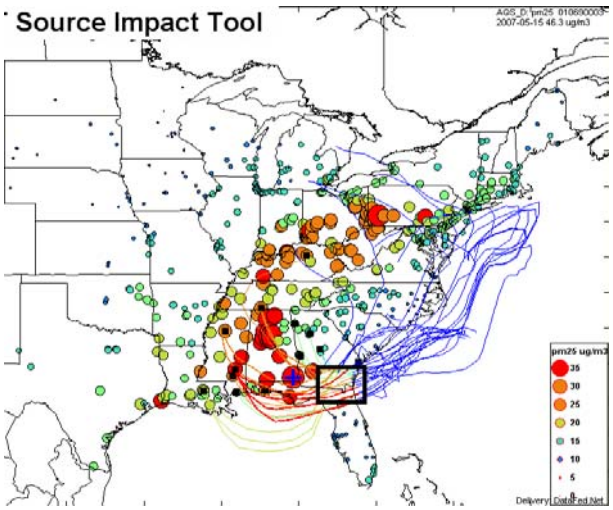
Exceedance Date: May 3, 15, 24, 27, 30 and June 2, 2007
MSA: Dothan, Houston Co., Alabama
Event Description: Georgia/Florida Wildfires

Detailed Discussion of Evidence
(C) Comparison of background levels

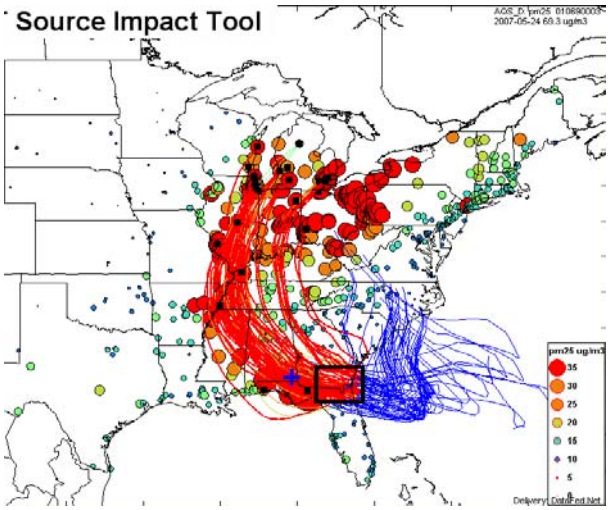
AQS	DATE	Monthly Mean	84th Percentile	95th Percentile	Exceedance Concentration	EPA Concurrence
01-069-0003	May 3	14.1	17.4	22.1	27.1	NO[2]
	May 15	14.1	17.4	22.1	46.3	YES
	May 24	14.1	17.4	22.1	69.3	YES
	May 27	14.1	17.4	22.1	46.5	YES
	May 30	14.1	17.4	22.1	25.1	YES
	June 2	16.0	22.0	27.6	29.8	NO[1]

Notes: [1] Three-year monthly average above 15µg/m3
[2] Not enough evidence

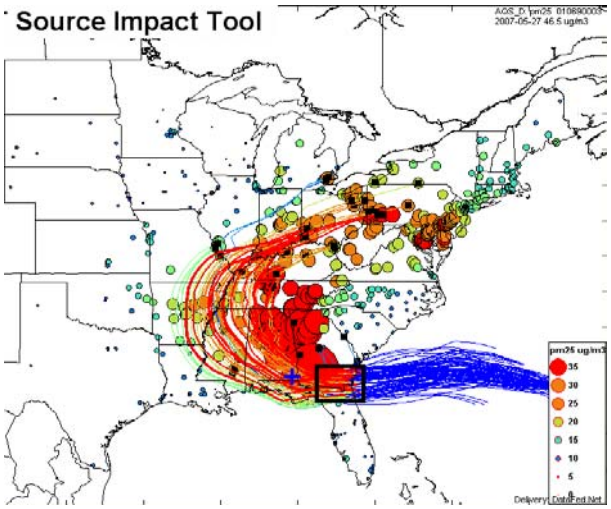
The maps shown below depict wind trajectories and measured concentrations. Blue lines indicate air mass movement into the box and the different colored lines indicate where the air mass goes afterwards. A blue "+" identifies the monitor. Figures 1a, 1d, 1h, 1j, 1m and 1p in the Appendix show the dispersion of PM2.5 as a result of the measured concentrations. Figures 2a, 2d and 2e in the appendix show the organic carbon impact on May 27 and May 30, respectively. Figures 3d and 3e show the sulfate impact on those same days. Unfortunately, the organic carbon maps were unavailable on www.datafed.net for the other days.



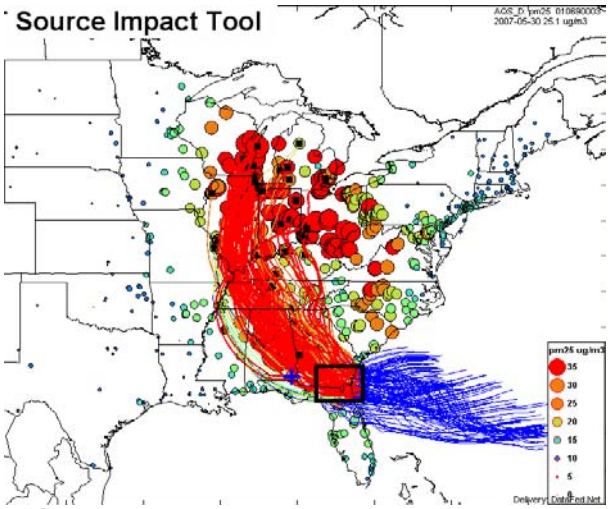
May 15, 2007



May 24, 2007



May 27, 2007



May 30, 2007

(D) Demonstration of No Exceedance "But For"...

There are no speciation data for this site. Since the historical monthly mean for June exceeds the annual standard already without the presence of an exceptional event, only values above the 24hr NAAQS of 35 ug/m3 will be considered for concurrence. EPA Region 4 does not concur on the following days and no further evaluation is necessary: June 2, 2007. There is not enough evidence available to support an exceptional event claim for May 3, 2007. EPA Region 4 does not concur on this day.

As the FRM data show, the measured concentrations for the days in May are about 3-47 ug/m3 above the 'extreme high' value as depicted by the 95th percentile (or two standard deviations) and 8-52 ug/m3 above the 'normal high' value as depicted by the 84th percentile (or one standard deviation).

Also, speciation data from nearby sites show high impacts of organic carbon on May 26-30. Source impact trajectories above show potential fire impact on most flagged days.

We believe, that based on historical averages and additional evidence presented, there is enough evidence to state that an exceedance would not have occurred on the following days 'but for' the impacts due to the south Georgia wildfires: May 15, 24, 27 and 30, 2007. EPA Region 4 concurs with these days.

EXCEEDANCE EVENT: **Georgia/Florida Wildfires**

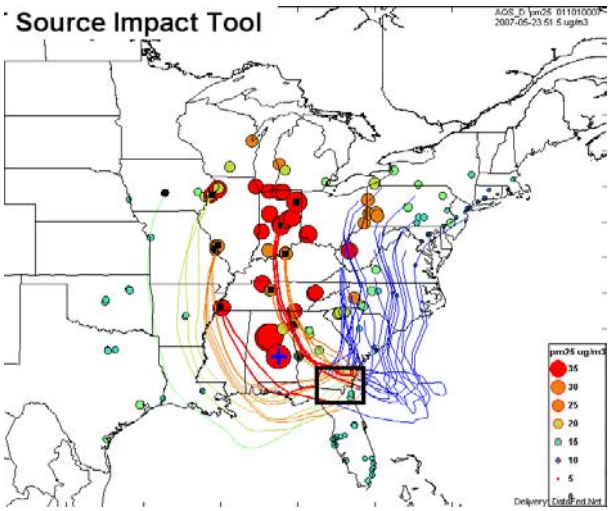
Exceedance Date: May 4, 15, 23, 26-30, 2007
MSA: Montgomery, Montgomery Co., Alabama
Event Description: Georgia/Florida Wildfires

Detailed Discussion of Evidence
(C) Comparison of background levels

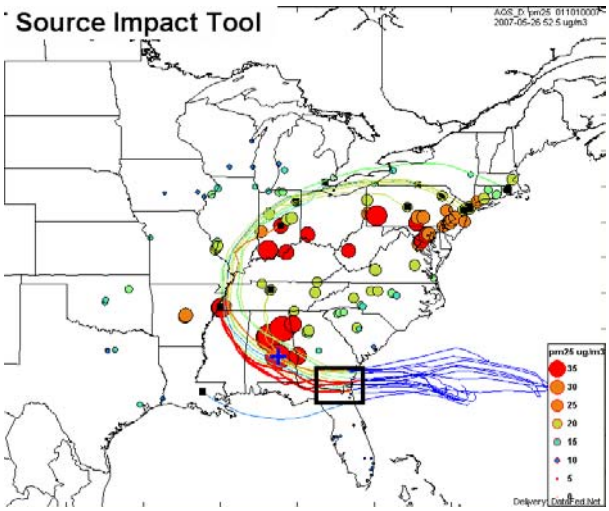
AQS	DATE	Monthly Mean	84th Percentile	95th Percentile	Exceedance Concentration	EPA Concurrence
01-101-0007	May 4	15.8	21.7	27.2	27.9	NO[1]
	May 15	15.8	21.7	27.2	31.3	NO[1]
	May 23	15.8	21.7	27.2	51.5	YES
	May 26	15.8	21.7	27.2	52.5	YES
	May 27	15.8	21.7	27.2	59.8	YES
	May 28	15.8	21.7	27.2	48.5	YES
	May 29	15.8	21.7	27.2	37.5	YES
01-101-0007-2	May 30	16.1	23.8	27.3	68.0	YES

Notes: [1]Three-year monthly average above 15µg/m3

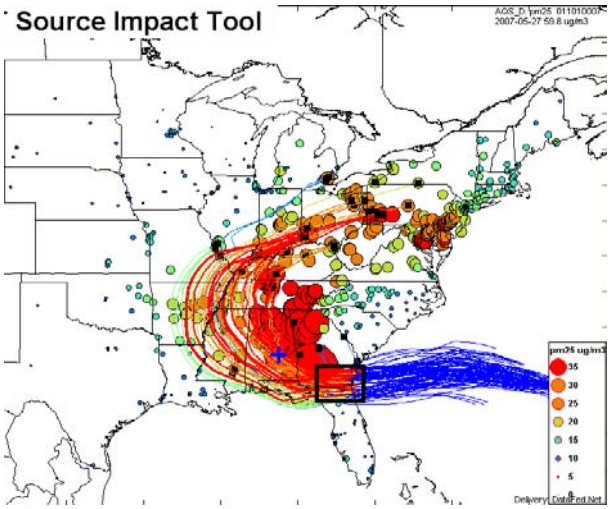
The maps shown below depict wind trajectories and measured concentrations. Blue lines indicate air mass movement into the box and the different colored lines indicate where the air mass goes afterwards. A blue "+" identifies the monitor. Figures 1g, 1i, 1j, 1k, 1l and 1m in the Appendix show the dispersion of PM2.5 as a result of the measured concentrations. Figures 2d, 2e, 3d, and 3e in the appendix show the organic carbon and sulfate impacts, on May 27 and 30, respectively. Unfortunately, the organic carbon maps were unavailable on www.datafed.net for the other days.



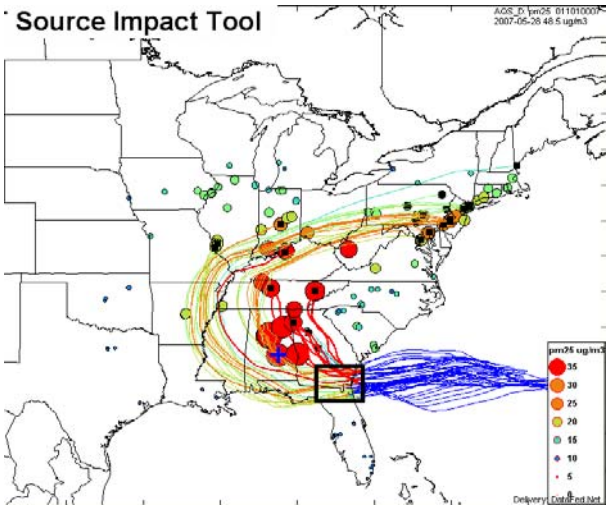
May 23, 2007



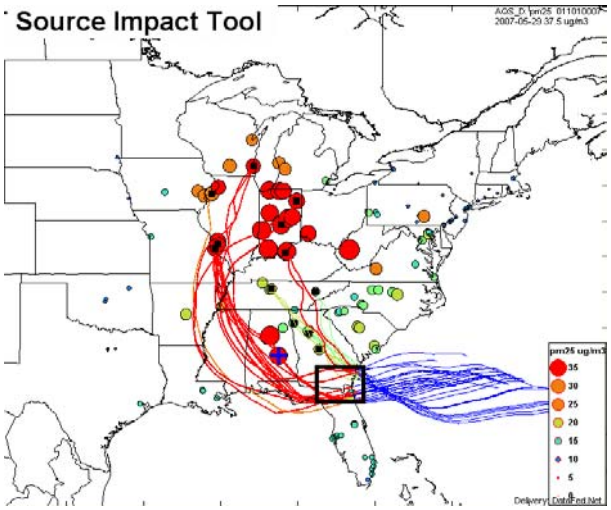
May 26, 2007



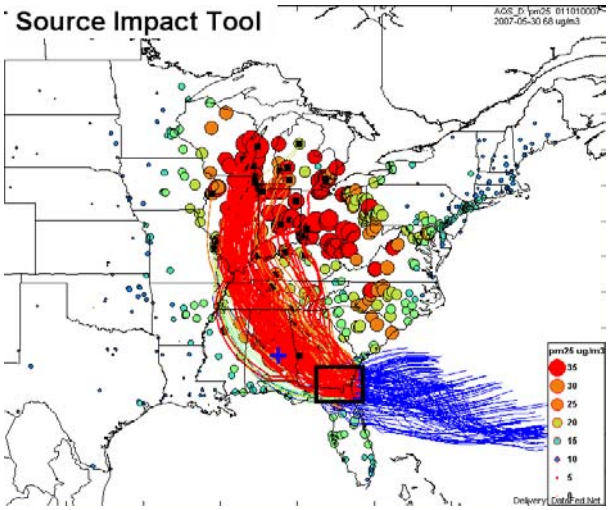
May 27, 2007



May 28, 2007



May 29, 2007



May 30, 2007

(D) Demonstration of No Exceedance "But For"...

Although there are speciation data for this site, there are no data for any of these days. Since the historical monthly mean for both months exceed the annual standard already without the presence of an exceptional event, only values above the 24hr NAAQS of 35 ug/m3 will be considered for concurrence. EPA Region 4 does not concur on the following days and no further evaluation is necessary: May 4 and 15, 2007.

As the FRM data show, the measured concentrations for the other flagged days in May are about 21-41 ug/m3 above the 'extreme high' value as depicted by the 95th percentile (or two standard deviations) and 16-45 ug/m3 above the 'normal high' value as depicted by the 84th percentile (or one standard deviation).

Also, speciation data from nearby sites like Birmingham (01-073-0023) and the Centerville SEARCH site show high impacts of organic carbon on May 27 and 30, 2007.

Source impact trajectories above show influence on May 23, 26-30, 2007. The most direct transport days were May 26-30, 2007.

We believe, that based on historical averages and additional evidence presented, there is enough evidence to state that an exceedance would not have occurred on the following days 'but for' the impacts due to the south Georgia wildfires: May 23, 26-30, 2007. EPA Region 4 concurs with these days.

EXCEEDANCE EVENT: Georgia/Florida Wildfires

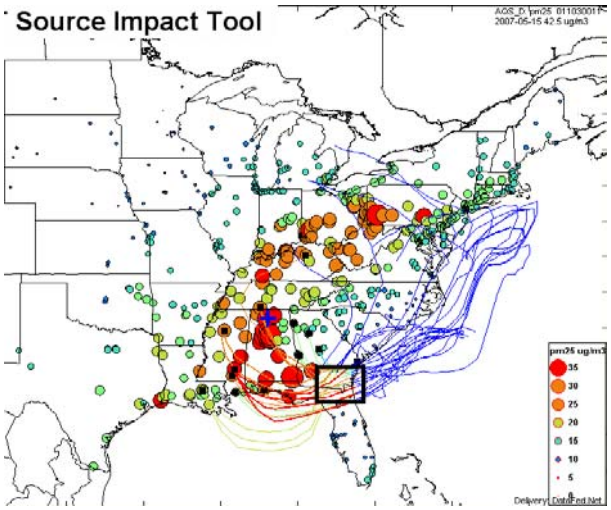
Exceedance Date: May 15, 27, 30 and June 2, 2007
MSA: Decatur, Morgan Co., Alabama
Event Description: Georgia/Florida Wildfires

Detailed Discussion of Evidence
(C) Comparison of background levels

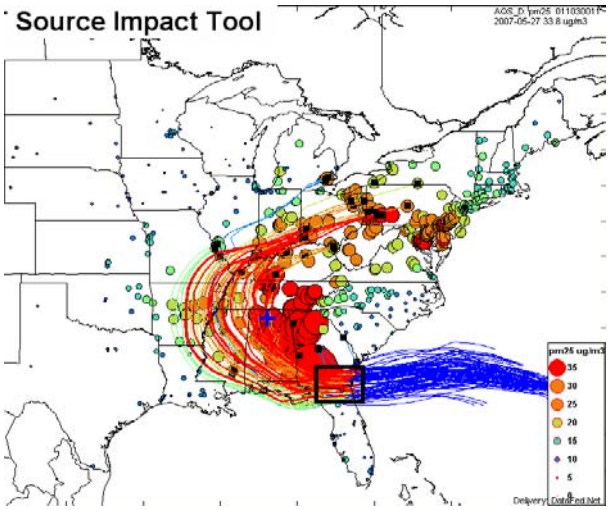
AQS	DATE	Monthly Mean	84th Percentile	95th Percentile	Exceedance Concentration	EPA Concurrence
01-103-0011	May 15	13.9	19.7	24.2	42.5	YES
	May 27	13.9	19.7	24.2	33.8	YES
	May 30	13.9	19.7	24.2	40.3	YES
	June 2	17.5	24.5	31.2	40.5	YES

Notes: [1]Three-year monthly average above 15µg/m3

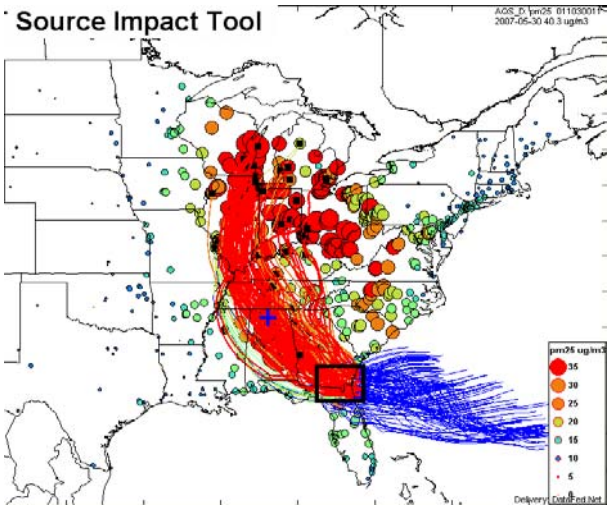
The maps shown below depict wind trajectories and measured concentrations. Blue lines indicate air mass movement into the box and the different colored lines indicate where the air mass goes afterwards. A blue "+" identifies the monitor. Figures 1d, 1j, 1m, and 1p in the Appendix show the dispersion of PM2.5 as a result of the measured concentrations. Figures 2a, 2d, 2e, 3a, 3d, and 3e in the appendix show the organic carbon and sulfate impacts, on May 15, 27 and 30, respectively. No data were available for June 2.



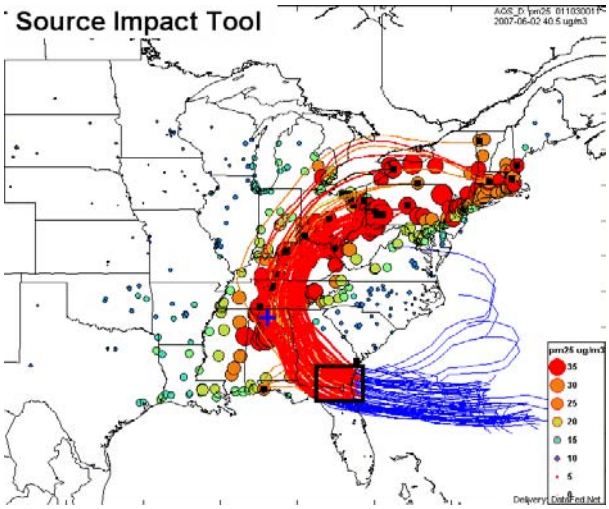
May 15, 2007



May 27, 2007



May 30, 2007



June 2, 2007

(D) Demonstration of No Exceedance "But For"...

There are no speciation data for this site. Since the historical monthly mean for June exceeds the annual standard already without the presence of an exceptional event, only values above the 24hr NAAQS of 35 ug/m3 will be considered for concurrence.

As the FRM data show, the measured concentrations for the days in May are about 3-47 ug/m3 above the 'extreme high' value as depicted by the 95th percentile (or two standard deviations) and 8-52 ug/m3 above the 'normal high' value as depicted by the 84th percentile (or one standard deviation).

Also, speciation data from Huntsville show high impacts of organic carbon on May 30, 2007, and does not have data available for the other days. Source impact trajectories above show more potential direct impact on May 27, 30 and June 2, 2007. In the demonstration provided by ADEM, pages 54-68, enough additional evidence was presented to warrant a concurrence by EPA Region for May 15, 2007.

We believe, that based on historical averages and additional evidence presented, there is enough evidence to state that an exceedance would not have occurred on the following days 'but for' the impacts due to the south Georgia wildfires: May 15, 27 and 30, and June 2, 2007. EPA Region 4 concurs with these days.

