AIR QUALITY STUDY

I-5 CORRIDOR IMPROVEMENT PROJECT

TECHNICAL ADDENDUM 0.1

$PM_{2.5}$ AND PM_{10} ANALYSES

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INTRODUCTION

LSA Associates, Inc. (LSA) has prepared this Air Quality Technical Addendum for the I-5 Corridor Improvement Project in response to the United States Environmental Protection Agency (EPA) releasing new $PM_{2.5}$[1] and PM_{10}[2] hotspot analysis requirements in its March 10, 2006 final transportation conformity rule (71 FR 12468). The 2006 Final Rule supersedes the Federal Highway Administration's (FHWA) existing September 12, 2001, "Guidance for Qualitative Project-Level: Hotspot Analysis in PM_{10} Nonattainment and Maintenance Areas." This technical addendum was conducted following the procedures and methodology provided in the "Transportation Conformity Guidance for Qualitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas" (EPA/FHWA Guidance) (EPA, 2006a), developed by the EPA and the FHWA. This technical addendum is an addendum to the Air Quality Analysis for the Interstate 5 (I-5) Corridor Improvement project dated September 2005.

$PM_{2.5}$ AND PM_{10} HOTSPOT METHODOLOGY

The new Final Rule establishes the transportation conformity criteria and procedures for determining which transportation projects must be analyzed for local air quality impacts in $PM_{2.5}$ and PM_{10} nonattainment and maintenance areas. The proposed project is located in the South Coast Air Basin (Basin), which has been designated as a federal nonattainment area for both $PM_{2.5}$ and PM_{10}; therefore, a hotspot analysis is required for both pollutants.

A hotspot analysis is defined in the Code of Federal Regulations (CFR) (40 CFR 93.101) as an estimation of likely future localized $PM_{2.5}$ or PM_{10} pollutant concentrations and a comparison of those concentrations to the relevant air quality standards. A hotspot analysis assesses the air quality impacts on a scale smaller than an entire nonattainment or maintenance area, including, for example, congested roadway intersections and highways or transit terminals. Such an analysis is a means of demonstrating that a transportation project meets Clean Air Act conformity requirements to support state and local air quality goals with respect to potential localized air quality impacts. When a hotspot analysis is required, it is included within the project-level conformity determination that is made by the FHWA or the Federal Transit Administration (FTA).

Clean Air Act Section 176(c)(1)(B) is the statutory criterion that must be met by all projects in nonattainment and maintenance areas that are subject to transportation conformity. Section 176(c)(1)(B) states that federally supported transportation projects must not "cause or contribute to any new violation of any standard in any area; increase the frequency or severity of any existing violation of any standard in any area; or delay timely attainment of any standard or any required interim emission reductions or other milestones in any area."

Ambient Air Quality Standards (AAQS). $PM_{2.5}$ nonattainment and maintenance areas are required to attain and maintain two standards:

- 24-hour standard: 35 micrograms per cubic meter ($\mu g/m^3$) (Based on 2004–2006 monitored data, the EPA tightened the $PM_{2.5}$ 24-hour standard from 65 to 35 $\mu g/m^3$, effective December 2006. New area designations will become effective early 2010 [EPA, 2006b].)

[1] Particulate matter less than 2.5 microns in diameter.
[2] Particulate matter less than 10 microns in diameter.

- Annual standard: 15.0 $\mu g/m^3$

The current 24-hour standard is based on a 3-year average of the 98th percentile of 24-hour $PM_{2.5}$ concentrations; the current annual standard is based on a 3-year average of annual mean $PM_{2.5}$ concentrations. A $PM_{2.5}$ hotspot analysis must consider both standards unless it is determined for a given area that meeting the controlling standard would ensure that Clean Air Act requirements are met for both standards. The interagency consultation process should be used to discuss how the qualitative $PM_{2.5}$ hotspot analysis meets statutory and regulatory requirements for both $PM_{2.5}$ standards, depending on the factors that are evaluated for a given project.

PM_{10} nonattainment and maintenance areas are required to attain and maintain two standards as well:

- 24-hour standard: 150 $\mu g/m^3$
- Annual standard: None (The annual AAQS was revoked by the EPA in September 2006 due to lack of evidence linking health problems to long-term exposure to coarse particulate pollution [EPA, 2006b]. However, for historical trending the previous AAQS of 50 $\mu g/m^3$ was used.)

