ATTACHMENT A:
Technical Evaluation: PM_{10} Air Quality Analysis

Project Background

Description of Project

The project area is located in the northeast quadrant of the Spokane County and the City of Spokane. If completed, the North Spokane Corridor (NSC) will be a 10.5-mile north/south limited access facility that connects I-90 on the south end and existing US 2 and US 395 on the north end. Currently, there are two major north-south trade routes through Spokane - both are on local arterials that run through neighborhoods, past shopping malls, schools, and parks. The NSC is expected to reduce congestion and related operational problems on city streets and county roads and freight traffic through these areas.

Phases Completed

Several phases of the project have already been completed or are currently under construction (noted below).

- Northbound Freya to Farwell NSC – (currently using one lane in each direction)
- Four bridges for US 395 interchange with US 2
- Six bridges between Fairview Road and Perry Street
    - NSC over Fairview Road (northbound)
    - NSC over Market Street (northbound)
    - NSC over Parksmith/BNSF Railroad (northbound)
    - Shady Slope Road over NSC
    - Shady Slope Road over US 2
    - Perry Street over the NSC
- Roundabout at Freya and NSC
- BNSF Railroad Tunnel
- Under construction: Six bridges for NSC interchange with US 2
- Under construction: US 2 to Wandermere

Air Quality Status

Course particulate matter (PM_{10}) refers to particles in the air with a diameter of 10 micrometers or less. The Spokane area, the location of this project, was designated nonattainment by the U.S. Environmental Protection Agency (EPA) upon enactment of the 1990 Clean Air Act amendments, meaning it did not meet the national ambient air quality standards established by the agency for this pollutant. However, the area attained the standard and EPA approved its attainment plan on January 27, 1997 (62 FR 3800). On November 30, 2004, Washington submitted a PM_{10} Limited Maintenance Plan (LMP) and redesignation request for Spokane. EPA approved the LMP and redesignated the area to attainment on July 1, 2005, effective August 30, 2005 (70 FR 38029).

Therefore, the Spokane PM_{10} Maintenance Area is a Limited Maintenance Area. By definition, a LMP presumes that the current PM_{10} levels and the potential for future growth in mobile source emissions provide minimal risk of violating the National Ambient Air Quality Standard (NAAQS). The LMP option is available to areas that have a low risk of future exceedances of the PM_{10} NAAQS[1].

[1] Limited Maintenance Plan Option for Moderate P10 Nonattainment Areas. EPA Memo from Lydia Wegman, available at http://www.epa.gov/ttn/caaa/t1/meta/m6852.html

Analysis Overview

Methodology

The analysis for this project uses the technical principles from EPA and FHWA's March 29, 2006 guidance "Transportation Conformity Guidance for Qualitative Hot-spot Analysis in PM2.5 and PM_{10} Nonattainment and Maintenance areas[2]." This guidance provides the methodology for conducting a qualitative analysis of localized PM air quality impacts on a smaller scale than an entire nonattainment or maintenance area. Such an analysis considers the localized emissions impacts with respect to potential future violations of the NAAQS. A qualitative analysis following the prescription outlined in the March 2006 guidance is appropriate at this time.[3] For the purposes of this analysis, the entire project including built portions was considered, not just the NSC TIGER Grant phase.

Emissions Considered

A PM_{10} hot-spot analysis considers directly emitted PM_{10} emissions – tailpipe, brake wear, and tire wear. PM_{10} precursors are not considered since secondary particles formed through precursor emissions take several hours to form in the atmosphere giving emissions time to disperse beyond the immediate project area for localized analysis. Re-entrained road dust is considered in the hot-spot analysis. For this project, construction emissions are considered temporary as it is not expected that construction will last more than five years at any individual site; therefore these emissions will not be included in the hot-spot analysis.[4]

Time frame and Analysis Year(s)

The year(s) of peak emissions within the timeframe of the area's transportation planning were considered for the analysis. This year(s) would be those where peak emissions from the project are expected and a new violation or exacerbation of an existing violation would most likely occur due to the cumulative impacts of the project and background concentrations in the project area. The Spokane Metropolitan Transportation Plan[5] was last updated in 2007 and included a 2030 forecast year. This forecast year was maintained when the Plan was revised in 2008. For this analysis, the year 2030 is considered as the year of peak emissions due to the expected growth in vehicle miles of travel (VMT) and freight. The US 395 corridor carries over 7.2 million tons of freight ($13.5 billion) annually through Spokane. Between 1993 and 2003, freight shipments on US 395 have increased 58%.[6]

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[2] Transportation Conformity Guidance for Qualitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas, March 2006. EPA420-06-902. Available at http://www.epa.gov/otaq/stateresources/transconf/policy.htm

[3] While EPA released the MOVES model in December 2009 to replace the MOBILE6.2 model, the agency has yet to release final quantitative modeling guidance or approve MOVES for project level quantitative analysis.