EXCEEDANCE EVENT: **Georgia/Florida Wildfires**

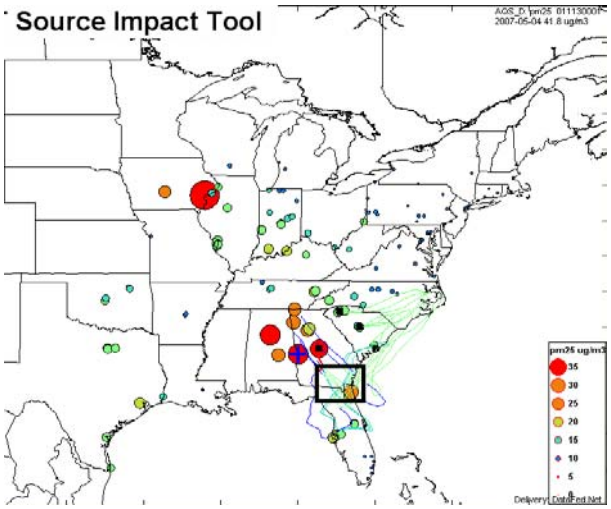
Exceedance Date: May 4, 21, 22, 26, 27, 28, 30 and June 1, 2007
MSA: Columbus-Phenix City, GA-AL, Russell Co., Alabama
Event Description: Georgia/Florida Wildfires

Detailed Discussion of Evidence
(C) Comparison of background levels

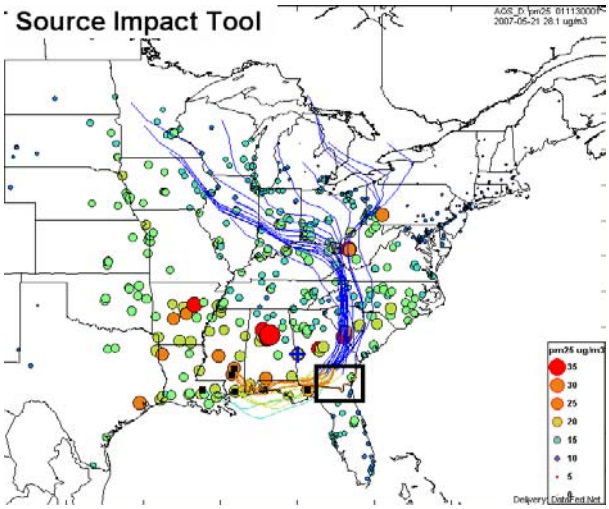
AQS	DATE	Monthly Mean	84th Percentile	95th Percentile	Exceedance Concentration	EPA Concurrence
01-113-0001	May 4	16.7	23.0	28.6	41.8	YES
	May 21	16.7	23.0	28.6	28.1	NO [1]
	May 22	16.7	23.0	28.6	44.3	YES
	May 26	16.7	23.0	28.6	37.0	YES
	May 27	16.7	23.0	28.6	53.0	YES
	May 28	16.7	23.0	28.6	47.9	YES
	June 1	17.6	23.0	28.6	71.2	YES
01-113-0001-2	May 21	16.9	21.3	29.9	29.4	NO [1]
	May 27	16.9	21.3	29.9	56.3	YES
	May 30	16.9	21.3	29.9	78.9	YES

Notes: [1] Three-year monthly average above 15µg/m3

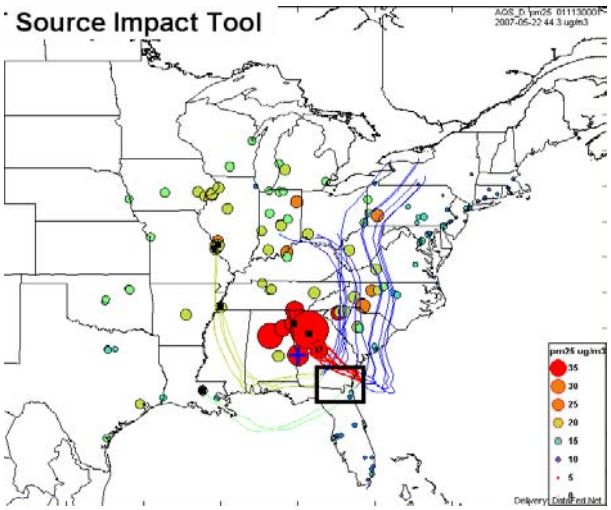
The maps shown below depict wind trajectories and measured concentrations. Blue lines indicate air mass movement into the box and the different colored lines indicate where the air mass goes afterwards. A blue "+" identifies the monitor. Figures 1b, 1e, 1f, 1i, 1j, 1k, 1m and 1o in the Appendix show the dispersion of PM2.5 as a result of the measured concentrations. Figures 2b, 2d, 2e, 3b, 3d, and 3e in the appendix show the organic carbon and sulfate impacts, on May 21, 27 and 30, respectively. Unfortunately, the organic carbon and sulfate maps were unavailable for the other days.



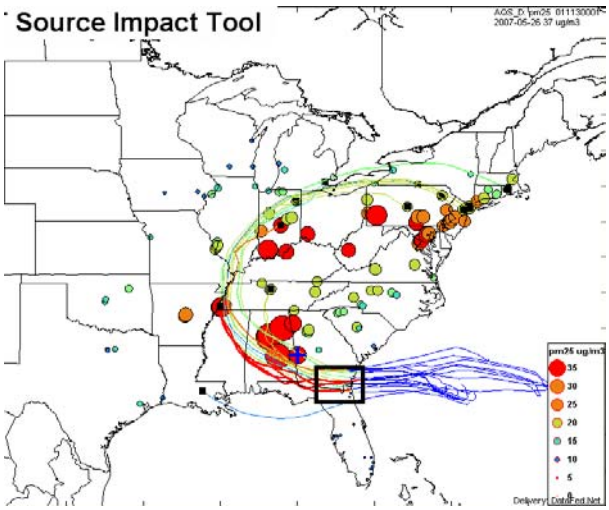
May 4, 2007



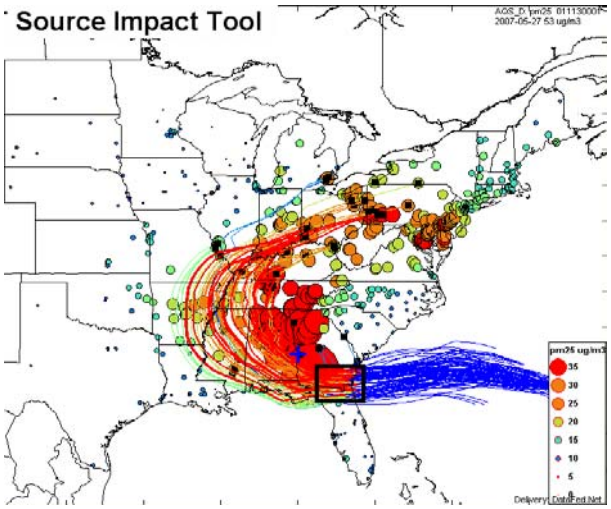
May 21, 2007



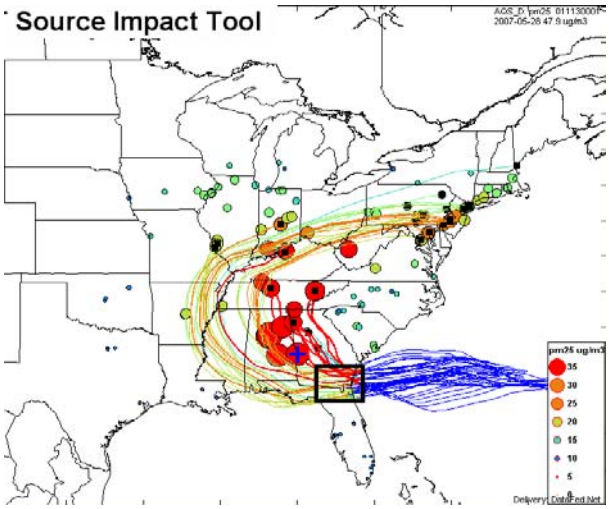
May 22, 2007



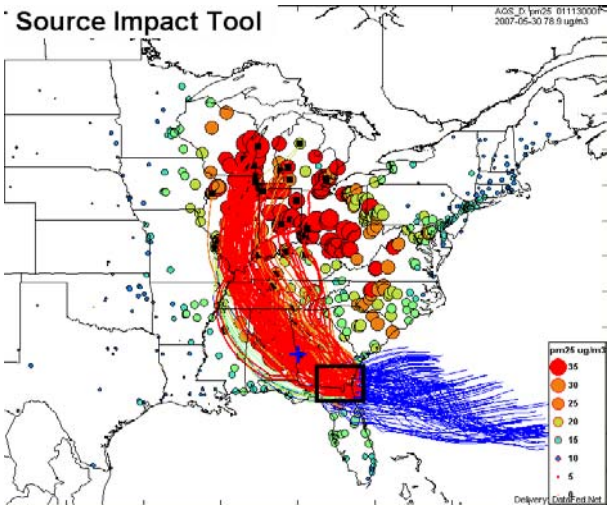
May 26, 2007



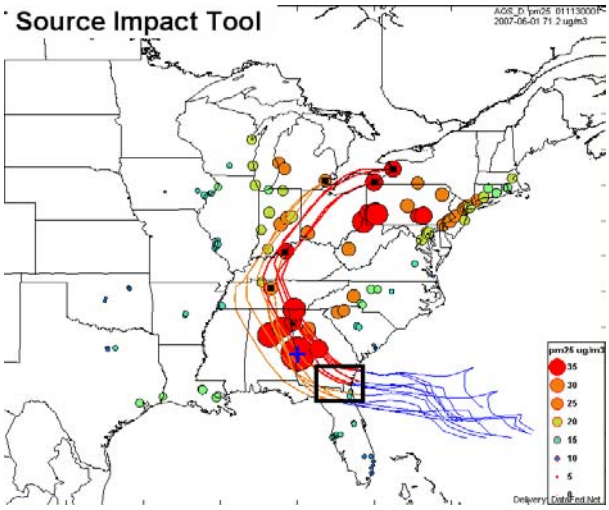
May 27, 2007



May 28, 2007



May 30, 2007



June 1, 2007

(D) Demonstration of No Exceedance "But For"…

Although there are speciation data for this site, there is only such data for May 30, 2007, out of all days requested for exclusion. Since the historical monthly mean for both months exceed the annual standard already without the presence of an exceptional event, only values above the 24hr NAAQS of 35 ug/m3 will be considered for concurrence. EPA Region 4 does not concur on the following day and no further evaluation is necessary: May 21, 2007.

As the FRM data show, the measured concentrations for the other flagged days in May are about 8-49 ug/m3 above the 'extreme high' value as depicted by the 95th percentile (or two standard deviations) and 14-58 ug/m3 above the 'normal high' value as depicted by the 84th percentile (or one standard deviation).

The closest area with speciation data is Birmingham. The Montgomery speciation site only has speciation data for May 30. The North Birmingham site and the Birmingham and Centerville SEARCH sites show higher impacts of organic carbon relative to sulfate on May 22, 26, 27, 28, 30 and June 1 and 2, 2007. Source impact trajectories above show influence on most flagged days. The most direct transport days were May 26-30, and June 1, 2007. Although speciation data is not available for May 4, 2007, Other evidence presented by ADEM for May 4 in their demonstration on pages 41-48, show cause and provide enough information to make a determination for concurrence.

We believe, that based on historical averages and additional evidence presented, there is enough evidence to state that an exceedance would not have occurred on the following days 'but for' the impacts due to the south Georgia wildfires: May 4, 22, 26-28, 30 and June 1, 2007. EPA Region 4 concurs with these days.

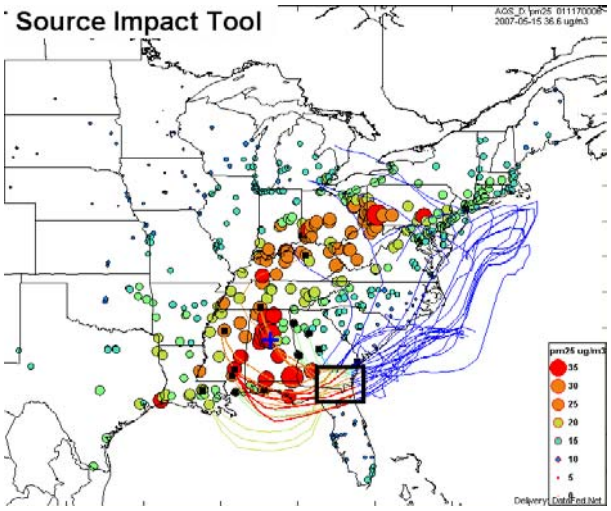
EXCEEDANCE EVENT: **Georgia/Florida Wildfires**

Exceedance Date: May 15, 27, 30 and June 2, 2007
MSA: Pelham, Shelby Co., Alabama
Event Description: Georgia/Florida Wildfires

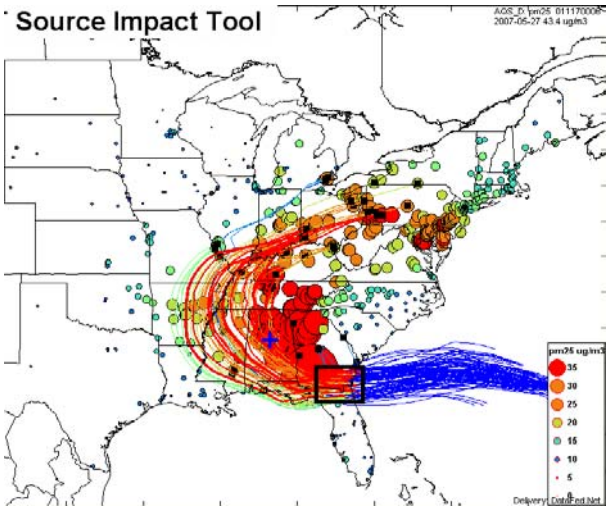
Detailed Discussion of Evidence
(C) Comparison of background levels

AQS	DATE	Monthly Mean	84th Percentile	95th Percentile	Exceedance Concentration	EPA Concurrence
01-117-0006	May 15	14.7	20.5	25.6	36.6	YES
	May 27	14.7	20.5	25.6	43.4	YES
	May 30	14.7	20.5	25.6	49.6	YES
	June 2	17.5	25.1	29.2	35.1	YES

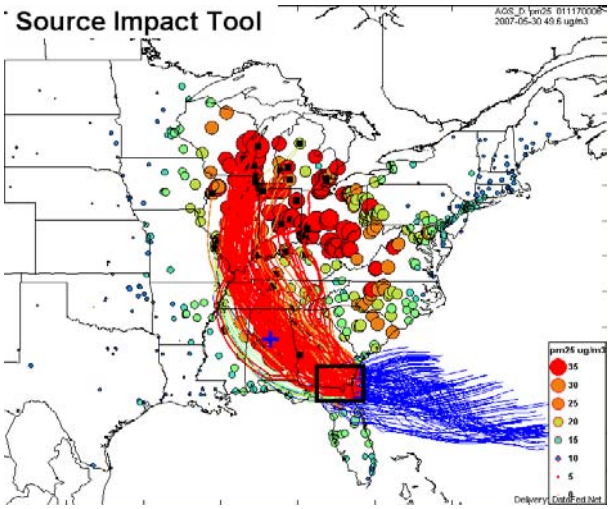
The maps shown below depict wind trajectories and measured concentrations. Blue lines indicate air mass movement into the box and the different colored lines indicate where the air mass goes afterwards. A blue "+" identifies the monitor. Figures 1d, 1j, 1m and 1p in the Appendix show the dispersion of PM2.5 as a result of the measured concentrations. Figures 2a, 2d, 2e, 3a, 3d, and 3e in the appendix show the organic carbon and sulfate impacts, on May 15, 27 and 30, respectively.



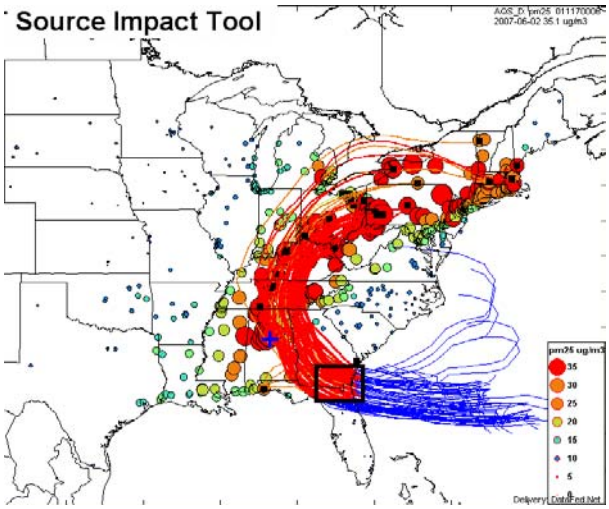
May 15, 2007



May 27, 2007



May 30, 2007



June 2, 2007

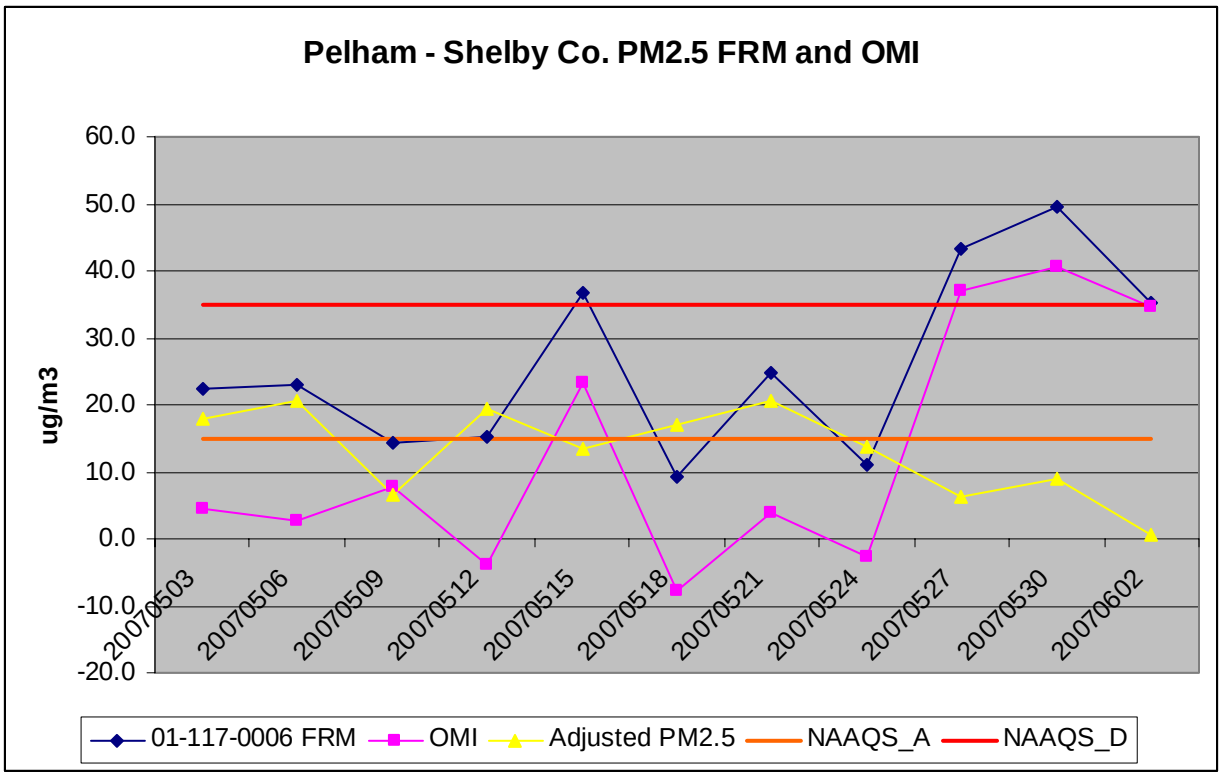
D) Demonstration of No Exceedance "But For" the Event

Although there are no speciation data available in Shelby County, this county is a part of the Birmingham MSA where speciation data are available. We will assume that the smoke impacts are similar on these days as wind trajectories show. In order to quantify the impacts of the fire on observed PM2.5 concentrations, speciation data collected at the North Birmingham speciation site on all four days were used to approximate the organic mass increment of the observed PM2.5 mass that was caused by the wildfire. The organic mass increment was calculated using the following equation, adapted from Turpin and Lim (2001).

$$\boldsymbol{OMI} = (OC_{observed} - OC_{average}) \times 2.0 \qquad \text{(Eq. 2)}$$

Where OMI is the organic mass increment due to smoke from the wildire, $OC_{observed}$ is the observed organic carbon mass, and $OC_{average}$ is the average organic carbon mass observed at the site during the month of May, and separately for June, for 2004-2006. A multiplier of 2.0 is used to approximate the total PM2.5 mass associated with smoke from wildfires (TURPIN AND LIM 2001). In order to approximate the PM2.5 concentration that would have been observed but for the fire, the OMI was subtracted from the observed 24-hr average PM2.5 concentration. This procedure was then repeated for each day that PM2.5 speciation data was collected during these two months to compare impacts of smoke on different days. The results of this analysis are shown in the graph below. This graph shows the calculated OMI and the adjusted PM2.5 mass (Observed PM2.5 – OMI). The graph demonstrates that without the PM2.5 mass emitted by the fire on these four days, the 24-hr average PM2.5 concentration would have been approximately 13.3, 6.3, 8.9, 0.6 µg/m3, on May 15, 27, 30 and June 2, 2007 respectively, and thus that there would have been no exceedance but for the wildfire.

The overall body of evidence suggests that there would have been no NAAQS exceedances during this period but for the south Georgia wildfire. EPA concurrence was given to all of the values requested during this event.