The 24-hour PM_{10} standard is attained when the average number of exceedances in the previous three calendar years is less than or equal to 1.0. An exceedance occurs when a 24-hour concentration of 155 $\mu g/m^3$ or greater is measured at a site. The annual PM_{10} standard is attained if the average of the annual arithmetic means for the previous three calendar years is less than or equal to 50 $\mu g/m^3$. A PM_{10} hotspot analysis must consider both standards unless it is determined for a given area that meeting the controlling standard would ensure that Clean Air Act requirements are met for both standards.

To meet statutory requirements, the March 10, 2006 Final Rule requires $PM_{2.5}$ and PM_{10} hotspot analyses to be performed for Projects of Air Quality Concern (POAQC). The Final Rule states that projects not identified in 40 CFR 93.123(b)(1) as projects of air quality concern have met statutory requirements without any further hotspot analyses (40 CFR 93.116[a]).

$PM_{2.5}$ AND PM_{10} HOTSPOT ANALYSIS

Projects of Air Quality Concern (POAQC)

The first step in the hotspot analysis is to determine whether a project meets the standard for a POAQC. The EPA specified in 40 CFR 93.123(b)(1) of the Final Rule that POAQC are certain highway and transit projects that involve significant levels of diesel vehicle traffic, or any other project that is identified in the $PM_{2.5}$ and PM_{10} State Implementation Plan (SIP) as a localized air quality concern. The Final Rule defines the POAQC that require a $PM_{2.5}$ and PM_{10} hotspot analysis in 40 CFR 93.123(b)(1) as:

i. New or expanded highway projects that have a significant number of or significant increase in diesel vehicles;

ii. Projects affecting intersections that are at Level-of-Service D, E, or F with a significant number of diesel vehicles, or those that will change to Level-of-Service D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project;

iii. New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;

iv. Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; and

v. Projects in or affecting locations, areas, or categories of sites which are identified in the $PM_{2.5}$ and PM_{10} applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

Proposed Project

This project clearly meets the criteria of the first item above, as the project proposes adding one or more lanes to the I-5 freeway, resulting in significant increases in traffic including diesel vehicles. Therefore, this project is considered to be a POAQC, and a qualitative project-level $PM_{2.5}$ and PM_{10} Hotspots analysis has been conducted to assess whether the project would cause or contribute to any new localized PM_{10} or $PM_{2.5}$ violations, or increase the frequency or severity of any existing violations, or delay timely attainment of the PM_{10} or $PM_{2.5}$ AAQS.

Types of Emissions Considered

In accordance with the EPA/FHWA Guidance, this hot-spot analysis will be based only on directly emitted $PM_{2.5}$ emissions. Tailpipe, brake wear, and tire wear $PM_{2.5}$ emissions will be considered in this hot-spot analysis.

Vehicles cause dust from paved and unpaved roads to be re-entrained, or re-suspended, in the atmosphere. According to the March 10, 2006 final rule, road dust emissions are only to be considered in $PM_{2.5}$ hot-spot analyses if the EPA or the state air agency has made a finding that such emissions are a significant contributor to the $PM_{2.5}$ air quality problem (40 CFR 93.102(b)(3)). The EPA or the California Air Resources Board (ARB) has not yet made such finding of significance; and therefore, the re-entrained $PM_{2.5}$ is not considered in this analysis.

Secondary particles formed through $PM_{2.5}$ precursor emissions from a transportation project take several hours to form in the atmosphere giving emissions time to disperse beyond the immediate project area of concern for localized analyses; therefore, they will not be considered in this hot-spot analysis. Secondary emissions of $PM_{2.5}$ are considered as part of the regional emission analysis prepared for the conforming RTP and FTIP.

According to the project schedules, the construction will not last more than 5 years, and construction-related emissions may be considered temporary; therefore, any construction-related $PM_{2.5}$ emissions due to this project will not be included in this hot-spot analysis. This project will comply with the South Coast Air Quality Management District (SCAQMD) Fugitive Dust Rules for any fugitive dusts emitted during the construction of this project. Excavation, transportation, placement, and handling of excavated soils will result in no visible dust migration. A water truck or tank will be available within the project limits at all times to suppress and control the migration of fugitive dusts from earthwork operations.