[4] See Chapter 3, Transportation Conformity Guidance for Qualitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas, March 2006. EPA420-06-902

[5] Spokane Metropolitan Transportation Plan 2007, available at http://www.srtc.org/MTP%20Update.html[6] NSC Quick Facts, December 2009, available at http://www.wsdot.wa.gov/Projects/US395/NorthSpokaneCorridor/Facts.htm

[6] NSC Quick Facts, December 2009, available at http://www.wsdot.wa.gov/Projects/US395/NorthSpokaneCorridor/Facts.htm

Description of existing and future conditions

Air Quality

As mentioned earlier, the Spokane PM_{10} maintenance area is a limited maintenance area. Monitoring data show that the area attained the standard in 1994.[7] The 2002 emissions inventory showed the largest sources of PM_{10} in the area were unpaved roads (49%), residential wood combustion (24%), construction (6%), paved roads (3%), and land clearing debris burning (3%).[8] EPA reports that nationally, 24-hr PM_{10} concentrations declined by 19% between 2001-2008. The Spokane area continues to see a downward trend in PM10 concentrations. When assessing a change in concentrations between the periods 2001-2003 and 2006-2008, the Spokane area experienced a decrease of approximately 10-30 $\mu g/m^3$.[9] According to the Spokane Regional Clean Air Agency, PM10 emissions will fluctuate with weather and economic conditions. No large changes either up or down are expected. Current programs and regulations should continue downward pressure on emissions.

Transportation and Traffic Conditions

Current average daily traffic (ADT) and truck percentages for the analyzed project area are included in the figure in Attachment 2. Future build volumes for the NSC are included in the table in Attachment 3 and the truck percentage is 10%. Since the project is a new facility, there is no expected change per se in the vehicle mix on the facility between current and build scenarios. The facility is expected to result in a decrease in truck traffic on local signalized major arterials that are currently carrying this directional traffic, namely Trent (290), Washington, Maple, Ash, and Division Streets. Projected trip distribution patterns are expected to follow growth patterns, discussed below. A detailed discussion of travel demand is available in the FEIS, Chapter 1[10].

Built and Natural Environment

Around the project area, according to the regional planning agency – the Spokane Regional Transportation Council, the areas experiencing major future residential growth are on the eastern, western, and northern edges of the existing urbanized area, particularly the Liberty Lake area, the Airway Heights/West Plains area, and the northern portion of the North South Corridor. Other areas gaining significant shares of future employment include Airway Heights/West Plains, the northern portion of the North South Corridor, and the traffic zones north of Liberty Lake.[11] Additional detailed information on the growth and distribution of population, housing, and employment is available in the FEIS, Chapter 1 (see footnote 8).

Control Measures

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[7] Spokane PM10 Limited Maintenance Plan, October 2004

[8] Spokane PM10 Limited Maintenance Plan, Appendix B: 2002 PM10 Emissions Inventory for the Spokane Nonattainment Area

[9] Our Nation's Air: Status and Trends through 2008, U.S. EPA. Available at http://www.epa.gov/airtrends/2010/

[10] North Spokane Highway Final Environmental Impact Statement, April 1997, available at http://www.wsdot.wa.gov/NR/rdonlyres/4579B7EA-0EB1-443E-94A1-B3434F187FC7/0/Chapter1.pdf

[11] 2030 Growth Forecasts for Employment, Housing, and Transportation Analysis Zones (TAZ) for Spokane County, Spokane Regional Transportation Council, available at http://www.srtc.org/taz.html.

The Spokane LMP includes several mobile source control measures which it cites as contributing to attainment and are part of the area's maintenance plan. These include reducing particulate matter by paving unpaved streets (in City of Spokane and Spokane County), reducing fugitive dust from paved roads through sweeping/sanding mitigation program, and reducing particulate matter from paved roads through requirement that governmental entities submit sweeping and sanding plans. Additionally, three contingency measures have also been identified, including controlling PM from unpaved roads, a ban on uncertified stoves, and paving of new parking lots. These contingency measures would be activated in the event that it appears the area is not able to maintain the PM_{10} standard with the control measures already established. [12] On a national level, the 2007 Heavy-duty engine standards introduced new, highly effective control technologies for heavy-duty engines, beginning in 2007. Particulate matter emission levels are expected to be 90 percent lower on a per vehicle basis than 2000 standards levels due to the 2007 diesel engine and fuel program.[13]

Analysis

Methodology

EPA and FHWA's March 29, 2006 guidance "Transportation Conformity Guidance for Qualitative Hot-spot Analysis in PM2.5 and PM_{10} Nonattainment and Maintenance areas" highlights two methods for completing qualitative PM_{10} hotspot analyses: A comparison method and an air quality studies approach. The analysis for this project uses the comparison method to compare the proposed project to an existing project at another location with similar characteristics. This method involves reviewing existing highway facilities built in a location similar to the proposed project and near an air quality monitor (the "surrogate") to allow comparison of PM_{10} concentrations. The comparison method is an approach used to assess whether a new project is expected to have localized air quality impacts.