EXCEEDANCE EVENT: **Georgia/Florida Wildfires**

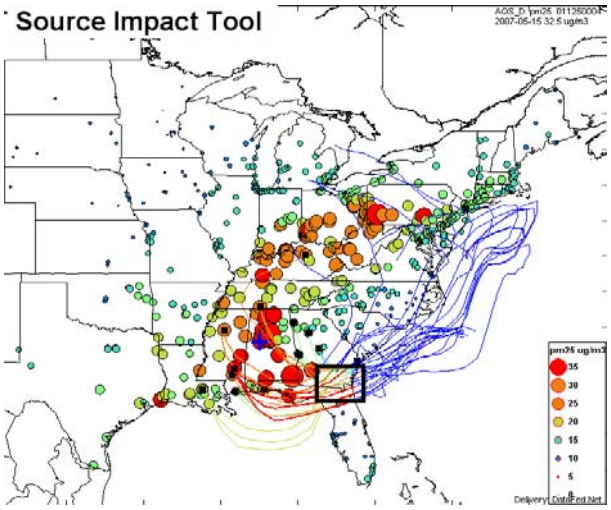
Exceedance Date: May 15, 27, 30 and June 2, 2007
MSA: Tuscaloosa, Tuscaloosa Co., Alabama
Event Description: Georgia/Florida Wildfires

Detailed Discussion of Evidence

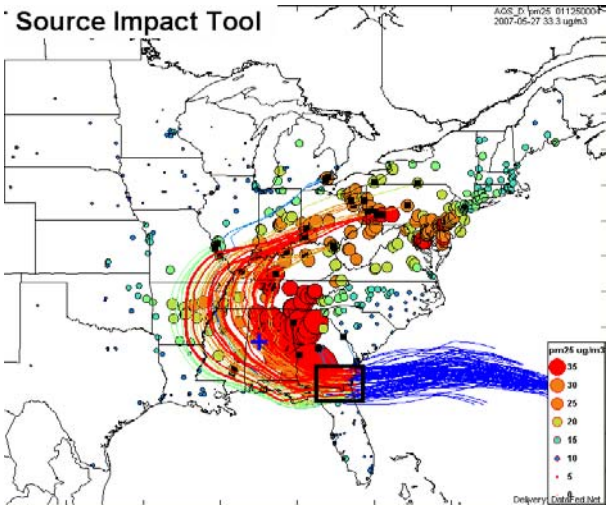
(C) Comparison of background levels

AQS	DATE	Monthly Mean	84th Percentile	95th Percentile	Exceedance Concentration	EPA Concurrence
01-125-0004	May 15	13.9	21.0	24.1	32.5	YES
	May 27	13.9	21.0	24.1	33.3	YES
	May 30	13.9	21.0	24.1	38.3	YES
	June 2	17.3	25.1	33.3	36.8	YES

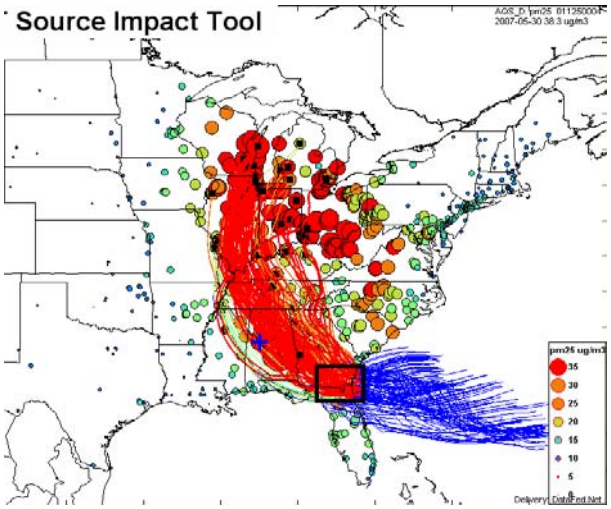
The maps shown below depict wind trajectories and measured concentrations. Blue lines indicate air mass movement into the box and the different colored lines indicate where the air mass goes afterwards. A blue "+" identifies the monitor. Figures 1d, 1j, 1m and 1p in the Appendix show the dispersion of PM2.5 as a result of the measured concentrations. Figures 2a, 2d, 2e, 3a, 3d, and 3e in the appendix show the organic carbon and sulfate impacts, on May 15, 27 and 30, respectively. Unfortunately, the organic carbon and sulfate maps were unavailable for June 2, 2007.

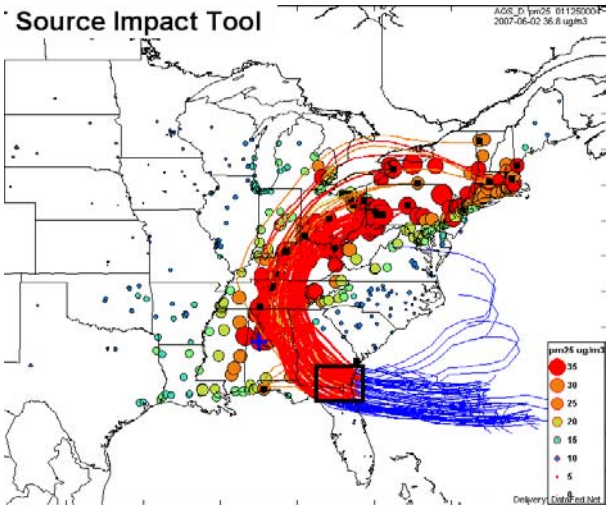


May 15, 2007



May 27, 2007



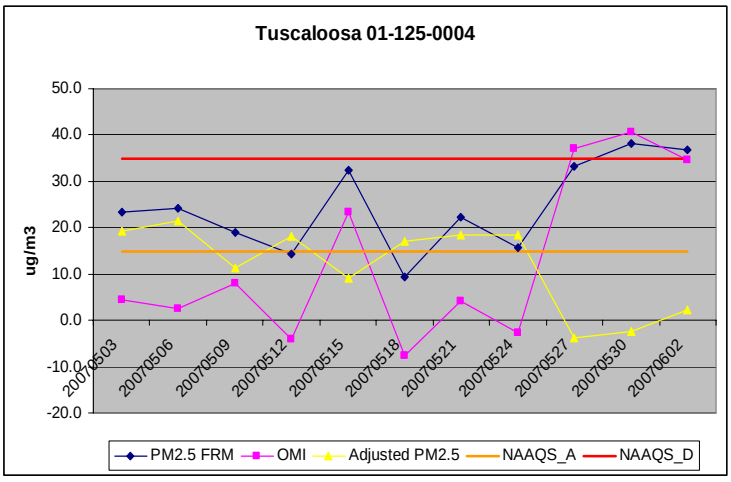


D) Demonstration of No Exceedance "But For" the Event

Although there are no speciation data available in Tuscaloosa, the Tuscaloosa MSA is adjacent to the Birmingham MSA where speciation data are available. We will assume that the smoke impacts are similar on these days as wind trajectories show similar impacts on these areas. In order to quantify the impacts of the fire on observed PM2.5 concentrations, speciation data collected at the North Birmingham speciation site on all four days were used to approximate the organic mass increment of the observed PM2.5 mass that was caused by the wildfire. The organic mass increment was calculated using the following equation, adapted from Turpin and Lim (2001).

$$\boldsymbol{OMI} = (OC_{observed} - OC_{average}) \times 2.0 \qquad \text{(Eq. 2)}$$

Where OMI is the organic mass increment due to smoke from the wildire, $OC_{observed}$ is the observed organic carbon mass, and $OC_{average}$ is the average organic carbon mass observed at the site during the month of May, and separately for June, for 2004-2006. A multiplier of 2.0 is used to approximate the total PM2.5 mass associated with smoke from wildfires (TURPIN AND LIM 2001). In order to approximate the PM2.5 concentration that would have been observed but for the fire, the OMI was subtracted from the observed 24-hr average PM2.5 concentration. This procedure was then



repeated for each day that PM2.5 speciation data was collected during these two months to compare impacts of smoke on different days. The results of this analysis are shown in the graph below. This graph shows the calculated OMI and the adjusted PM2.5 mass (Observed PM2.5 – OMI). The graph demonstrates that without the PM2.5 mass emitted by the fire on these four days, the 24-hr average PM2.5 concentration would have been approximately 9.2, -3.8, -2.4 and 2.3 µg/m3, on May 15, 27, 30 and June 2, 2007 respectively, and thus that there would have been no exceedance but for the wildfire.

The overall body of evidence suggests that there would have been no NAAQS exceedances during this period but for the south Georgia wildfire. EPA concurrence was given to all of the values requested during this event.

EXCEEDANCE EVENT: Georgia/Florida Wildfires

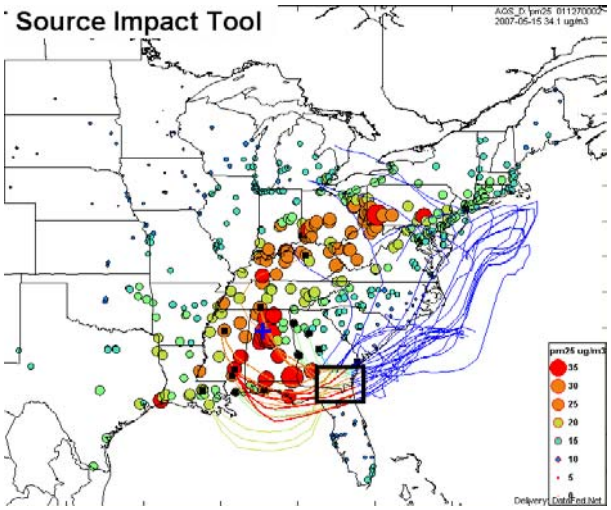
Exceedance Date: May 15, 21, 27, 30 and June 2, 2007
MSA: Jasper, Walker Co., Alabama
Event Description: Georgia/Florida Wildfires

Detailed Discussion of Evidence
(C) Comparison of background levels

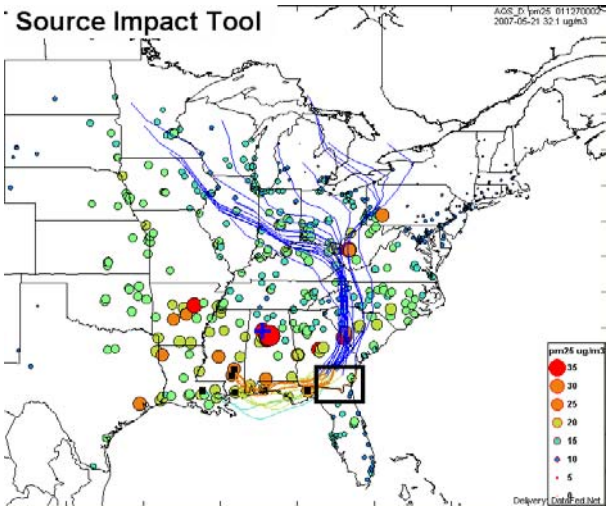
AQS	DATE	Monthly Mean	84th Percentile	95th Percentile	Exceedance Concentration	EPA Concurrence
01-127-0002	May 15	14.4	19.7	25.6	34.1	YES
	May 21	14.4	19.7	25.6	32.1	NO [1]
	May 27	14.4	19.7	25.6	41.2	YES
	May 30	14.4	19.7	25.6	37.7	YES
	June 2	18.1	25.9	34.5	35.1	YES

Notes: [1] ~~After subtracting OMI, value still greater than Annual NAAQS~~

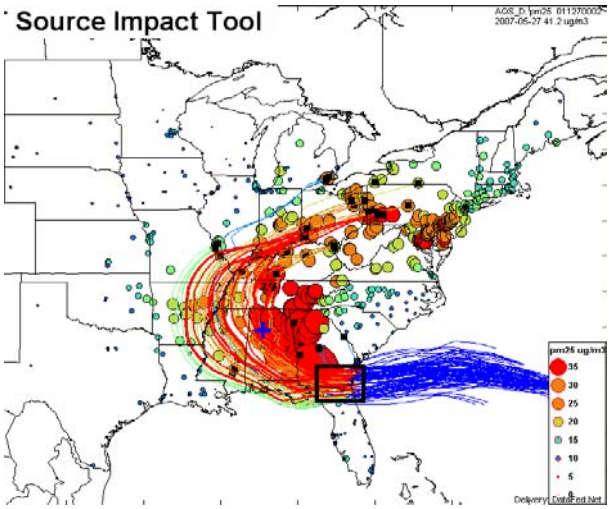
The maps shown below depict wind trajectories and measured concentrations. Blue lines indicate air mass movement into the box and the different colored lines indicate where the air mass goes afterwards. A blue "+" identifies the monitor. Figures 1d, 1e, 1j, 1m and 1p in the Appendix show the dispersion of PM2.5 as a result of the measured concentrations. Figures 2a, 2b, 2d, 2e, 3a, 3b, 3d, and 3e in the appendix show the organic carbon and sulfate impacts, on May 15, 21, 27 and 30, respectively.



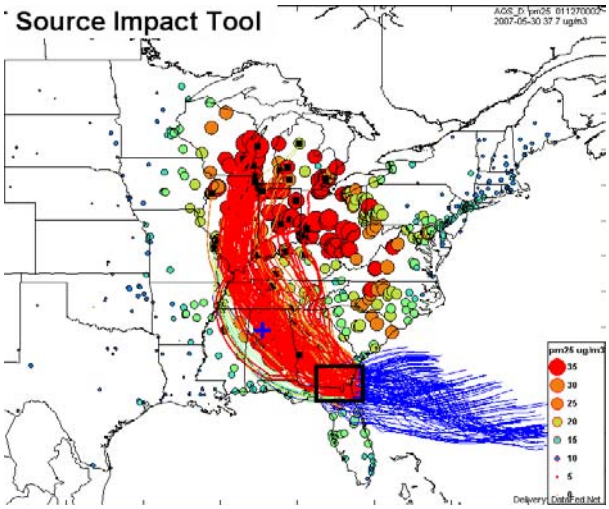
May 15, 2007



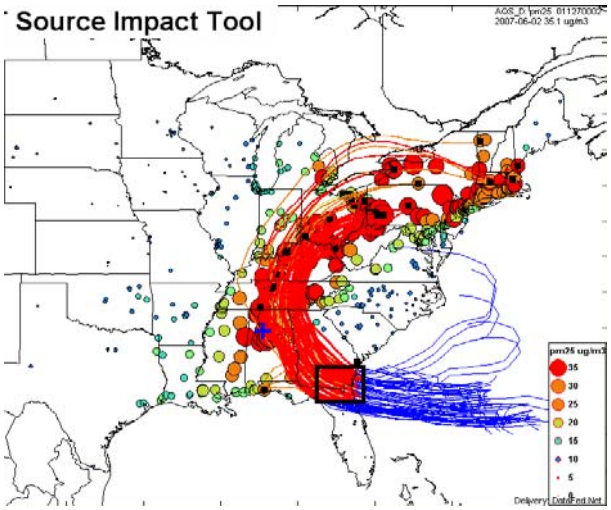
May 21, 2007



May 27, 2007



May 30, 2007



June 2, 2007

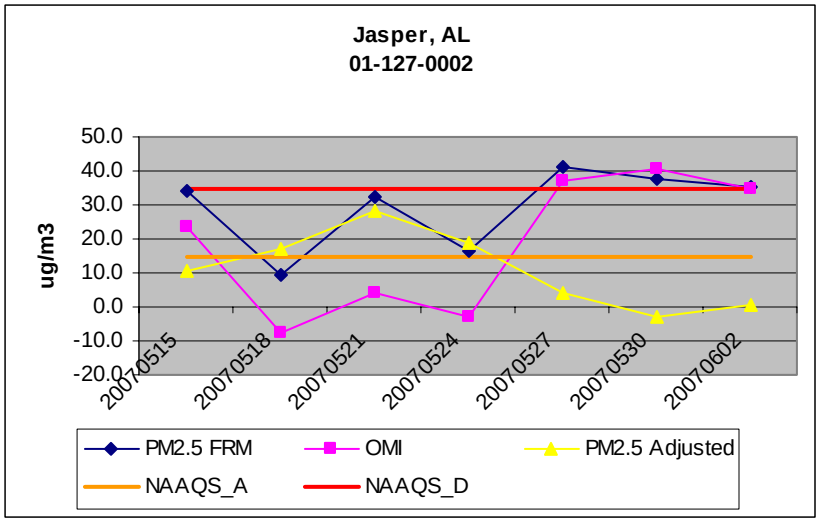
D) Demonstration of No Exceedance "But For" the Event

Although there are no speciation data available in Walker County, this county is part of the Birmingham MSA where speciation data are available. We will assume that the smoke impacts are similar on these days as wind trajectories show similar impacts in these areas. In order to quantify the impacts of the fire on observed PM2.5 concentrations, speciation data collected at the North Birmingham speciation site on all four days were used to approximate the organic mass increment of the observed PM2.5 mass that was caused by the wildfire. The organic mass increment was calculated using the following equation, adapted from Turpin and Lim (2001).

$$\boldsymbol{OMI} = (OC_{observed} - OC_{average}) \times 2.0 \qquad \text{(Eq. 2)}$$

Where OMI is the organic mass increment due to smoke from the wildire, $OC_{observed}$ is the observed organic carbon mass, and $OC_{average}$ is the average organic carbon mass

observed at the site during the month of May, and separately for June, for 2004-2006. A multiplier of 2.0 is used to approximate the total PM2.5 mass associated with smoke from wildfires (TURPIN AND LIM 2001). In order to approximate the PM2.5 concentration that would have been observed but for the fire, the OMI was subtracted from the observed 24-hr average PM2.5 concentration. This procedure was then repeated for each day that PM2.5 speciation data was collected during these two months to compare impacts of smoke on different days. The results of this analysis are shown in the graph below. This graph shows the calculated OMI and the adjusted PM2.5 mass (Observed PM2.5 – OMI). The graph demonstrates that without the PM2.5 mass emitted by the fire on these four days, the 24-hr average PM2.5 concentration would have been approximately 10.8, 4.1, -3.0 and 0.6 µg/m3, on May 15, 27, 30 and June 2, 2007 respectively, and thus that there would have been no exceedance but for the wildfire. EPA concurrence was given to all values except May 21, 2007.



Jefferson County Department of Health
Birmingham, Alabama

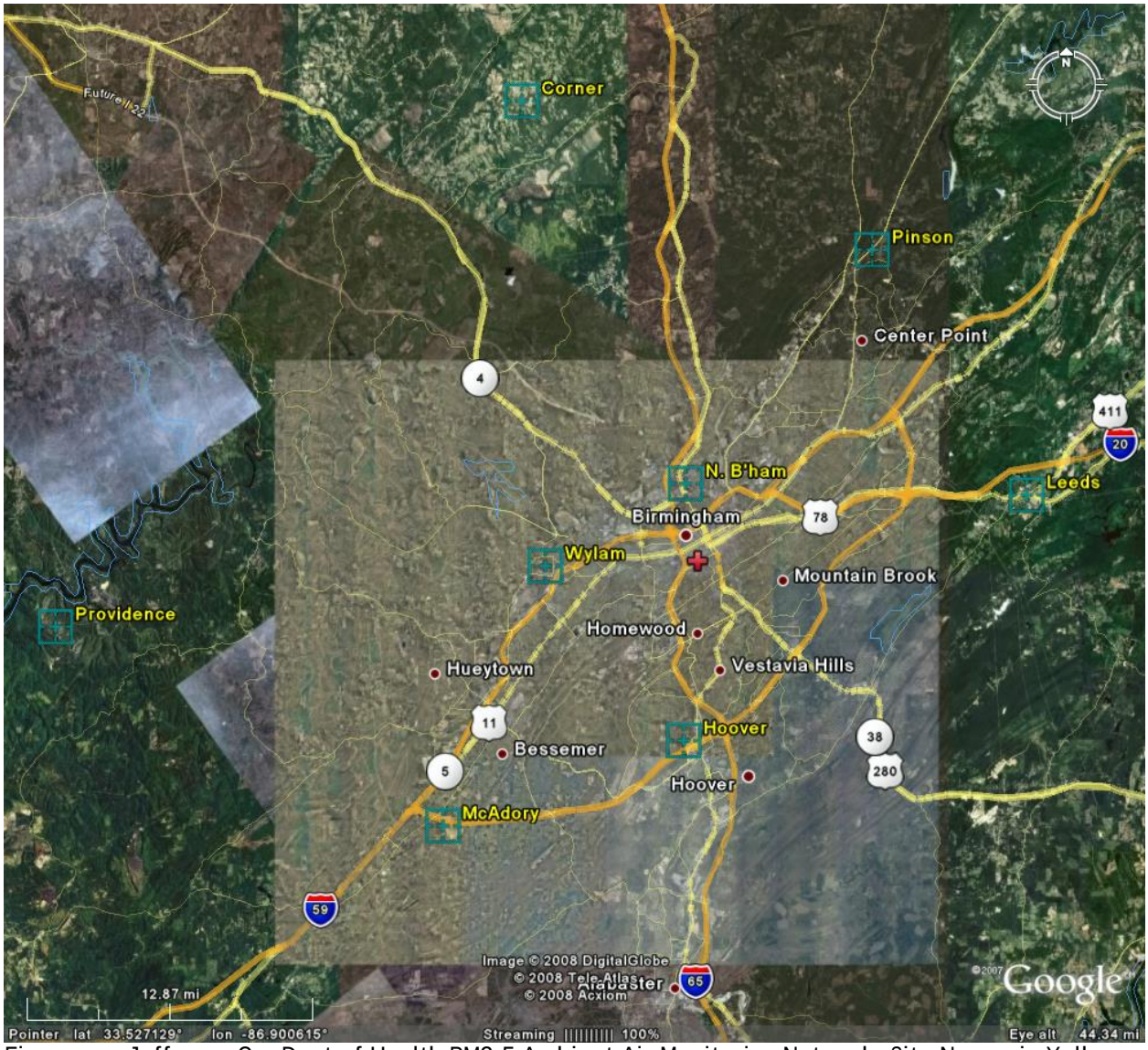


Figure xx. Jefferson Co. Dept of Health PM2.5 Ambient Air Monitoring Network. Site Names in Yellow.

Since we are considering one county, we are assuming that all sites were affected similarly by widespread smoke and/or sulfate. If we determine this is not the case, we will provide additional information as needed. There are two other sites in the MSA, outside of Jefferson County, that were reviewed along with the State's demonstration: Shelby and Walker counties. Those sites are not shown on the map above and will not be discussed here. The following dates will not be approved or discussed further in this document (please refer to page 3 from the demonstration by JCDH): May 17-21, 2007 and May 24-25, 2007.

All sites and days that failed the monthly mean test described in the introduction will receive a non-concurrence by EPA Region 4. These are listed here and there will be no further discussion for these in this document.