Analysis Method

According to the Hotspots methodology an estimate of the future localized $PM_{2.5}$ and PM_{10} pollutant concentrations needs to be determined. This analysis makes those estimates by extrapolating present $PM_{2.5}$ and PM_{10} pollutant concentrations from air quality data measured at monitoring stations in the vicinity of the proposed project. The data from these stations are combined with projections from the AQMP and examined for trends in order to predict future conditions in the project vicinity. Additionally, the impacts of the project are discussed and the likelihood of these impacts interacting with the ambient $PM_{2.5}$ and PM_{10} levels to cause hotspots.

Data Considered

Baseline PM_{10} Emissions. Due to the length of this project the data from two air monitoring stations, the Anaheim-Pampas Lane Station and at the Los Angeles-North Main St. Station, were used to represent the air quality in the project vicinity. While there are other stations in the project vicinity, there is either terrain, other major freeways or other factors that make these two stations the best candidates to represent the air quality in the project vicinity.

The monitored PM_{10} concentrations at the Anaheim-Pampas Lane Station and at the Los Angeles-North Main St. Station, shown in Table A, indicate that neither the federal 24-hour PM_{10} AAQS (150 $\mu g/m^3$) nor the old federal annual AAQS (50 $\mu g/m^3$) were exceeded between 2001 and 2006. These measured concentrations were significantly below the annual and 24-hour PM_{10} standards. The original Air Quality Technical Study (September 2005) used monitored data from 2000 through 2002; no exceedances of the annual and 24-hour PM_{10} AAQS occurred in 2000 either.

Table A: Ambient PM_{10} Monitoring Data ($\mu g/m^3$)

	2001	2002	2003	2004	2005	2006
Anaheim-Pampas Lane AQ Station						
First High:	62	69	96	74	65	61
Second High:	52	64	77	70	54	45
Third High:	51	61	65	62	53	43
Fourth High:	49	57	56	61	45	39
No. days above national 24-hour standard (150 $\mu g/m^3$)	0	0	0	0	0	0
National annual average	21.9	33.5	32.8	33.9	28.2	30.5
Exceeded national annual average standard (50 $\mu g/m^3$)?	No	No	No	No	No	No
Los Angeles-North Main St. AQ Station						
First High:	97	65	81	72	70	59
Second High:	83	61	76	64	68	48
Third High:	82	59	60	58	68	43
Fourth High:	81	57	58	54	51	43
No. days above national 24-hour standard (150 $\mu g/m^3$)	0	0	0	0	0	0
National annual average	44.2	36	34.7	32.7	29.6	29.6
Exceeded national annual average standard (50 $\mu g/m^3$)?	No	No	No	No	No	No

ARB Web: http://www.arb.ca.gov/adam/welcome.html, March 2007.

While the current levels of PM_{10} in the project vicinity are below federal standards, indications are that levels in the future will decrease even further. The draft 2007 Air Quality Management Plan (AQMP) published by SCAQMD reports that since the federal annual PM_{10} standard has been revoked, the Basin is expected to be declared in attainment for the 24-hour federal PM_{10} standard since 2000. Tables 2-23 and 2-25 on pages V-2-57 and V-2-58, respectively, in Appendix V of the approved 2003 AQMP show the projected maximum 24-hour average PM_{10} concentrations for the Anaheim area to be 137.5 and 115.8 $\mu g/m^3$ for 2006 and 2010, respectively. This decrease in concentrations in the future is largely due to continued improvements in emissions control technologies. To estimate what the background PM_{10} concentration will be in 2025, a straight-line projection was made from the 2006 and 2010 values, predicting an ambient concentration of approximately 35 $\mu g/m^3$ by 2025. The projected maximum 24-hour average PM_{10} concentration for the Los Angeles area (the second closest site in the AQMP to the project area) is 116.7 and 93.7 $\mu g/m^3$ for 2006 and 2010, respectively. Using a straight-line projection, that level would be less than 10 $\mu g/m^3$ by 2025.