AQS ID	DATE	VALUE	Mo. Avg.	84th Perc	95th Perc	Approved?
01-073-0023-1	20070514	32.5	20.1	31.5	40.4	NO
01-073-2003-1	20070514	28	18.2	25.3	31.6	NO
01-073-5002-1	20070515	34.2	15.9	22.4	25.1	NO
01-073-0023-1	20070516	15.4	20.1	31.5	40.4	NO
01-073-2003-1	20070516	17.6	18.2	25.3	31.6	NO
01-073-0023-1	20070531	34.3	20.1	31.5	40.4	NO
01-073-2003-1	20070531	29.6	18.2	25.3	31.6	NO
01-073-0023-1	20070603	21.1	21.4	32.2	36.9	NO
01-073-2003-1	20070603	18.3	20.1	29.7	36.1	NO

The following Figures will be referenced in this discussion.

Figure B01 – North Birmingham Speciation Data (1 in 3)

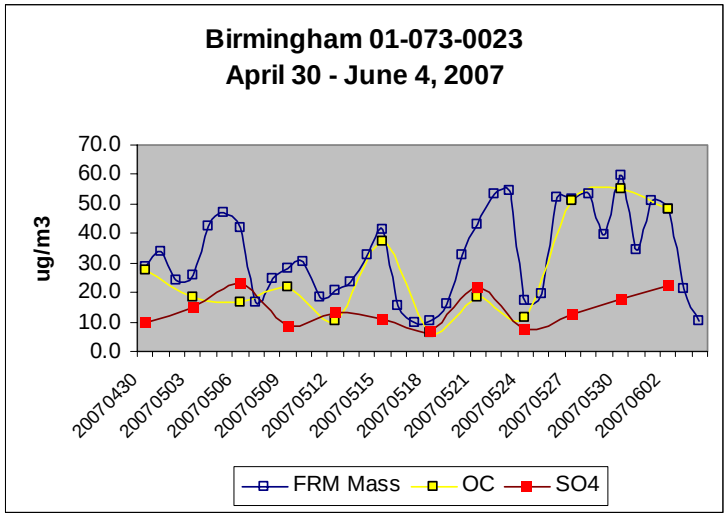


Figure B02 – Wylam Speciation Data (1 in 6)