Baseline $PM_{2.5}$ Emissions. The monitored $PM_{2.5}$ concentrations at the Anaheim-Pampas Lane Station and at the Los Angeles-North Main St. Station are shown in Table B. These data show that the federal 24-hour $PM_{2.5}$ AAQS (35 $\mu g/m^3$) has been exceeded at both the Anaheim and the Los Angeles-North Main St. Station in all of the last three years. However, the trend is either a steady reduction. The Anaheim-Pampas Lane Station shows that the annual average $PM_{2.5}$ concentration fell below the federal annual arithmetic mean standard (15 $\mu g/m^3$) in 2005. The annual average $PM_{2.5}$ at the Los Angeles-North Main St. Station was exceeded in all three years; however, as at the Anaheim-Pampas Lane Station, the concentration continues to diminish every year.

Table B: Ambient $PM_{2.5}$ Monitoring Data

	2001	2002	2003	2004	2005	2006
Anaheim-Pampas Lane AQ Station						
3-year average 98th percentile	64.0	58.0	53.3	49.3	47.3	43.7
Exceeds federal 24-hour standard (35 $\mu g/m^3$)?	Yes	Yes	Yes	Yes	Yes	Yes
National Annual average	NA	18.6	17.3	16.8	14.7	NA
Exceeds federal annual average standard (15 $\mu g/m^3$)?	Yes	Yes	Yes	Yes	No	No
Los Angeles-North Main St. AQ Station						
3-year average 98th percentile	61.0	62.0	58.0	60.7	60.3	53.3
Exceeds federal 24-hour standard (35 $\mu g/m^3$)?	Yes	Yes	Yes	Yes	Yes	Yes
National Annual average	22.8	22.0	21.3	19.7	17.8	NA
Exceeds federal annual average standard (15 $\mu g/m^3$)?	Yes	Yes	Yes	Yes	Yes	Yes

EPA Web: http://www.epa.gov/air/data/monvals.html?st~CA~California, March 2007.
NA = Data not available.

While the current levels of $PM_{2.5}$ in the project vicinity are generally above the federal 24-hour standard, indications are that levels in the future will go down. To estimate what the background $PM_{2.5}$ concentration will be in the project opening year, 2015, an exponential projection was made of

the Anaheim-Pampas Lane 3-year 98th percentile levels (the 2003 AQMP does not have any projections for $PM_{2.5}$ concentrations). This predicts that the $PM_{2.5}$ concentration would be less than 23 $\mu g/m^3$, which is approximately 66 percent of the federal 24-hr $PM_{2.5}$ standard. The exponential projection for the Los Angeles levels indicates that the $PM_{2.5}$ concentration would be at the federal 24-hr $PM_{2.5}$ standard of 35 $\mu g/m^3$ in approximately 2025.

When projected to 2030, the 24-hour and annual average $PM_{2.5}$ concentrations experienced at both stations are significantly lower than the current levels. Based on the historical 24-hour and annual average $PM_{2.5}$ concentrations and their projections, constant decrease is anticipated in the future. This trend is consistent with the ARB's plan to achieve attainment for $PM_{2.5}$ by 2010. The Initial Attainment State Implementation Plan (SIP) submittal to the EPA is anticipated by April 5, 2008.

Transportation and Traffic Conditions

Existing average daily traffic volumes, truck percentage, and average daily truck volumes for I-5 within the project limits are tabulated below.

Table C: I-5 Existing Conditions

	AADT	% of Trucks (3 or more Axles)	Truck AADT (3 or more Axles)
I-5 in 2005	**193,000**	4.6	**8,840**

Source: Caltrans web site (www.dot.ca.gov/hq/traffops/saferesr/trafdata/) retrieved March 20, 2007.

The table indicates that the facility currently experiences less than 10,000 trucks AADT. In terms of traffic congestion experienced by motorists, the traffic analysis for this project described the facility as operating at LOS F. LOS F indicates that typical motorists would experience traffic congestion for more than 15 minutes but less than 1 hour during peak hours.