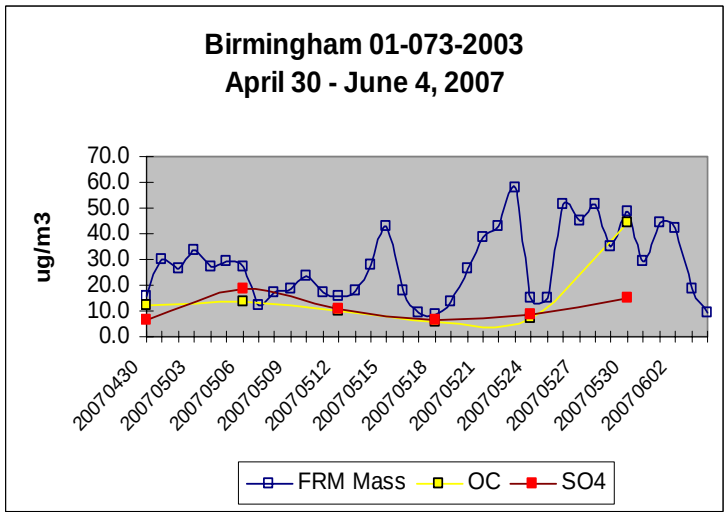


Figure B03

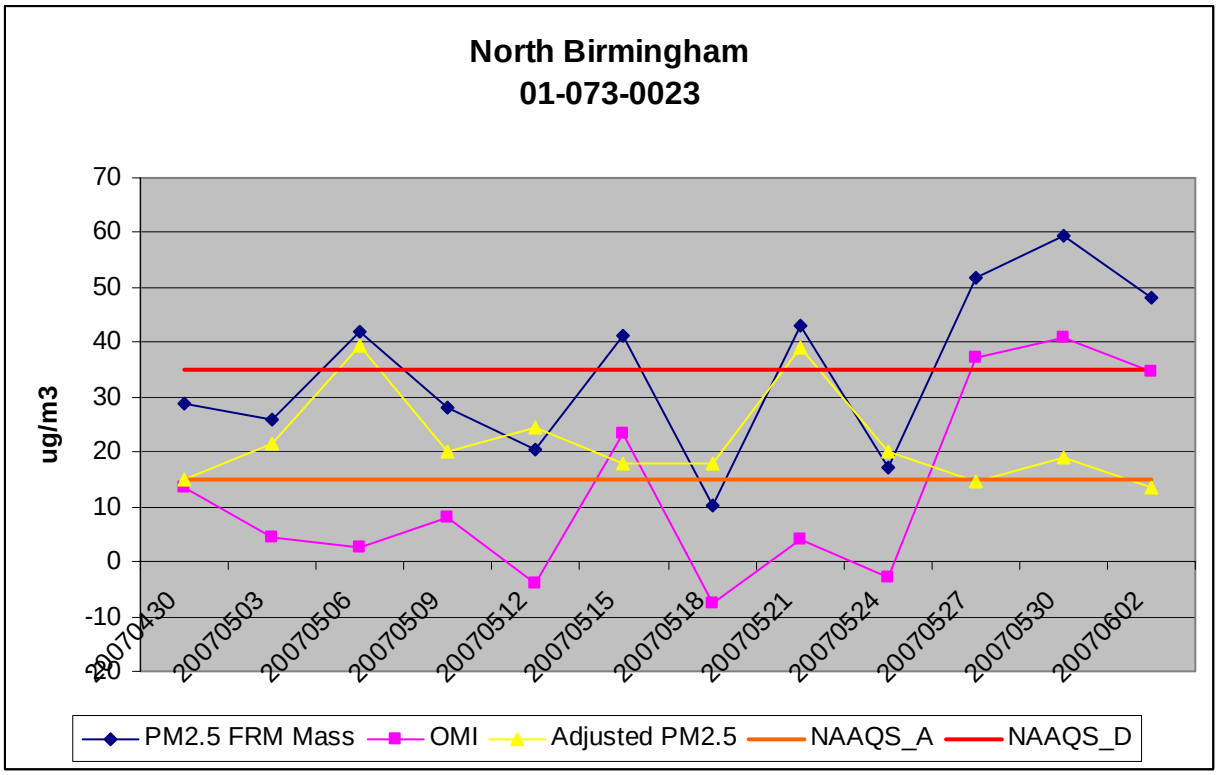


Figure B04

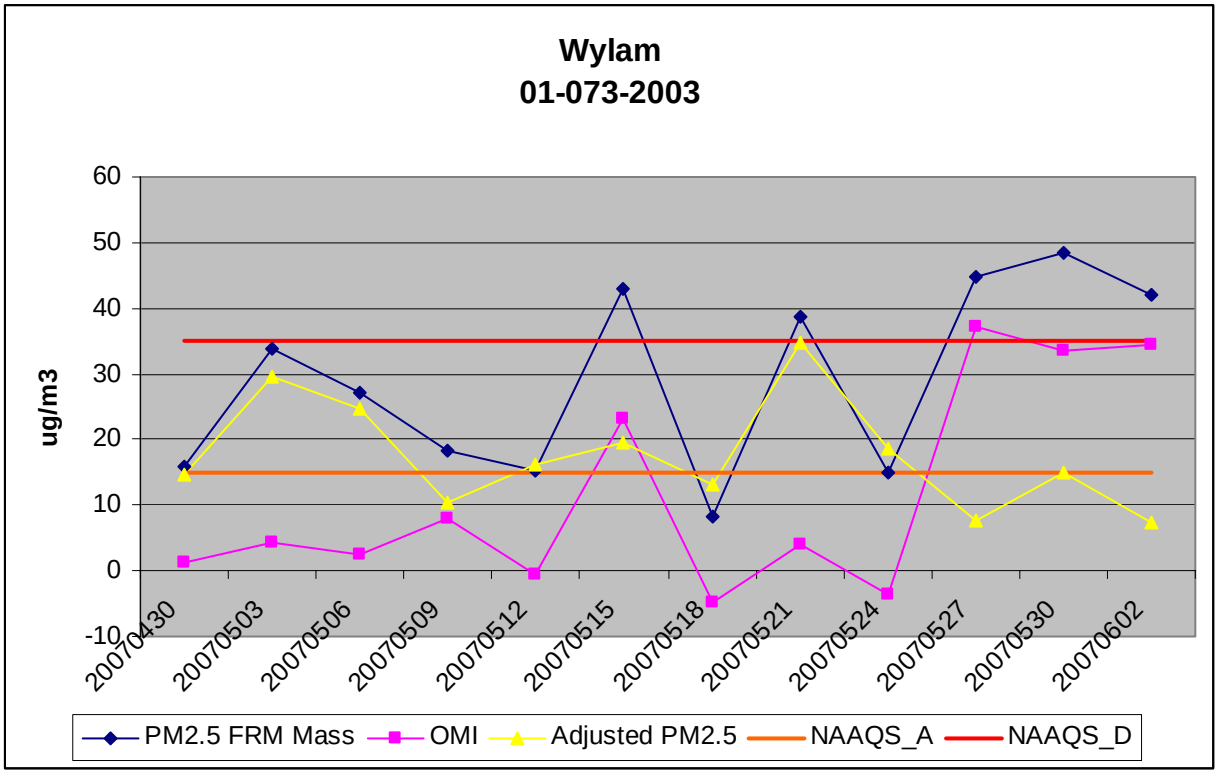


Figure B05

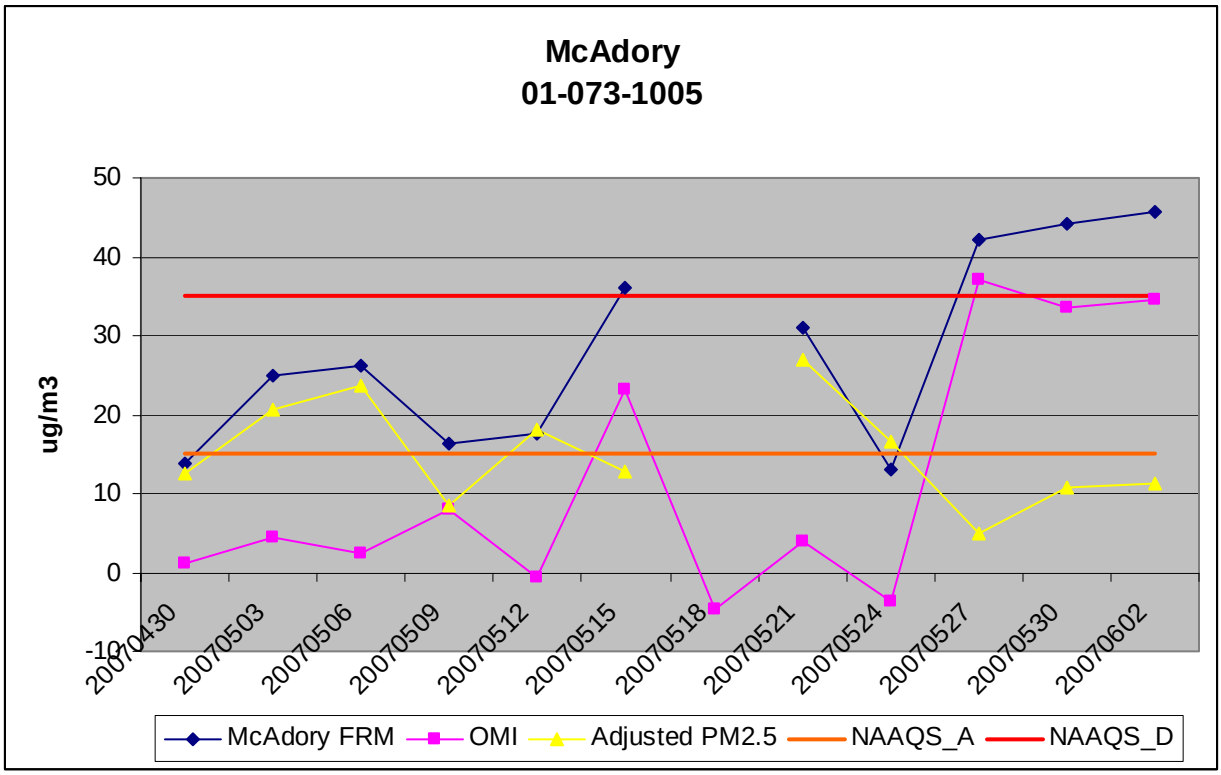


Figure B06

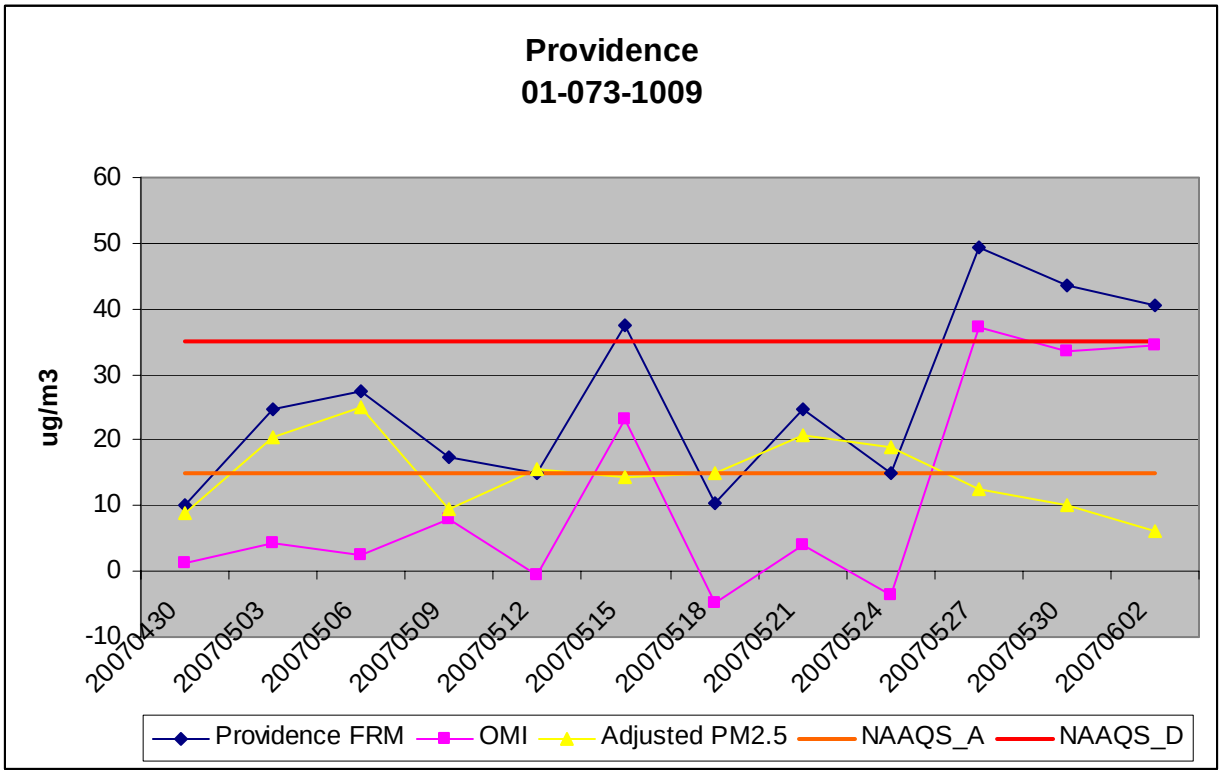


Figure B07

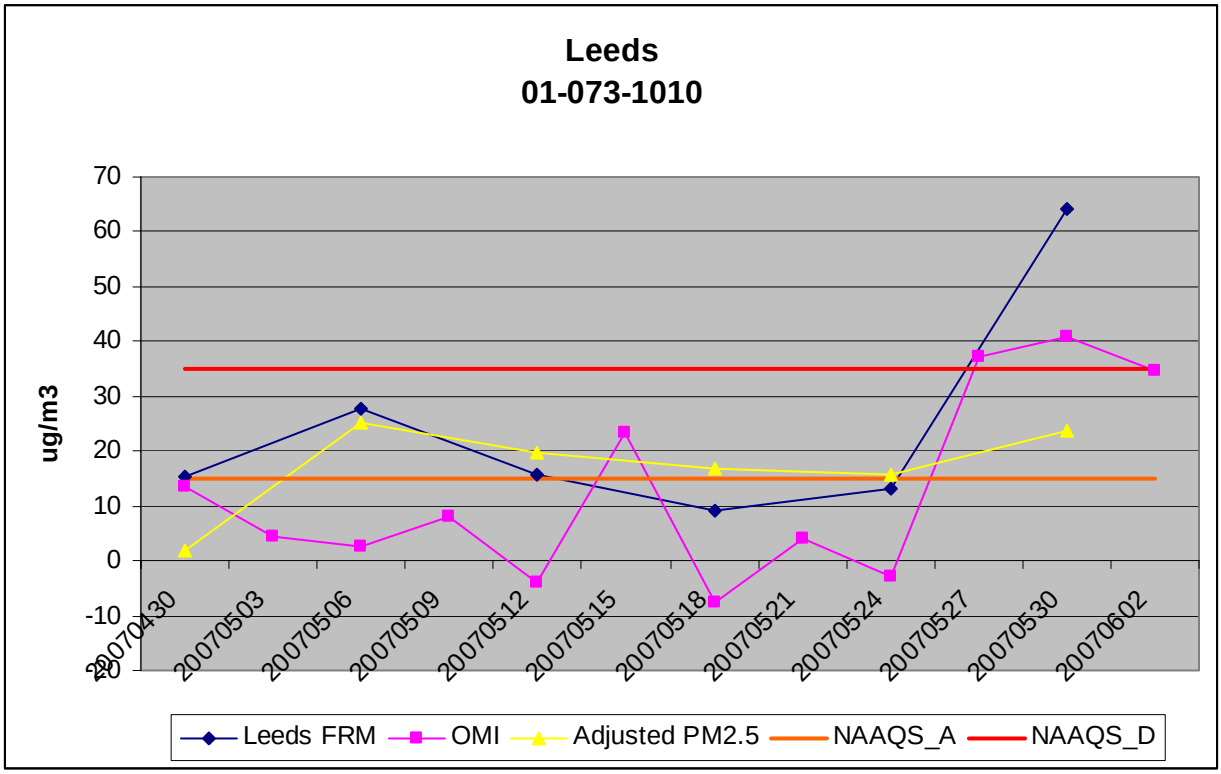


Figure B08

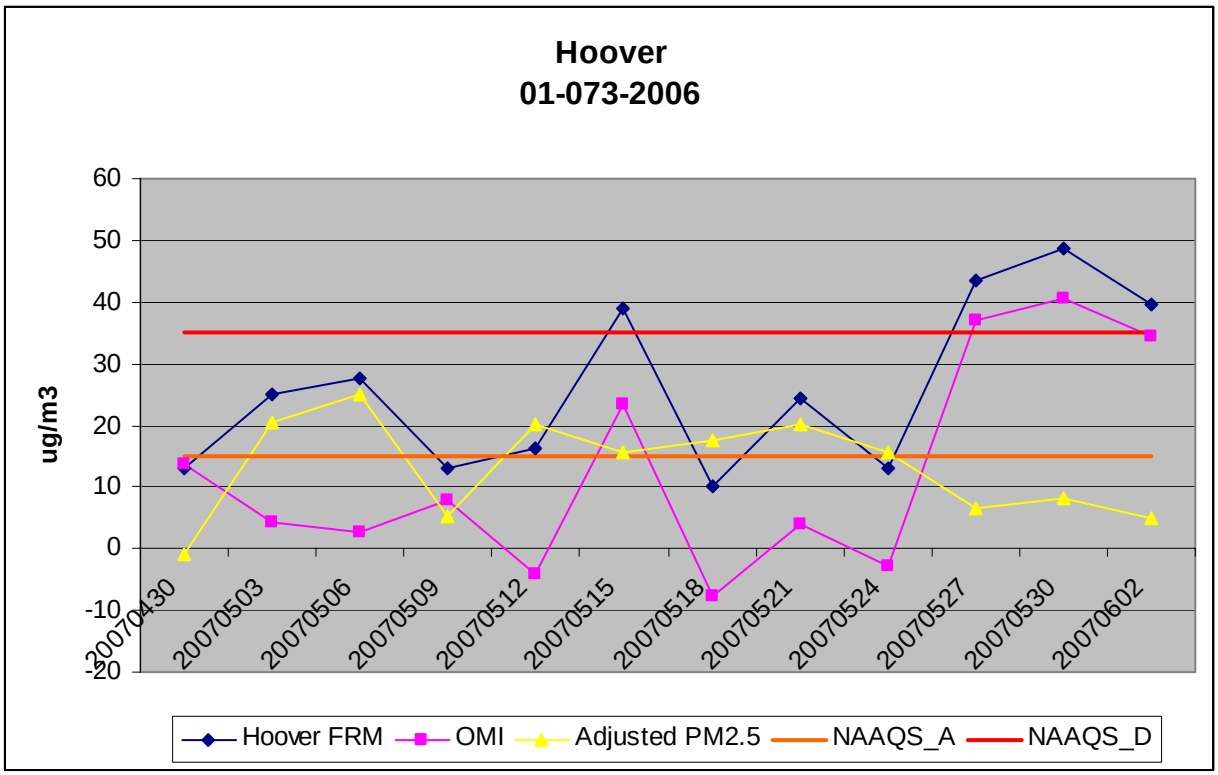


Figure B09

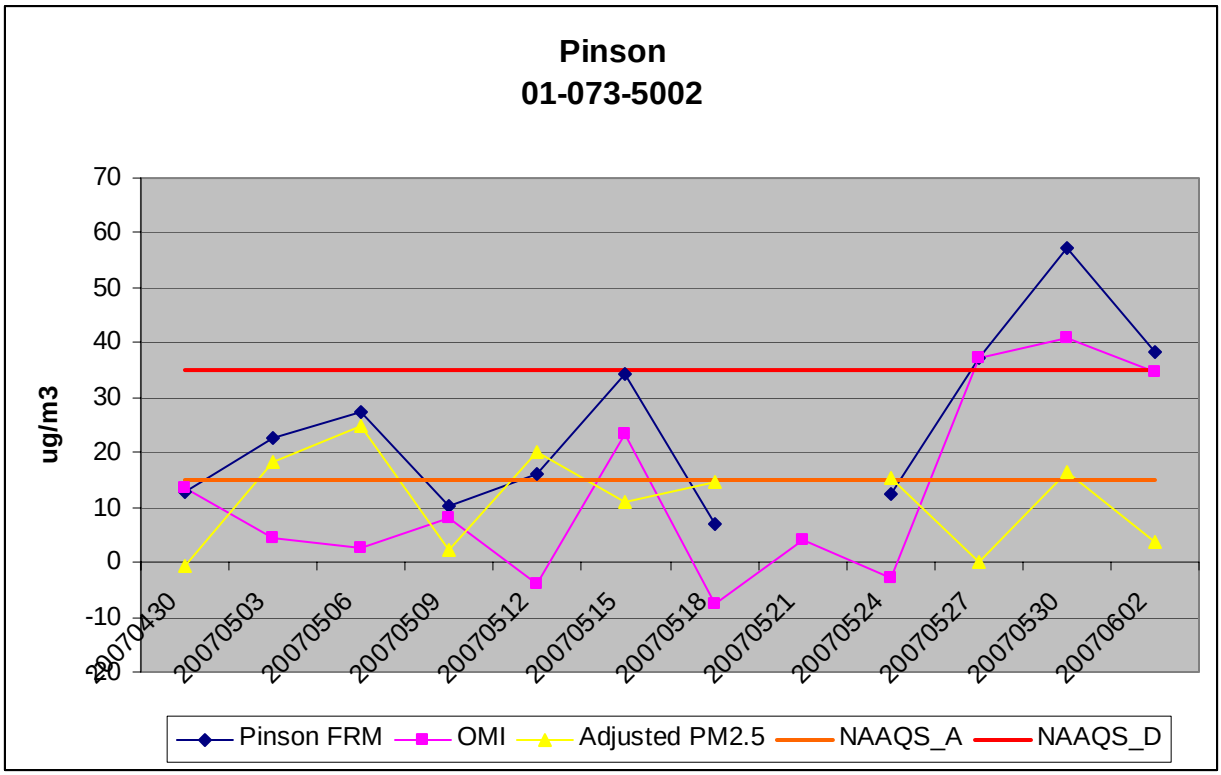
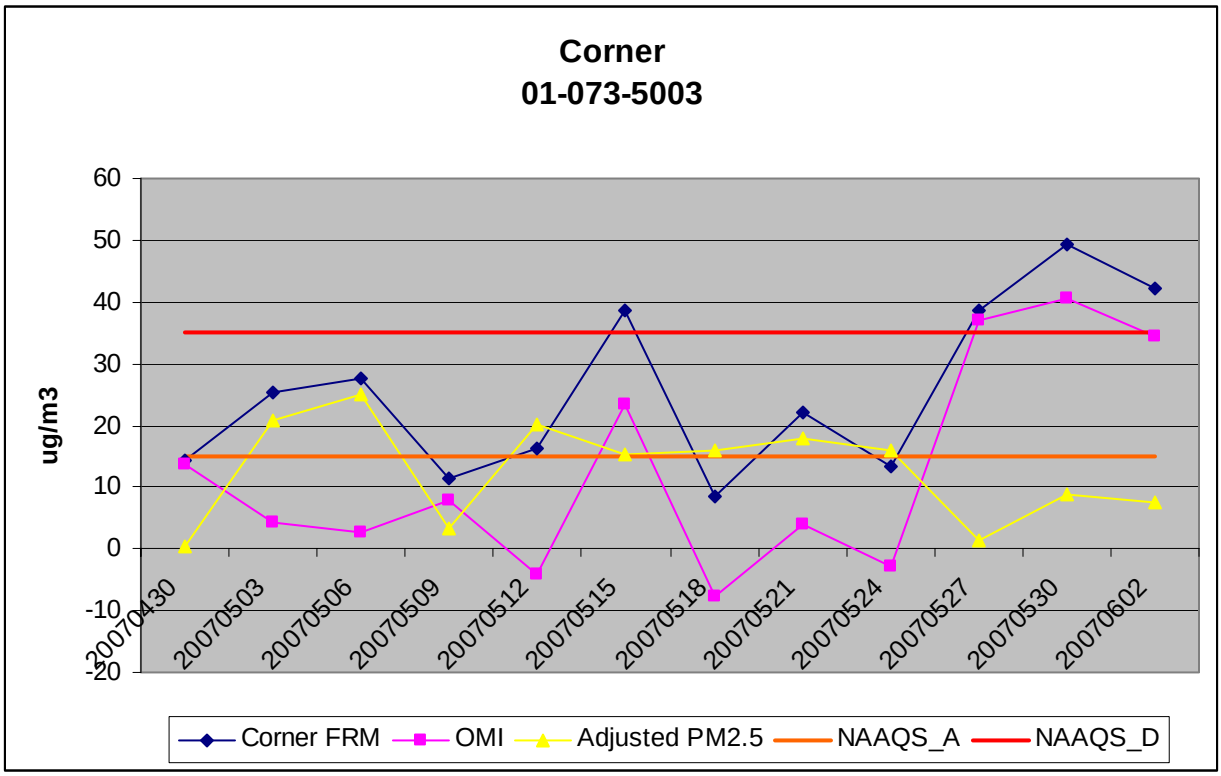


Figure B10



EXCEEDANCE EVENT: Georgia/Florida Wildfires

Exceedance Date: May 15, May 22-23, May 26-30, June 1-2, 2007
MSA: Birmingham, Jefferson Co., Alabama
Event Description: Georgia/Florida Wildfires

Detailed Discussion of Evidence
(C) Comparison of background levels

AQS ID	DATE	Monthly Mean	84th Percentile	95th Percentile	Exceedance Concentration	EPA Concurrence
01-073-0023-1	May 15	20.1	31.5	40.4	41.3	YES
01-073-0023-2	May 15	20.5	31.0	33.3	41	YES
01-073-1005-1	May 15	16.6	24.8	28.3	36.1	YES
01-073-1009-1	May 15	15.8	23.0	27.1	37.6	YES
01-073-2003-1	May 15	18.2	25.3	31.6	42.9	YES
01-073-2003-2	May 15	17.2	23.5	27.3	41.3	YES
01-073-2006-1	May 15	16.3	22.7	26.8	38.9	YES
01-073-5003-1	May 15	15.4	21.3	26.3	38.5	YES
01-073-0023-1	May 22	20.1	31.5	40.4	53.3	YES
01-073-2003-1	May 22	18.2	25.3	31.6	42.7	YES
01-073-0023-1	May 23	20.1	31.5	40.4	54.6	YES
01-073-2003-1	May 23	18.2	25.3	31.6	57.7	YES
01-073-0023-1	May 26	20.1	31.5	40.4	52.4	YES
01-073-2003-1	May 26	18.2	25.3	31.6	51.3	YES
01-073-0023-1	May 27	20.1	31.5	40.4	51.6	YES
01-073-1005-1	May 27	16.6	24.8	28.3	42.1	YES
01-073-1009-1	May 27	15.8	23.0	27.1	49.5	YES
01-073-2003-1	May 27	18.2	25.3	31.6	44.8	YES
01-073-2006-1	May 27	16.3	22.7	26.8	43.6	YES
01-073-5002-1	May 27	15.9	22.4	25.1	37.2	YES
01-073-5003-1	May 27	15.4	21.3	26.3	38.6	YES
01-073-0023-1	May 28	20.1	31.5	40.4	53.3	YES
01-073-2003-1	May 28	18.2	25.3	31.6	51.4	YES
01-073-0023-1	May 29	20.1	31.5	40.4	39.5	YES
01-073-2003-1	May 29	18.2	25.3	31.6	35.1	YES
01-073-0023-1	May 30	20.1	31.5	40.4	59.6	YES
01-073-0023-2	May 30	20.5	31.0	33.3	58.7	YES
01-073-1005-1	May 30	16.6	24.8	28.3	44.1	YES
01-073-1005-2	May 30	13.5	16.9	22.1	44.2	YES
01-073-1009-1	May 30	15.8	23.0	27.1	43.6	YES
01-073-1009-2	May 30	15.9	23.4	35.6	42.2	YES
01-073-1010-1	May 30	16.7	23.3	25.1	64.3	YES
01-073-1010-2	May 30	16.6	23.6	24.9	64.4	YES
01-073-2003-1	May 30	18.2	25.3	31.6	48.4	YES
01-073-2003-2	May 30	17.2	23.5	27.3	48.8	YES
01-073-2006-1	May 30	16.3	22.7	26.8	48.8	YES
01-073-2006-2	May 30	12.1	15.9	19.8	49.2	YES
01-073-5002-1	May 30	15.9	22.4	25.1	57.2	YES

AQS ID	DATE	Monthly Mean	84th Percentile	95th Percentile	Exceedance Concentration	EPA Concurrence
01-073-5003-1	May 30	15.4	21.3	26.3	49.4	YES
01-073-5003-2	May 30	12.0	16.4	19.2	49.8	YES
01-073-0023-1	June 01	21.4	32.2	36.9	51.3	YES
01-073-2003-1	June 01	20.1	29.7	36.1	44.6	YES
01-073-0023-1	June 02	21.4	32.2	36.9	48.2	YES
01-073-1005-1	June 02	19.4	26.9	33.9	45.7	YES
01-073-1009-1	June 02	18.5	27.4	34.9	40.6	YES
01-073-2003-1	June 02	20.1	29.7	36.1	41.9	YES
01-073-2006-1	June 02	18.9	27.9	30.8	39.5	YES
01-073-5002-1	June 02	19.0	28.3	29.6	38.3	YES
01-073-5003-1	June 02	19.8	28.6	34.1	42.1	YES

D) Demonstration of No Exceedance "But For" the Event

There are two speciation sites operated by the JCDH. In order to quantify the impacts of the fire on observed PM2.5 concentrations, speciation data collected at the North Birmingham and Wylam speciation sites on all days were used to approximate the organic mass increment of the observed PM2.5 mass that was caused by the wildfire. Curiously, the JCDH did not include any information about the SEARCH site data in their county. This information was also helpful in filling in the gaps on days where speciation data from North Birmingham and Wylam were unavailable. This information can be found in the State of Alabama's Demonstration on page 25.

The organic mass increment was calculated using the following equation, adapted from Turpin and Lim (2001).

$$\boldsymbol{OMI} = (OC_{observed} - OC_{average}) \times 2.0 \qquad \text{(Eq. 2)}$$

Where OMI is the organic mass increment due to smoke from the wildire, $OC_{observed}$ is the observed organic carbon mass, and $OC_{average}$ is the average organic carbon mass observed at the site during the month of May, and separately for June, for 2004-2006. A multiplier of 2.0 is used to approximate the total PM2.5 mass associated with smoke from wildfires (TURPIN AND LIM 2001). In order to approximate the PM2.5 concentration that would have been observed but for the fire, the OMI was subtracted from the observed 24-hr average PM2.5 concentration. This procedure was then repeated for each day that PM2.5 speciation data was collected during these two months to compare impacts of smoke on different days. The results of this analysis are shown in the graphs above (Figures B03-B10). These graphs show the calculated OMI and the adjusted PM2.5 mass (Observed PM2.5 – OMI). The graphs demonstrate that without the PM2.5 mass emitted by the fire on these four days, there would not have been an exceedance on those days but for the wildfire. EPA concurrence was given to all values listed above.

References

Turpin, B.J., Lim, H.J., 2001. Species Contributions to PM2.5 Mass Concentrations: Revisiting common Assumptions for Estimating Organic Mass; Aerosol Science and Technology. Volume 35, Pages 602-610.

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Appendix A

Common Graphs and Maps

Section 1: Daily PM2.5 Concentration

Figure 1a - May 3, 2007

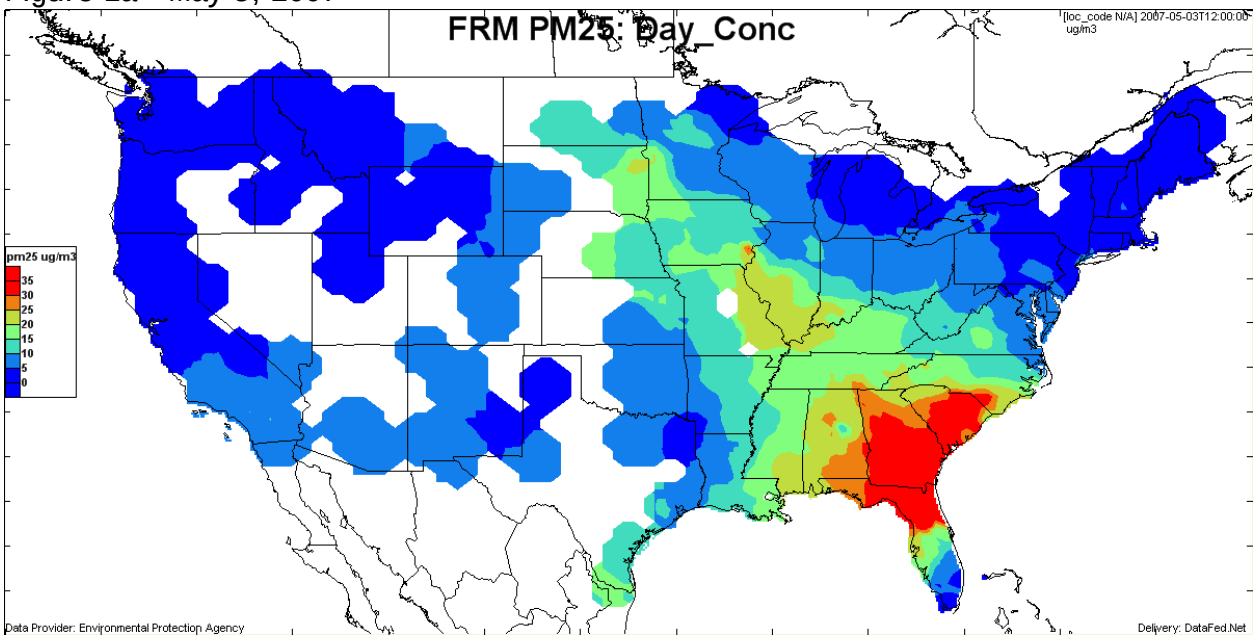


Figure 1b - May 4, 2007

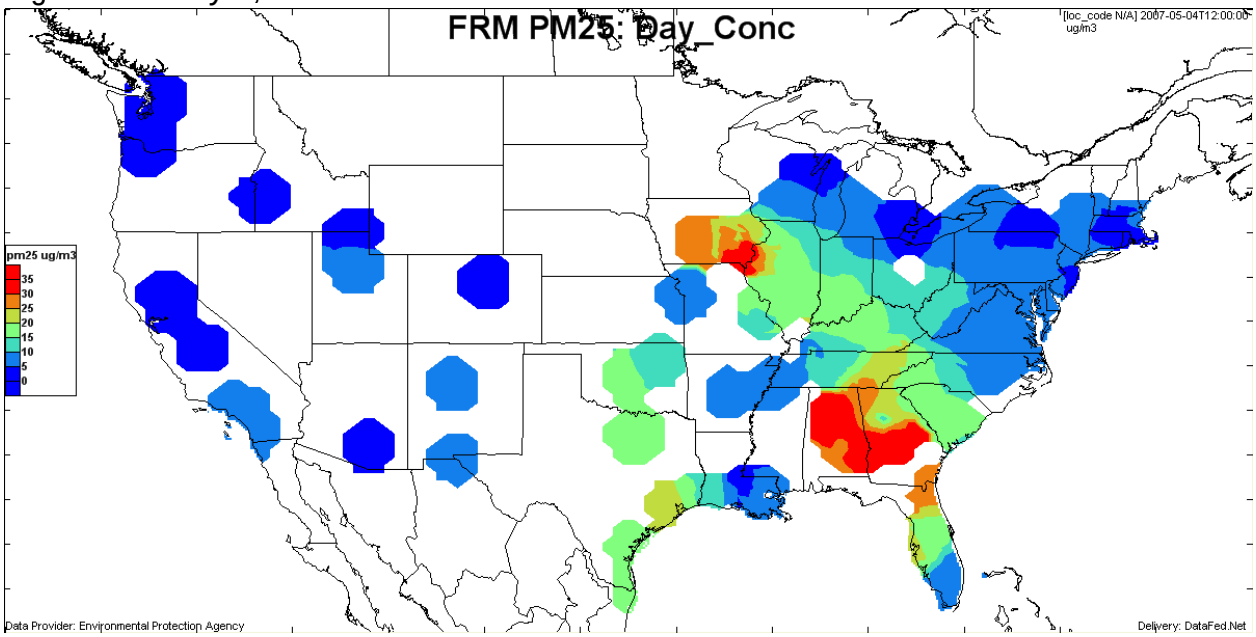


Figure 1c - May 5, 2007

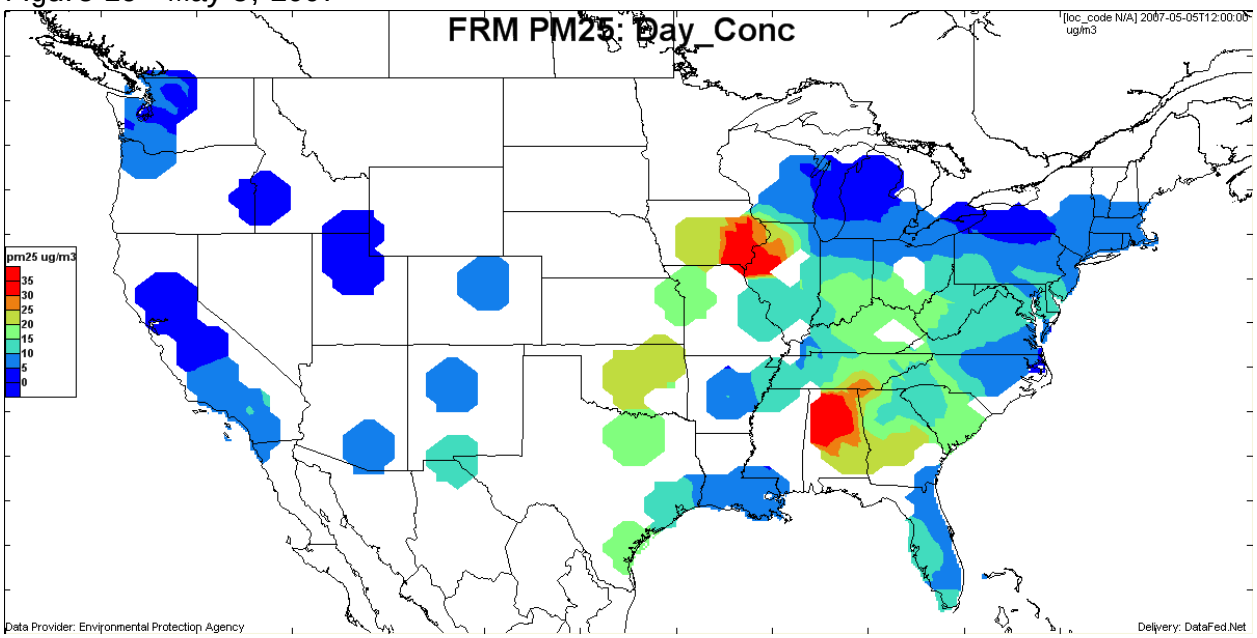


Figure 1d – May 15, 2007

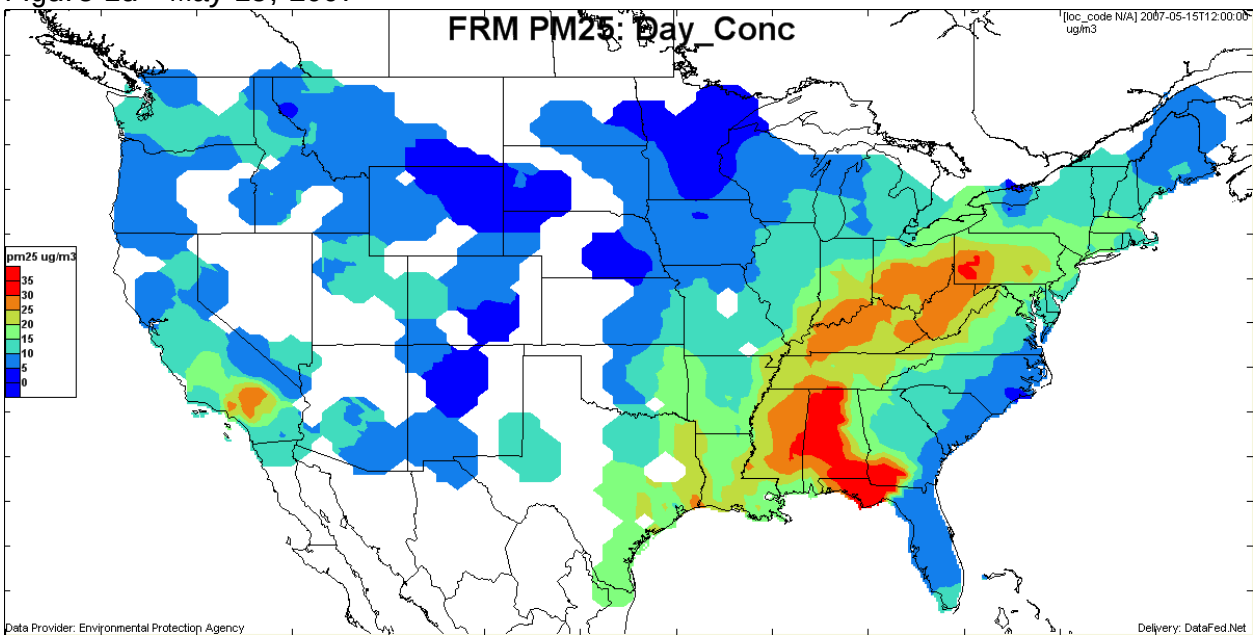


Figure 1e – May 21, 2007

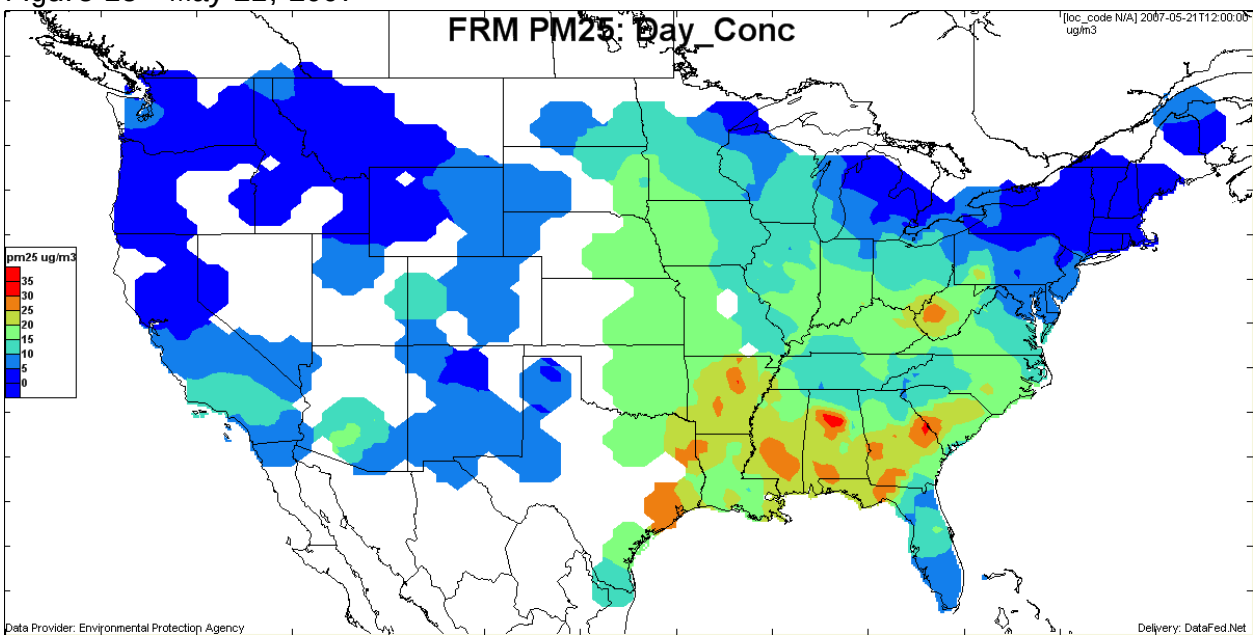


Figure 1f - May 22, 2007

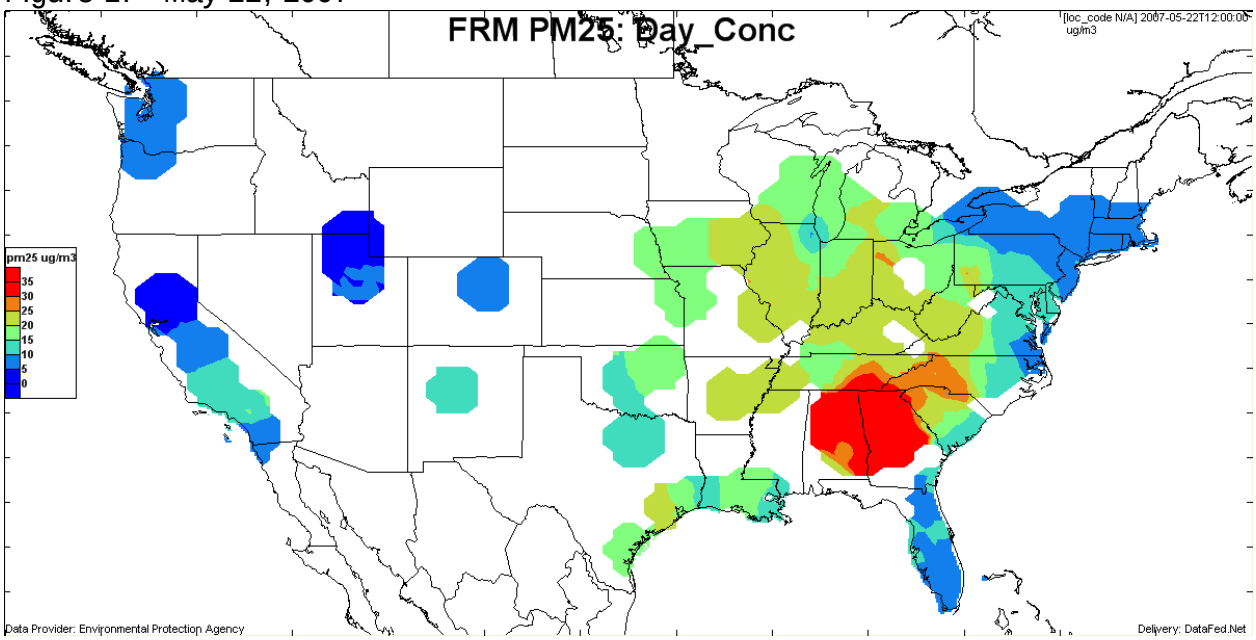


Figure 1g – May 23, 2007

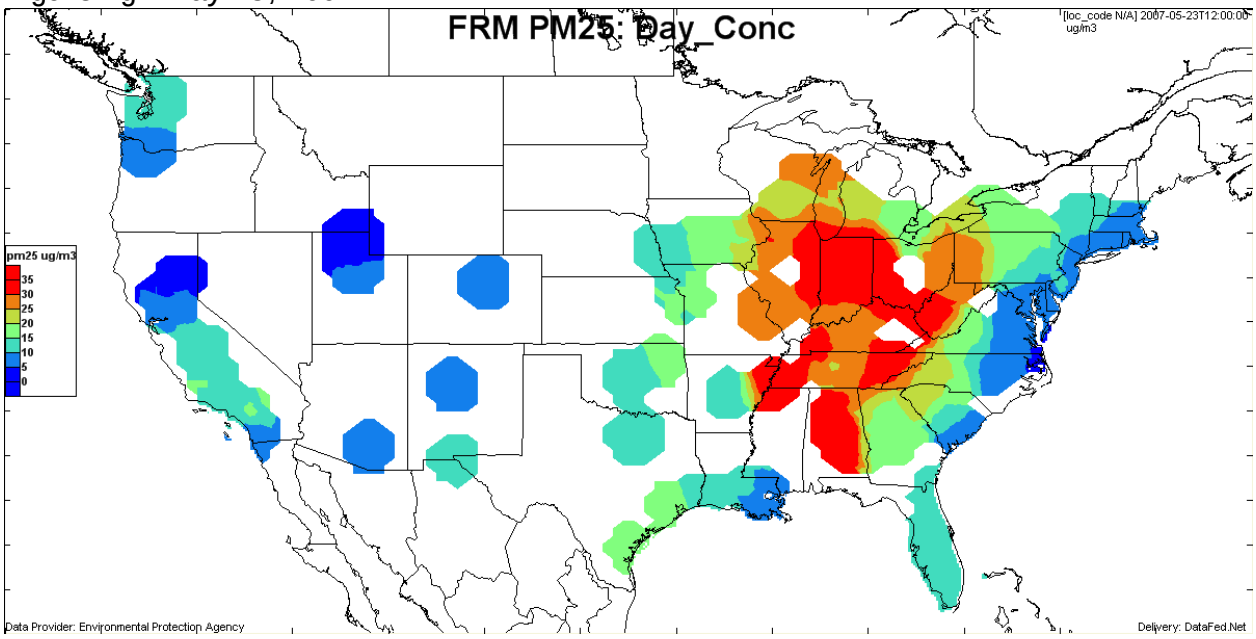


Figure 1h – May 24, 2007

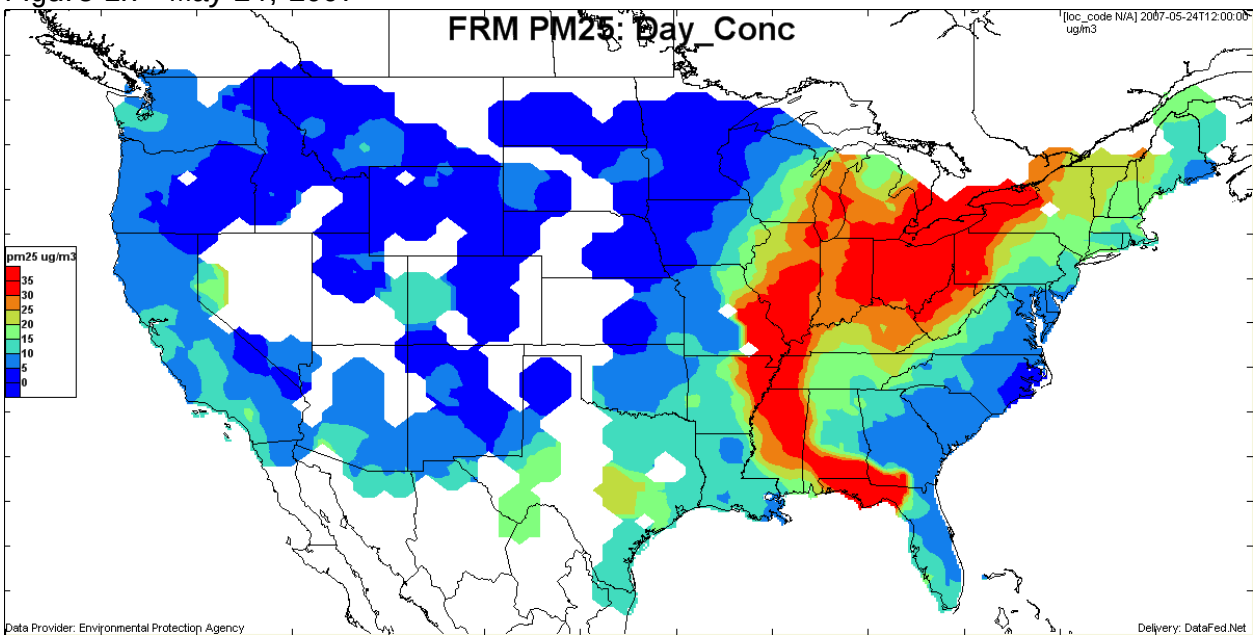


Figure 1i – May 26, 2007

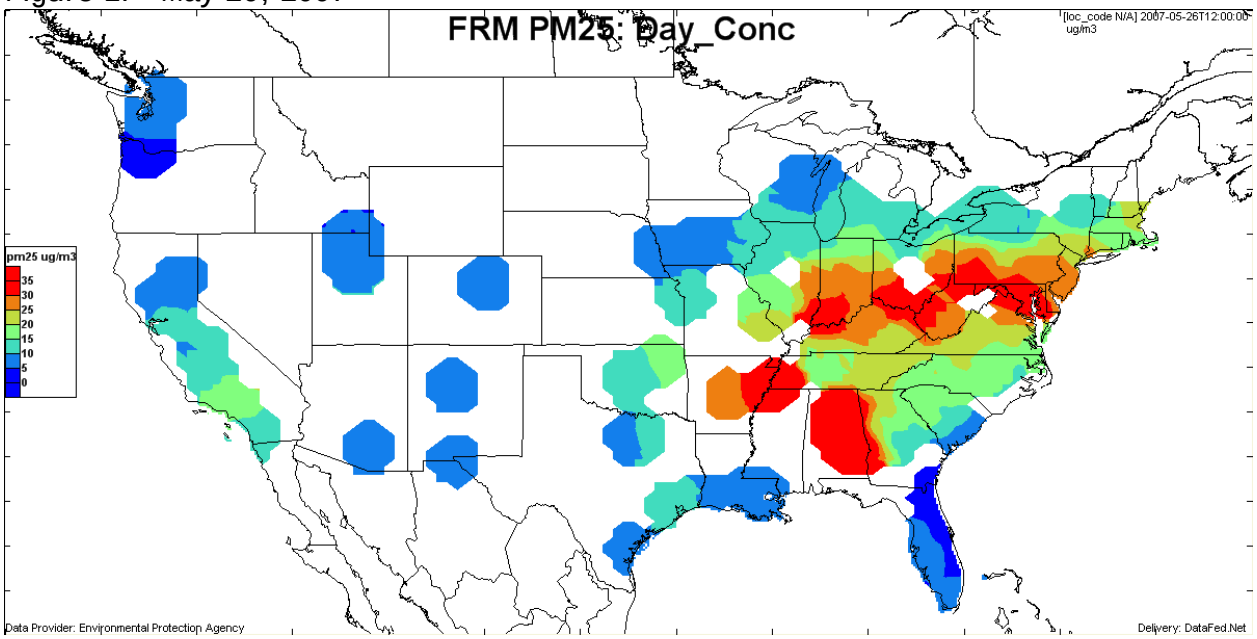


Figure 1j – May 27, 2007

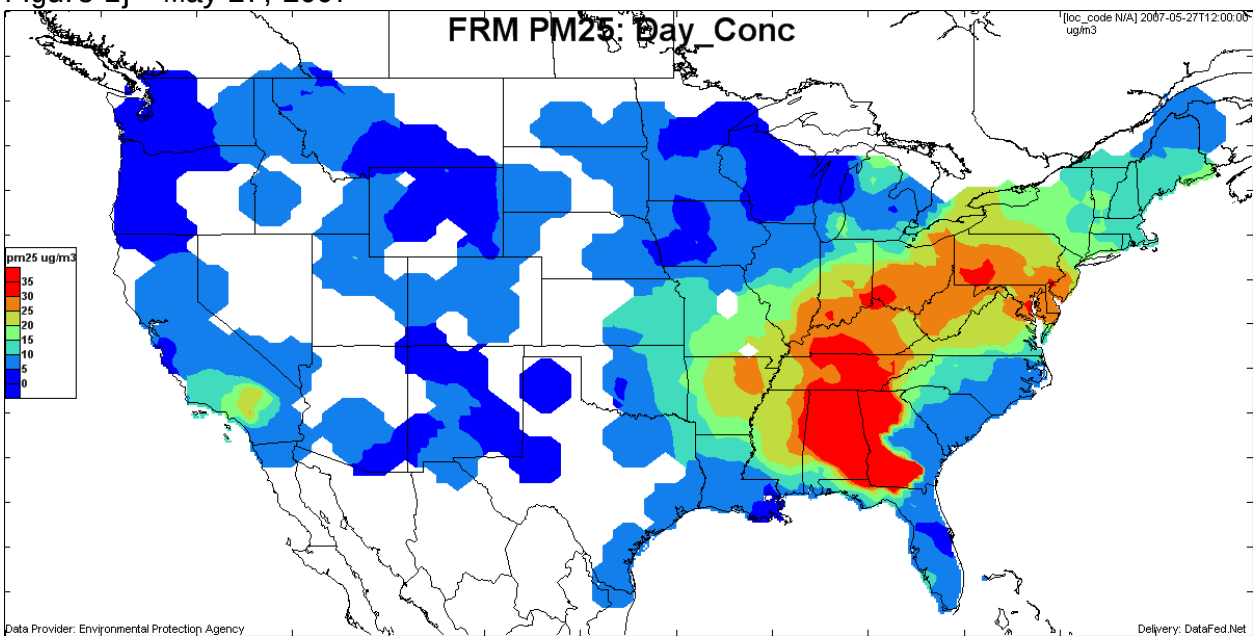


Figure 1k – May 28, 2007

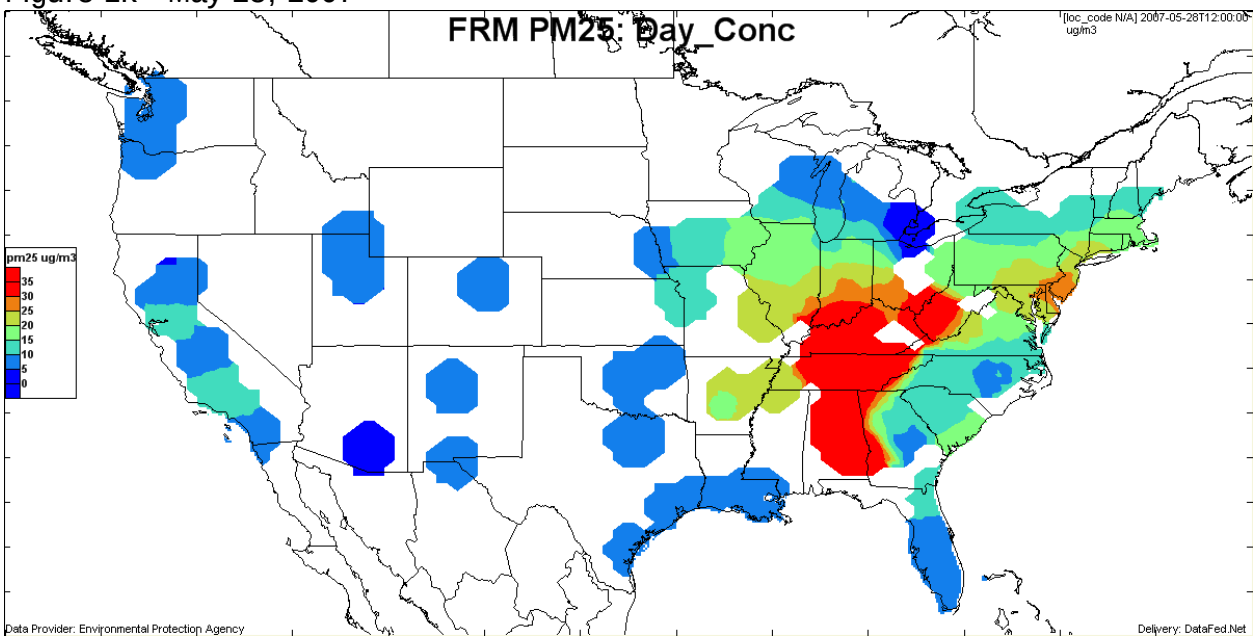


Figure 1l – May 29, 2007

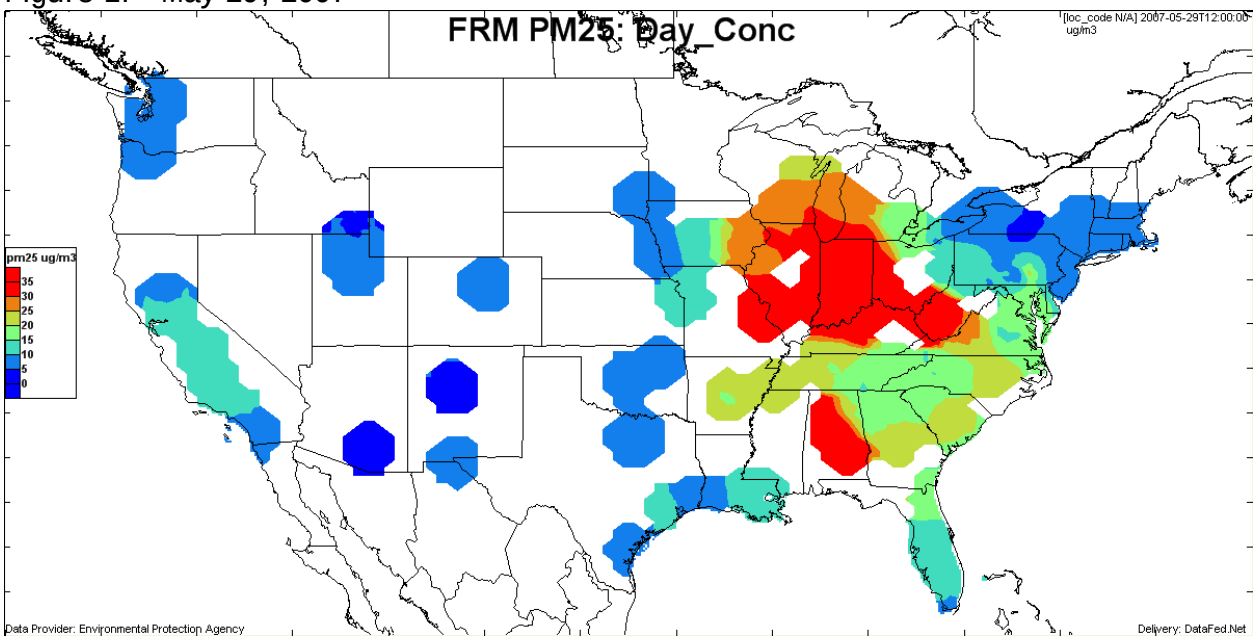


Figure 1m – May 30, 2007

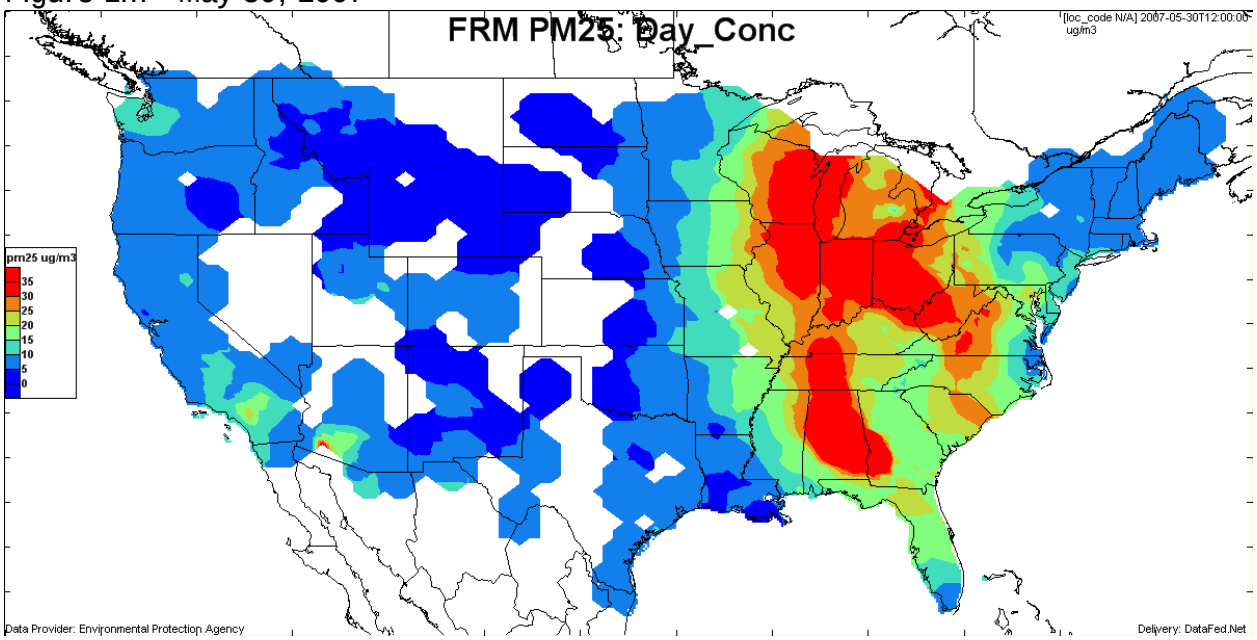


Figure 1n – May 31, 2007