Traffic Changes Due to the Proposed Project

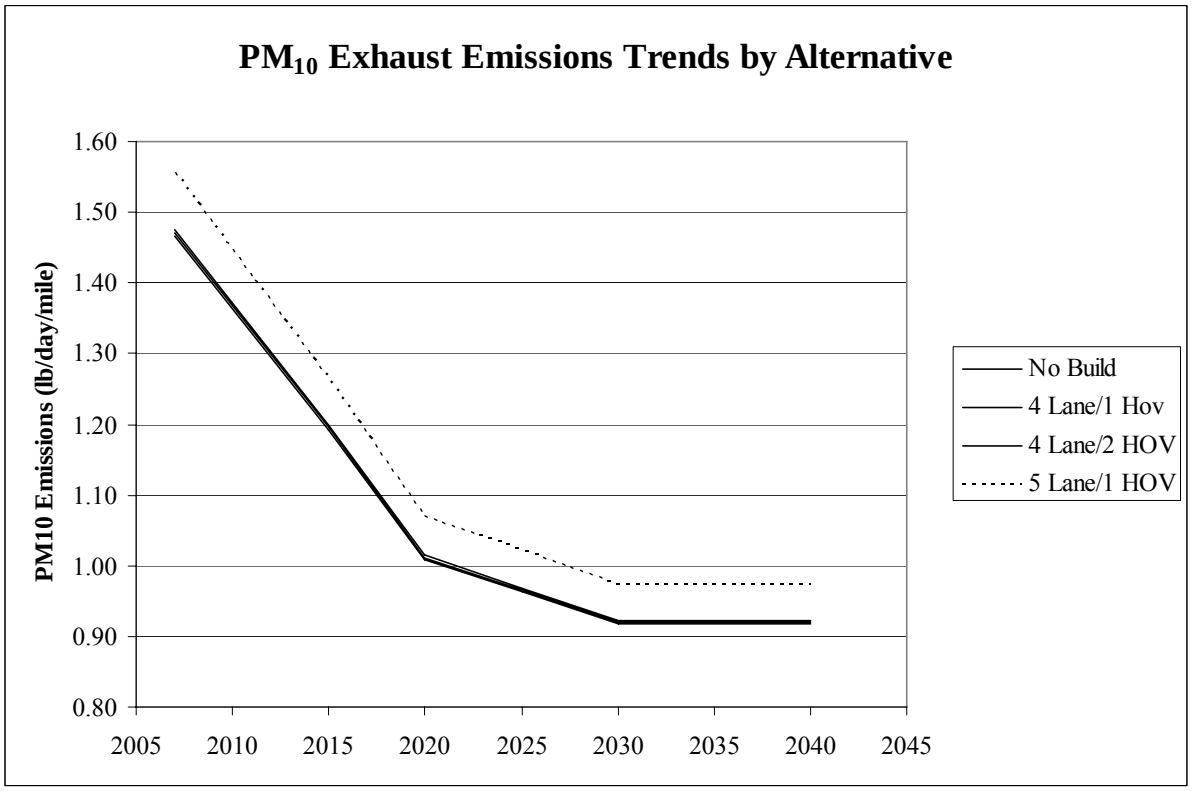
The proposed project is a highway expansion project that increases the capacity of I-5. This type of project improves freeway mainline and interchange operations by reducing traffic congestion and improving ingress/egress movements. Table D shows that, based on the Traffic Analysis (LSA Associates, Inc., February 2004), all the Build Alternatives would result in an overall increase in traffic volumes on the I-5; however, the hourly peak number of vehicles per lane would be reduced compared to the No Build Alternative. Thus, the efficiency of the traffic flow would be better for all the Build Alternatives compared to the No Build Alternative. Improved traffic flow efficiency is directly related to vehicle engine operating efficiency, which directly affects pollutant emission rates, including $PM_{2.5}$ and PM_{10}.

Table D: I-5 PM Peak-Hour Traffic Volumes for 2030

Alternative	Total[1]	Traffic per Lane[2]
No Build Alternative (3 Lane/4 Lane Mix)	20,793	6,700
4 Lane/1 HOV Alternative	20,857	4,359
4 Lane/2 HOV Alternative	20,918	3,776
5 Lane/1 HOV Alternative	22,064	3,809

Source: LSA Associates, Inc., February 2004.

Using emission factors from the ARB EMFAC2007 model and the total vehicle trips from Table D shows trends in the PM_{10} emissions from the various alternatives in the future.