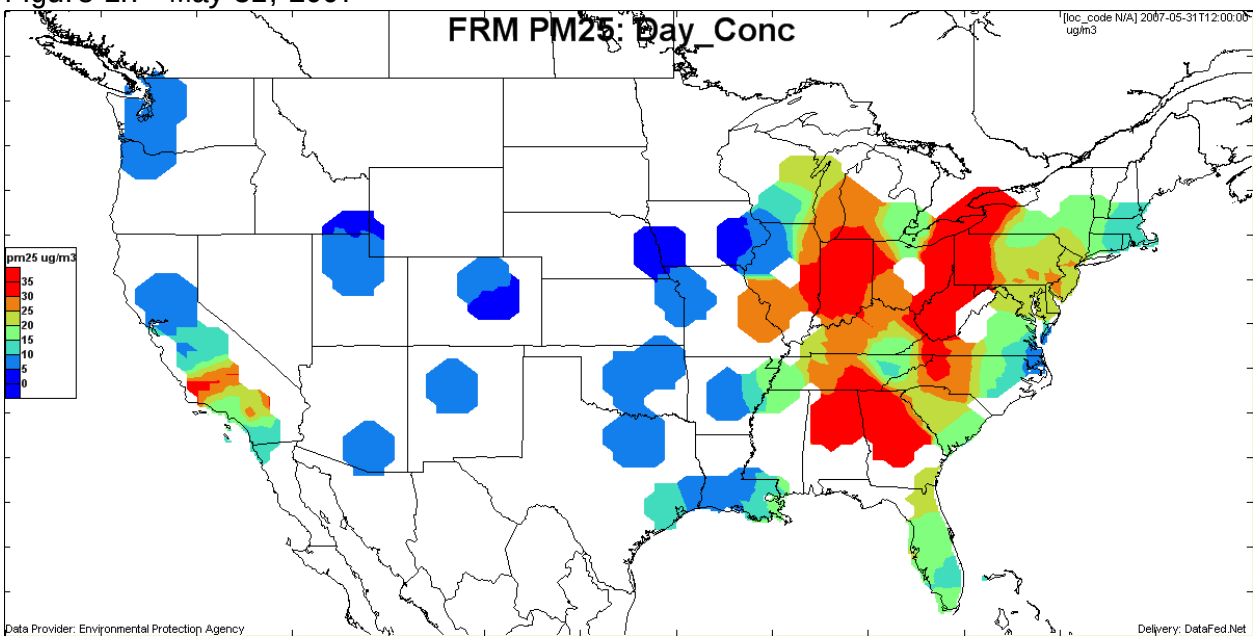


Figure 1o – June 1, 2007

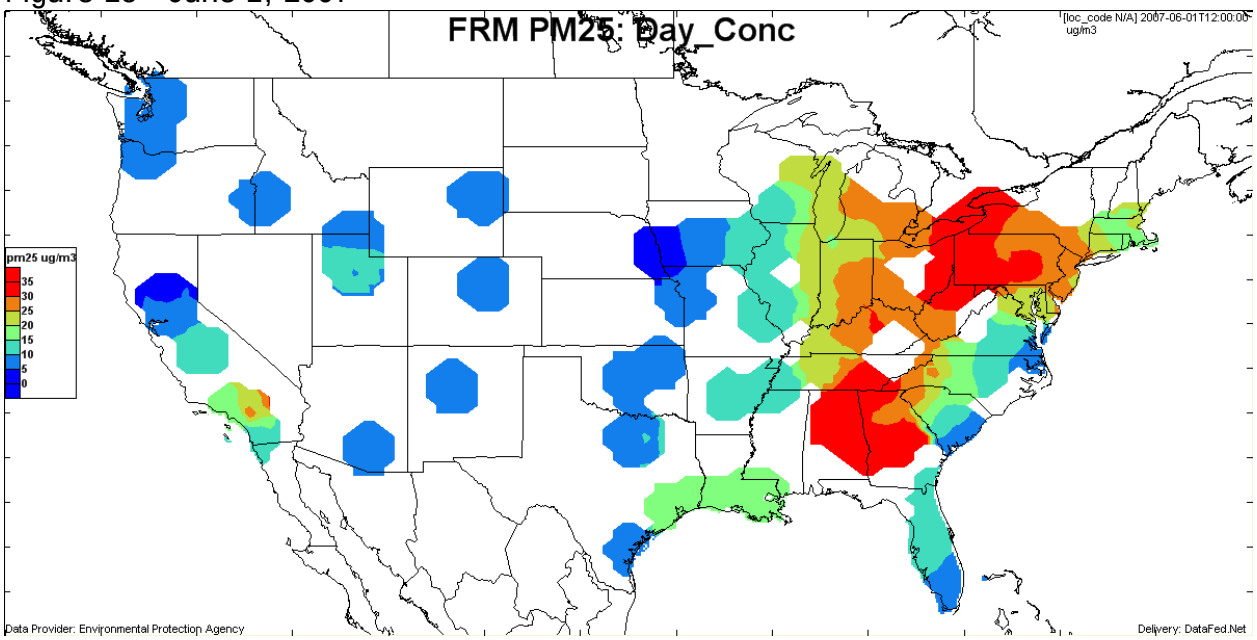
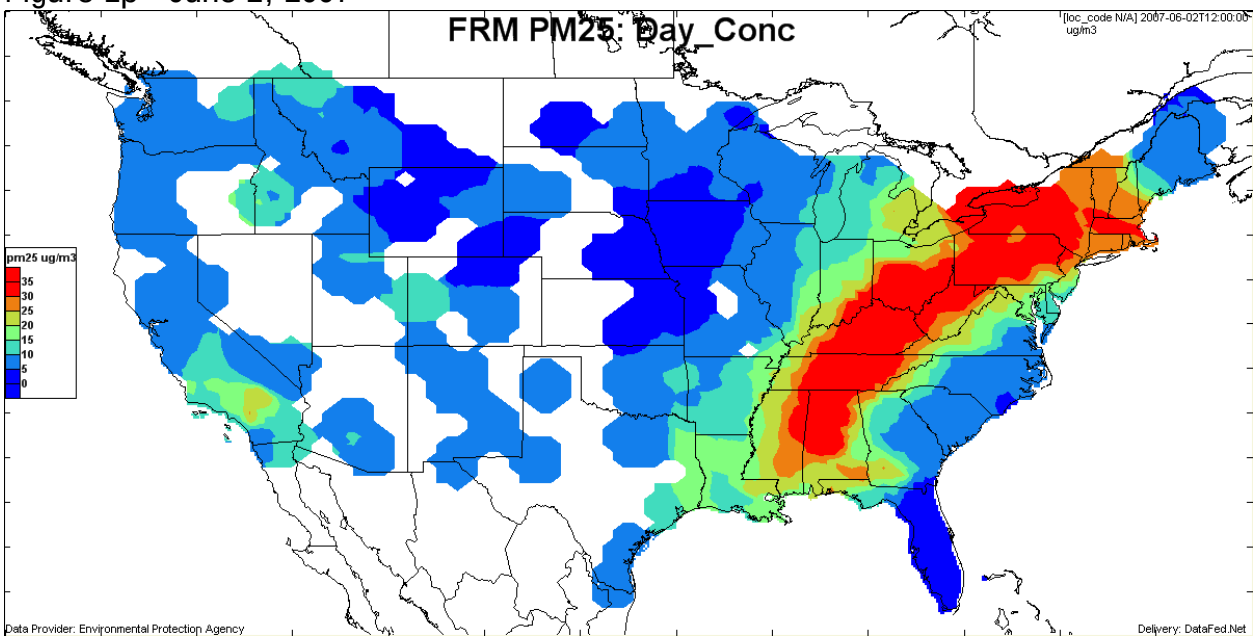


Figure 1p – June 2, 2007



Section 2: Organic Carbon

Since PM2.5 speciation data is typically only available on an every 3rd day basis, there are 4 days that particularly affected most of the state. If this information is available for other days, it will be included in the discussion for a particular site.

Figure 2a – May 15, 2007

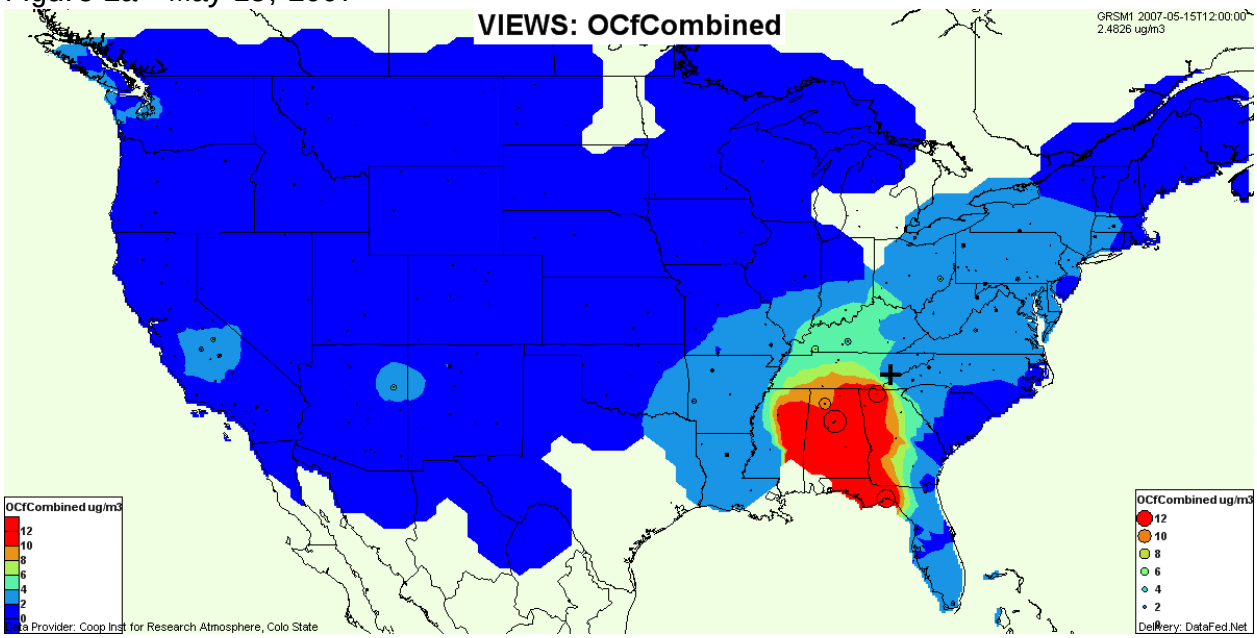


Figure 2b – May 21, 2007

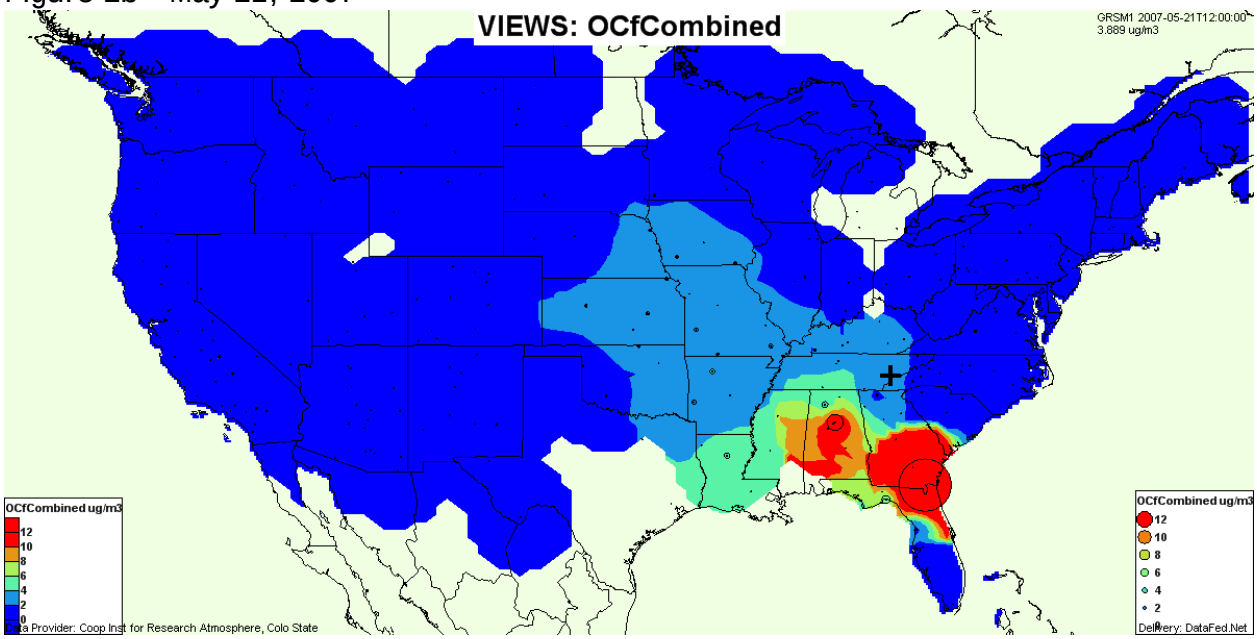


Figure 2c – May 24, 2007

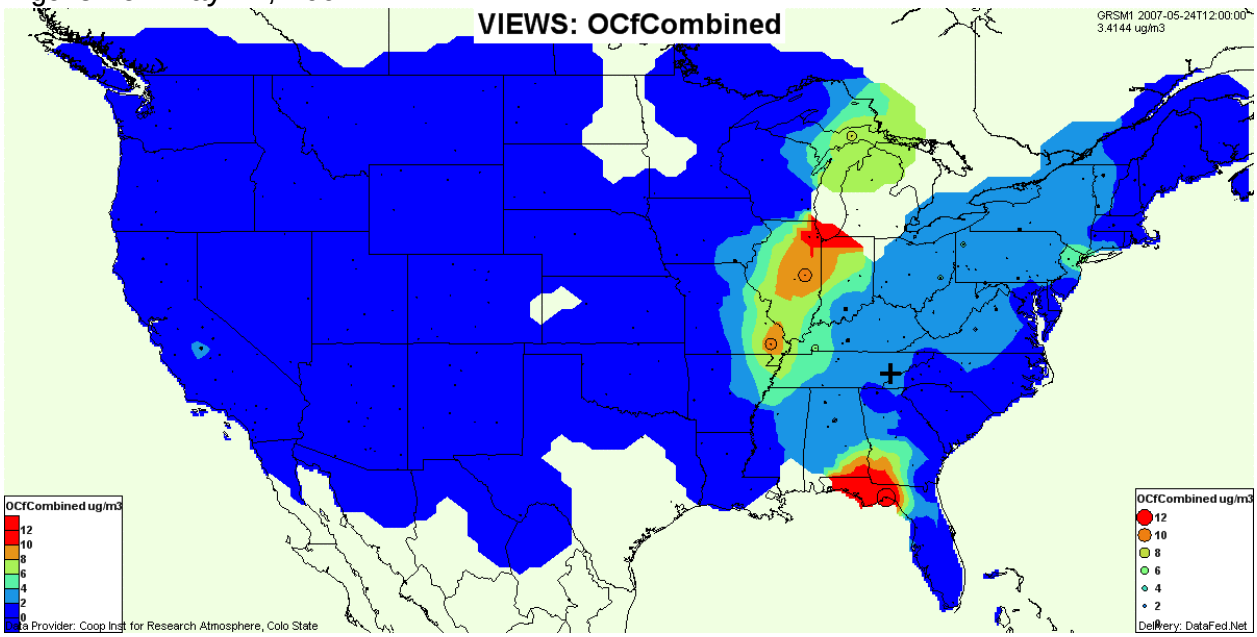


Figure 2d – May 27, 2007

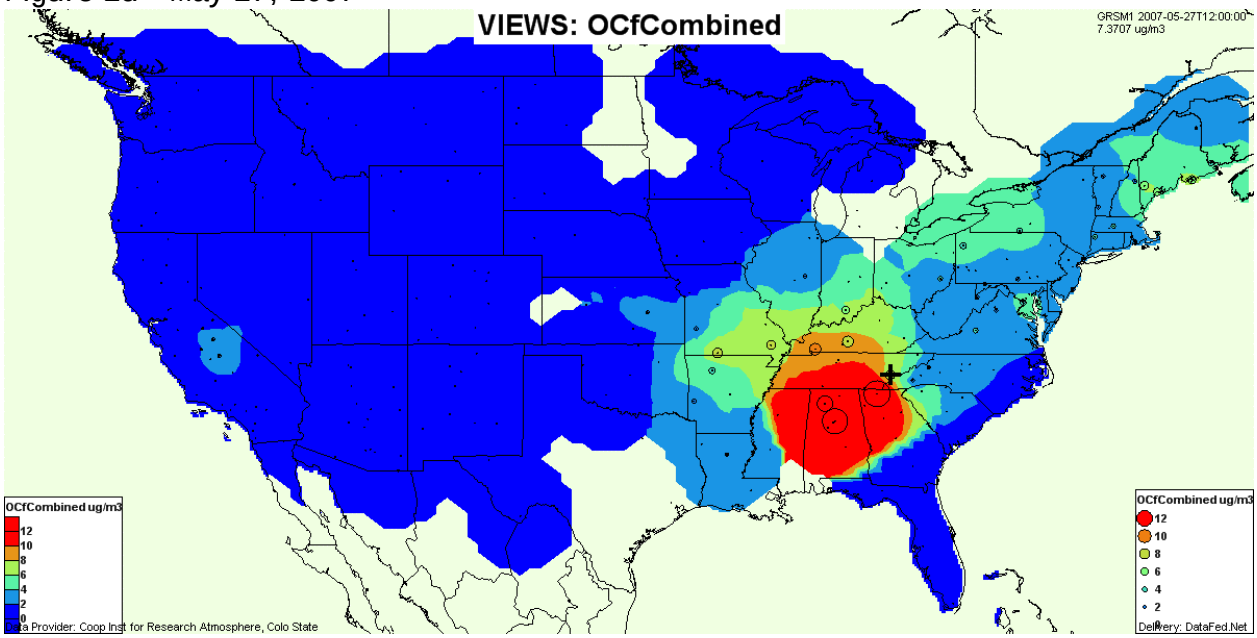
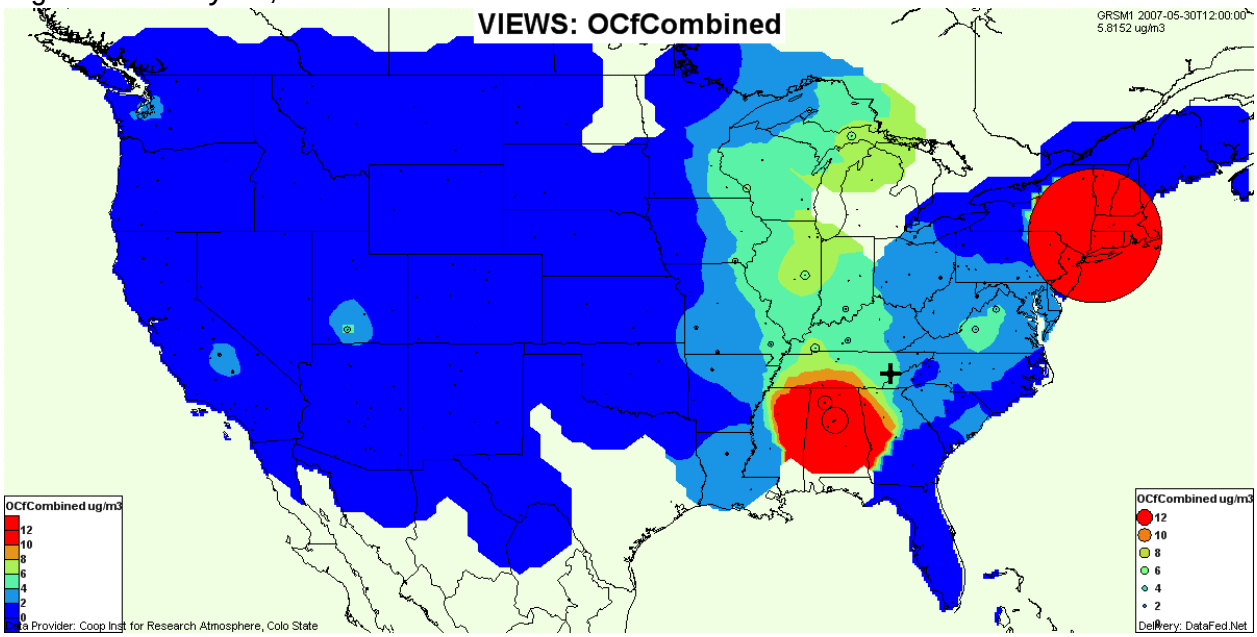


Figure 2e – May 30, 2007



Section 3: Sulfate

Since PM2.5 speciation data is typically only available on an every 3rd day basis, there are 4 days that particularly affected most of the state. If this information is available for other days, it will be included in the discussion for a particular site.

Figure 3a – May 15, 2007

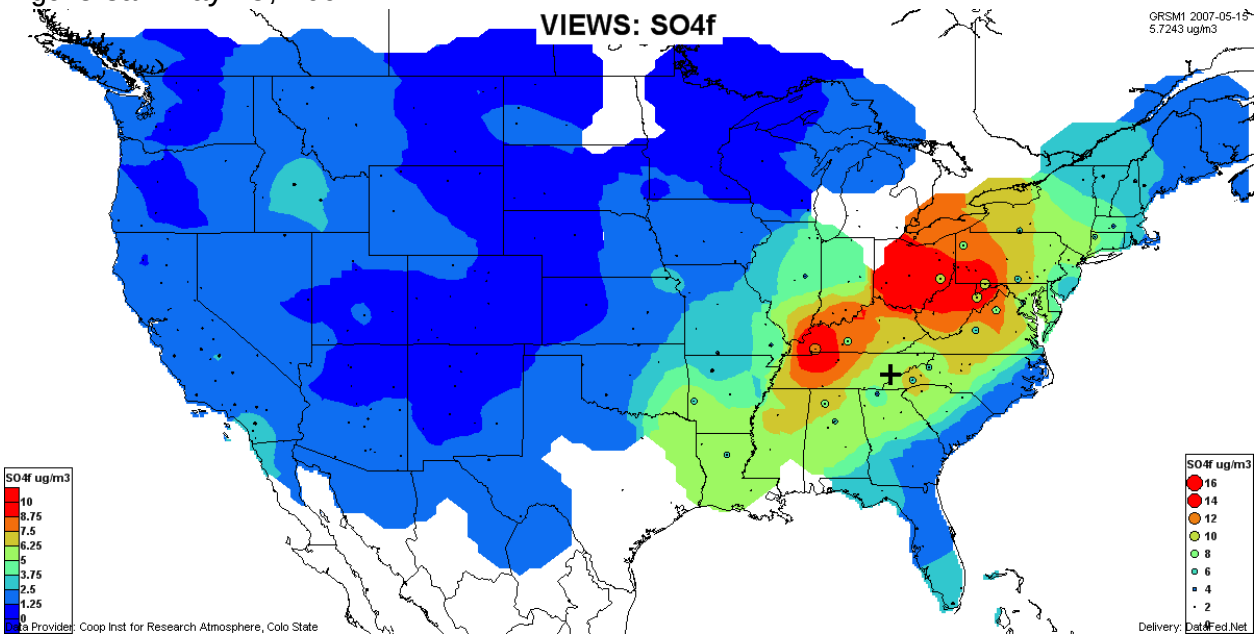


Figure 3b – May 21, 2007

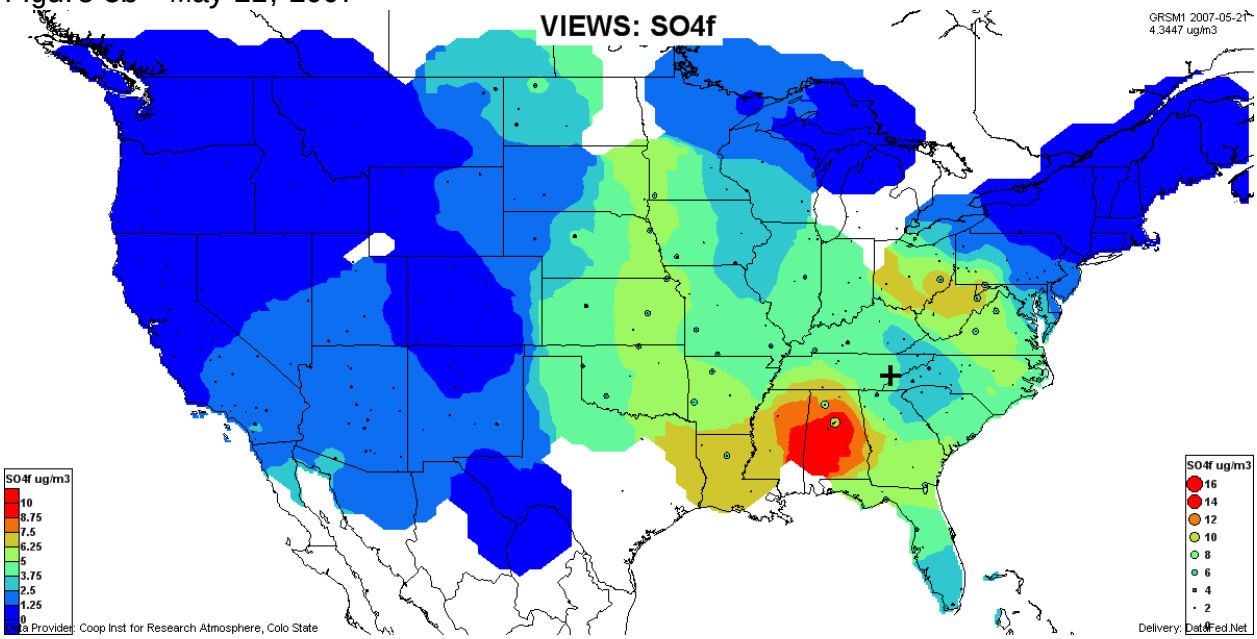


Figure 3c – May 24, 2007

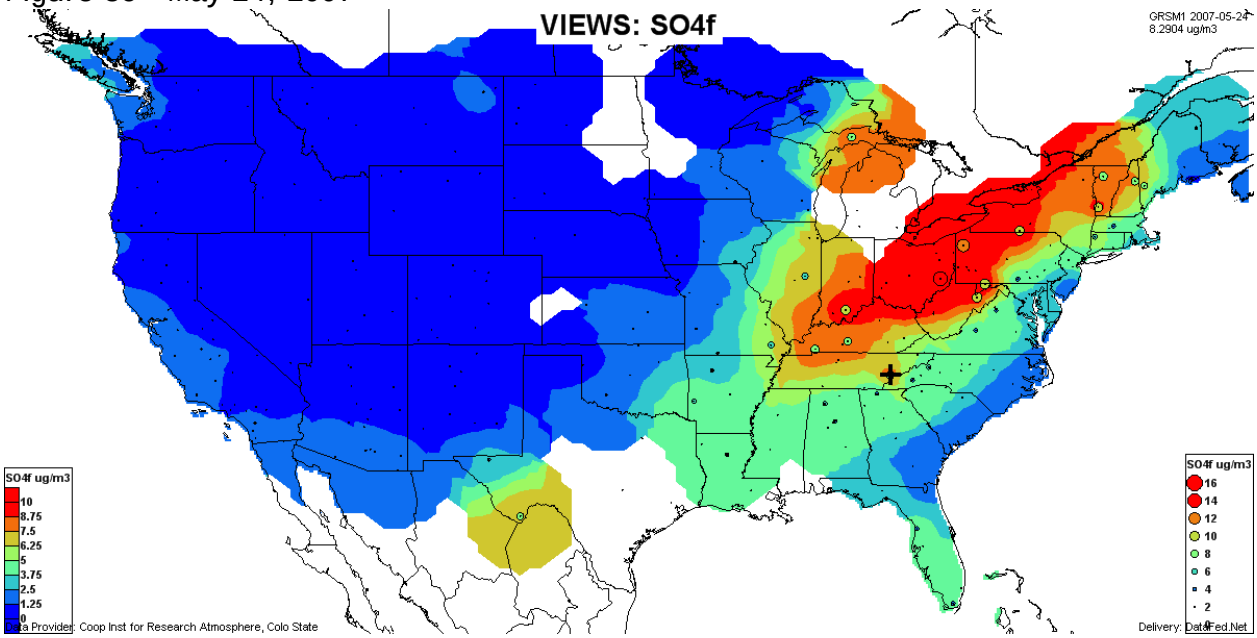


Figure 3d – May 27, 2007

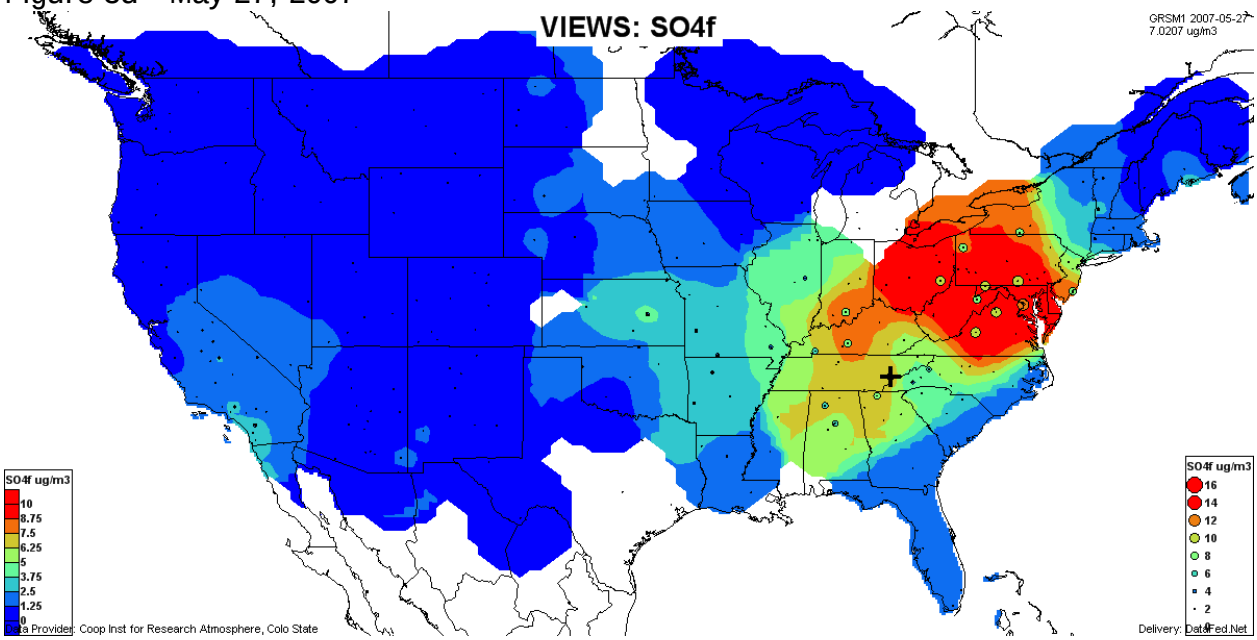
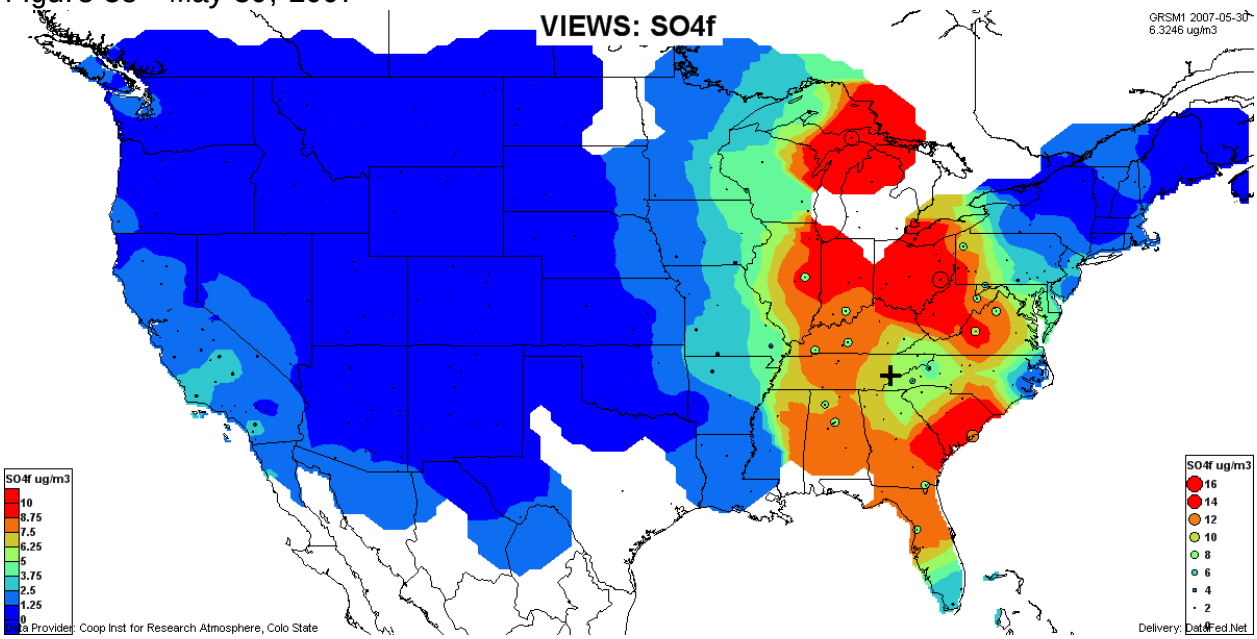


Figure 3e – May 30, 2007



APPENDIX B

REVIEW DATA

AQS ID	DATE	VALUE	Monthly Avg.	84th Perc	95th Perc	ug Over 95th	Approved?
01-027-0001-1	20070527	47.1	14.8	20.6	22.0	25.1	YES
01-027-0001-1	20070530	46.6	14.8	20.6	22.0	24.6	YES
01-033-1002-1	20070515	29.3	12.8	18.2	23.6	5.7	YES
01-033-1002-1	20070527	37.6	12.8	18.2	23.6	14.0	YES
01-033-1002-1	20070530	28.3	12.8	18.2	23.6	4.7	YES
01-033-1002-1	20070602	39.8	15.6	21.7	25.8	14.0	YES
01-049-1003-1	20070527	41.6	15.0	20.9	24.8	16.8	YES
01-049-1003-1	20070530	27.1	15.0	20.9	24.8	2.3	YES
01-053-0002-1	20070515	33.4	14.5	20.9	23.7	9.7	YES
01-053-0002-1	20070521	27.7	14.5	20.9	23.7	4.0	YES
01-053-0002-1	20070524	50.1	14.5	20.9	23.7	26.4	YES
01-055-0010-1	20070505	30.1	15.4	20.9	22.9	7.2	NO
01-055-0010-1	20070522	34.7	15.4	20.9	22.9	11.8	NO
01-055-0010-1	20070523	24.5	15.4	20.9	22.9	1.6	NO
01-055-0010-1	20070526	53.4	15.4	20.9	22.9	30.5	YES
01-055-0010-1	20070527	53.1	15.4	20.9	22.9	30.2	YES
01-055-0010-1	20070528	45.9	15.4	20.9	22.9	23.0	YES
01-055-0010-1	20070530	37	15.4	20.9	22.9	14.1	YES
01-055-0010-1	20070531	30	15.4	20.9	22.9	7.1	NO
01-055-0010-1	20070601	42.9	17.9	24.7	25.7	17.2	YES
01-055-0010-1	20070602	30.3	17.9	24.7	25.7	4.6	NO
01-069-0003-1	20070503	27.1	14.1	17.4	22.1	5.0	NO
01-069-0003-1	20070515	46.3	14.1	17.4	22.1	24.2	YES
01-069-0003-1	20070524	69.3	14.1	17.4	22.1	47.2	YES
01-069-0003-1	20070527	46.5	14.1	17.4	22.1	24.4	YES
01-069-0003-1	20070530	25.1	14.1	17.4	22.1	3.0	YES
01-069-0003-1	20070602	29.8	16.0	22.0	27.6	2.2	NO
01-101-0007-1	20070504	27.9	15.8	21.7	27.2	0.8	NO
01-101-0007-1	20070515	31.3	15.8	21.7	27.2	4.2	NO
01-101-0007-1	20070522	24.4	15.8	21.7	27.2	-2.8	NO
01-101-0007-1	20070523	51.5	15.8	21.7	27.2	24.4	YES
01-101-0007-1	20070526	52.5	15.8	21.7	27.2	25.4	YES
01-101-0007-1	20070527	59.8	15.8	21.7	27.2	32.7	YES
01-101-0007-1	20070528	48.5	15.8	21.7	27.2	21.4	YES
01-101-0007-1	20070529	37.5	15.8	21.7	27.2	10.4	YES
01-101-0007-2	20070530	68	16.1	23.8	27.3	40.7	YES
01-103-0011-1	20070515	42.5	13.9	19.7	24.2	18.3	YES
01-103-0011-1	20070527	33.8	13.9	19.7	24.2	9.6	YES
01-103-0011-1	20070530	40.3	13.9	19.7	24.2	16.1	YES
01-103-0011-1	20070602	40.5	17.5	24.5	31.2	9.3	YES
01-113-0001-2	20070503	28.2	16.9	21.3	29.9	-1.7	NO
01-113-0001-2	20070521	29.4	16.9	21.3	29.9	-0.5	NO
01-113-0001-2	20070527	56.3	16.9	21.3	29.9	26.4	YES
01-113-0001-2	20070530	78.9	16.9	21.3	29.9	49.0	YES
01-117-0006-1	20070602	35.1	17.5	25.1	29.2	5.9	YES
01-125-0004-1	20070515	32.5	13.9	21.0	24.1	8.4	YES
01-125-0004-1	20070527	33.3	13.9	21.0	24.1	9.2	YES

AQS ID	DATE	VALUE	Monthly Avg.	84th Perc	95th Perc	ug Over 95th	Approved?
01-125-0004-1	20070530	38.3	13.9	21.0	24.1	**14.2**	YES
01-125-0004-1	20070602	36.8	17.3	25.1	33.3	**3.6**	YES
01-127-0002-1	20070521	32.1	14.3	19.7	25.6	**6.5**	NO
01-127-0002-1	20070602	35.1	18.1	25.9	34.5	**0.6**	YES

Jefferson County Department of Health

AQS ID	DATE	VALUE	Monthly Avg.	84th Perc	95th Perc	ug Over 95th	Approved?
01-073-0023-1	20070514	32.5	20.1	31.5	40.4	-7.9	NO
01-073-2003-1	20070514	28	18.2	25.3	31.6	-3.6	NO
01-073-0023-1	20070515	41.3	20.1	31.5	40.4	0.9	YES
01-073-0023-2	20070515	41	20.5	31.0	33.3	7.8	YES
01-073-1005-1	20070515	36.1	16.6	24.8	28.3	7.8	YES
01-073-1009-1	20070515	37.6	15.8	23.0	27.1	10.6	YES
01-073-2003-1	20070515	42.9	18.2	25.3	31.6	11.3	YES
01-073-2003-2	20070515	41.3	17.2	23.5	27.3	14.0	YES
01-073-2006-1	20070515	38.9	16.3	22.7	26.8	12.1	YES
01-073-5002-1	20070515	34.2	15.9	22.4	25.1	9.1	NO
01-073-5003-1	20070515	38.5	15.4	21.3	26.3	12.3	YES
01-073-0023-1	20070516	15.4	20.1	31.5	40.4	-25.0	NO
01-073-2003-1	20070516	17.6	18.2	25.3	31.6	-14.0	NO
01-073-0023-1	20070522	53.3	20.1	31.5	40.4	13.0	YES
01-073-2003-1	20070522	42.7	18.2	25.3	31.6	11.1	YES
01-073-0023-1	20070523	54.6	20.1	31.5	40.4	14.3	YES
01-073-2003-1	20070523	57.7	18.2	25.3	31.6	26.1	YES
01-073-0023-2	20070524	17.7	20.5	31.0	33.3	-15.6	NO
01-073-1009-2	20070524	13.3	15.9	23.4	35.6	-22.3	NO
01-073-0023-1	20070526	52.4	20.1	31.5	40.4	12.1	YES
01-073-2003-1	20070526	51.3	18.2	25.3	31.6	19.7	YES
01-073-0023-1	20070527	51.6	20.1	31.5	40.4	11.3	YES
01-073-1005-1	20070527	42.1	16.6	24.8	28.3	13.8	YES
01-073-1009-1	20070527	49.5	15.8	23.0	27.1	22.5	YES
01-073-2003-1	20070527	44.8	18.2	25.3	31.6	13.2	YES
01-073-2006-1	20070527	43.6	16.3	22.7	26.8	16.8	YES
01-073-5002-1	20070527	37.2	15.9	22.4	25.1	12.1	YES
01-073-5003-1	20070527	38.6	15.4	21.3	26.3	12.4	YES
01-073-0023-1	20070528	53.3	20.1	31.5	40.4	13.0	YES
01-073-2003-1	20070528	51.4	18.2	25.3	31.6	19.8	YES
01-073-0023-1	20070529	39.5	20.1	31.5	40.4	-0.9	YES
01-073-0023-1	20070530	59.6	20.1	31.5	40.4	19.3	YES
01-073-0023-2	20070530	58.7	20.5	31.0	33.3	25.5	YES
01-073-1005-1	20070530	44.1	16.6	24.8	28.3	15.8	YES
01-073-1005-2	20070530	44.2	13.5	16.9	22.1	22.1	YES
01-073-1009-1	20070530	43.6	15.8	23.0	27.1	16.6	YES
01-073-1009-2	20070530	42.2	15.9	23.4	35.6	6.6	YES
01-073-1010-1	20070530	64.3	16.7	23.3	25.1	39.2	YES
01-073-1010-2	20070530	64.4	16.6	23.6	24.9	39.5	YES
01-073-2003-1	20070530	48.4	18.2	25.3	31.6	16.8	YES
01-073-2003-2	20070530	48.8	17.2	23.5	27.3	21.5	YES
01-073-2006-1	20070530	48.8	16.3	22.7	26.8	22.0	YES
01-073-2006-2	20070530	49.2	12.1	15.9	19.8	29.5	YES
01-073-5002-1	20070530	57.2	15.9	22.4	25.1	32.1	YES
01-073-5003-2	20070530	49.8	12.0	16.4	19.2	30.6	YES

AQS ID	DATE	VALUE	Monthly Avg.	84th Perc	95th Perc	ug Over 95th	Approved?
01-073-2003-1	20070531	29.6	18.2	25.3	31.6	**-2.0**	NO
01-073-0023-1	20070601	51.3	21.4	32.2	36.9	**14.4**	YES
01-073-2003-1	20070601	44.6	20.1	29.7	36.1	**8.5**	YES
01-073-0023-1	20070602	48.2	21.4	32.2	36.9	**11.3**	YES
01-073-1005-1	20070602	45.7	19.4	26.9	33.9	**11.8**	YES
01-073-1009-1	20070602	40.6	18.5	27.4	34.9	**5.7**	YES
01-073-2003-1	20070602	41.9	20.1	29.7	36.1	**5.8**	YES
01-073-2006-1	20070602	39.5	18.9	27.9	30.8	**8.7**	YES
01-073-5002-1	20070602	38.3	19.0	28.3	29.6	**8.7**	YES
01-073-5003-1	20070602	42.1	19.8	28.6	34.1	**8.0**	YES
01-073-0023-1	20070603	21.1	21.4	32.2	36.9	**-15.8**	NO
01-073-2003-1	20070603	18.3	20.1	29.7	36.1	**-17.8**	NO