The Caltrans traffic data shows that the existing traffic on the I-5 between SR-91 and SR-605 was approximately 4.6 percent heavy vehicles (3+ axle trucks). This project is not expected to have any effect on this percentage. The project does not provide additional truck capacity as a design purpose. The project adds 1 or 2 mixed flow lanes lanes, which if configured as HOV lanes in the Los Angeles area accommodate primarily gasoline-fueled light duty and alternative-fueled (typically CNG or LNG) transit vehicles. State and local (South Coast Air Quality Management District) transit fleet rules essentially prohibit the acquisition of diesel-powered transit vehicles for use in the South Coast air basin.

1 Total hourly traffic for PM peak hour, including all traffic (cars & trucks).
2 Capacity of HOV Lane is 75 percent of capacity of Mixed Flow Lane.

The University of California, Davis (UCD) has performed studies[1] for Caltrans indicating that, in the absence of unusual circumstances or existing conditions (monitored) that are above or within 80 percent of the federal 24-hr PM_{10} standard (150 $\mu g/m^3$), a transportation facility in California is unlikely to cause or experience a localized PM_{10} problem unless the immediate vicinity is already at or above this federal standard. The PM_{10} level projected for 2025 (approximately 35 $\mu g/m^3$) is approximately 23 percent of the federal 24-hr PM_{10} standard.

Additionally, the three-year 99th percentile average PM_{10} concentration measured at the Anaheim-Pampas Lane Station is 48 $\mu g/m^3$, which is approximately 32 percent of the federal 24-hr PM_{10} standard. On the basis of the AQMP projections for PM_{10}, it is unlikely that the project area would experience a localized PM_{10} problem. Therefore, it is expected that any of the Build Alternatives would contribute to a PM_{10} hotspot that would cause or contribute to violations of the 24-hr PM_{10} AAQS.

CONCLUSION

Transportation conformity is required under CAA section 176(c) to ensure that federally supported highway and transit project activities are consistent with the purpose of the state air quality implementation plan (SIP). Conformity to the purpose of the SIP means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant AAQS. As required by the March 10, 2006 final rule, this qualitative $PM_{2.5}$ hot-spot analysis demonstrates that this project meets the CAA conformity requirements to support state and local air quality goals with respect to potential localized air quality impacts.

It is not expected that changes to $PM_{2.5}$ and PM_{10} emissions levels associated with the proposed project would result in a new violation because any increased emissions that might affect concentrations would be offset by the decreasing ambient $PM_{2.5}$ and PM_{10} emissions and concentrations at the project location described above. In other words, any increase in the emissions of $PM_{2.5}$ and PM_{10} due to increased traffic volumes associated with future growth and the proposed project would be offset by decreases in the background concentrations. Additionally, $PM_{2.5}$ and PM_{10} emissions will be reduced due to implementation of the proposed project because the efficiency of the traffic flow would be better for all the Build Alternatives compared to the No Build Alternative.

Federal regulations and the State's Diesel Risk Reduction Plan will require future diesel vehicles to have substantially cleaner engines and to use fuels with lower sulfur contents. Thus, even though the project will have an increase in diesel truck traffic in all future analysis years, the increase will be more than offset by the larger decrease in per-vehicle $PM_{2.5}$ emissions. Therefore, the project will not cause higher $PM_{2.5}$ emissions or a $PM_{2.5}$ hot-spot.

The historical meteorological and climatic data, monitored PM_{10} and $PM_{2.5}$ emissions data and their declining trends, current and projected traffic data, and the Federal regulations and the State's Plan, support the assertion that the project will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant AAQS. Activities of this project should,

[1] Caltrans Interim Guidance: Project-Level PM_{10} Hot-Spot Analysis, Prepared by Doug Eisinger and Tom Kear (UCD), and Mike Brady (Caltrans), February 2000.

therefore, be considered that they are consistent with the purpose of the SIP and it should be determined that this project conforms to the requirements of the CAA.

REFERENCES

United States Environmental Protection Agency (EPA). 2006a. "Transportation Conformity Guidance for Qualitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas" (EPA 420-B-06-902, March 2006).

EPA. 2006b. Final Revisions to the National Ambient Air Quality Standards for Particulate Pollution (Particulate Matter). EPA Web site: www.epa.gov/oar/particulatepollution/naaqsrev2006.html accessed on March 19, 2007.