Monitor selection

Three monitors are currently measuring PM_{10} concentrations within the Spokane PM_{10} Maintenance Area:

- Augusta and Fiske (at 3104 East Augusta Ave.) – located in commercial/industrial urban area; monitoring began in April 2009
- Cheney-Turnbull (in Turnbull Slough National Wildlife Refuge)
- Liberty Lake

Two additional monitors were moved or decommissioned in 2009:

- Freya and Ferry (at 3530 E. Ferry Ave.) – located in commercial/light industrial urban area on eastern side of Spokane City; monitoring ended March 2009 - monitor moved to Augusta and Fiske

[12] Copies of the rules and resolutions associated with these measures are available at http://yosemite.epa.gov/r10/airpage.nsf/283d45bd5bb068e68825650f0064cdc2/840f6ea82e294f0f88257053007e8625?OpenDocument.

[13] Heavy-duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements - Final Rule ("2007 Heavy-Duty Highway Final Rule") (Signed December 21, 2000)

- Monroe and College (at 1101 W. College Ave.) – located in residential and commercial/urban area; monitoring ended in January 2009 after regional air agency moved to new location

For each of these two monitors, data is available for the most recent years preceding their movement or discontinuation: 2006-2008.

In reviewing the site criteria of the monitors, three monitors were eliminated from further consideration based on the following points:

- Data availability: Augusta and Fiske, while in the Spokane urban area, currently only has less than one year of quality assured data. Therefore, the lack of data makes it not appropriate as a surrogate monitor for comparison purposes.
- Land use surrounding the monitor: Cheney-Turnbull is located on a wildlife refuge approximately 20 miles southwest of the Spokane urban area. The refuge is 16,000 acres and is not associated with residential/commercial or urban land uses. Therefore, this monitor is not appropriate for comparison purposes.
- Monitor type: The Liberty Lake monitor is a temporary, special purposes site, intended to monitor the air in the East Valley area and therefore is also not appropriate.

Therefore, the Freya and Ferry monitor and the Monroe and College monitor are used for this analysis. Both of these monitors were intended to measure population exposure and are located in commercial/urban areas. The monitors are also very close to the project area. All recent data, including the Augusta and Fiske monitor, is provided below[14]. Attachment 1 shows a corresponding map of these monitors.

Table 1 24-hour PM_{10} Monitor Values* in the Spokane Nonattainment Area

Monitor Name	Location		2006	2007	2008	2009**	Notes
Freya and Ferry	3530 E Ferry Avenue, Spokane, WA	# of readings	118	91	61	15	2009 Jan to March
		1st Max	80.98	62	78.0	40	
		2nd Max	73.75	61	65	28	
		3rd Max	72.34	54	53	26	
		4th Max	70.67	53	43.9	25	
Monroe and College	1101 W College Ave, Spokane, WA	# of readings	56	65	60	6	No Data after January 2009
		1st Max	71.53	58	38.1	16	
		2nd Max	61.54	49	38	12	
		3rd Max	49.99	41	31.6	10	
		4th Max	46.73	38	29.8	7	

[14] Monitors are maintained by the Spokane Regional Clean Air Agency. Data are available at http://www.spokanecleanair.org/air_quality.asp. Data used for this review are from the Federal Reference Method (FRM) samplers. The Agency also collects near real time data using TEOMs. Data from the real time monitoring may vary from the FRM data and will cover more days. The official numbers reported to the U.S. EPA are the FRM data.

Monitor Name	Location		2006	2007	2008	2009**	Notes
Augusta and Fiske *(Freya/Ferry monitor moved to this location)	3104 East Augusta Avenue, Spokane, WA	# of readings	--	--	--	46	2009 April to December
		1st Max	--	--	--	39	
		2nd Max	--	--	--	39	
		3rd Max	--	--	--	39	
		4th Max	--	--	--	48	

* Method used was FRM, measured in $\mu g/m^3$
** Provided for informational purposes

Table 2 below shows the major roadways within a one-mile radius of the two monitors considered in the PM_{10} qualitative hotspot analysis. Attachment 2 provides a visual display of this information. Since these monitors are each impacted by several roadways, they capture the potential contributions of vehicle exhaust, brake and tire wear, and paved road dust in recent years (along with the other sources contributing to the PM10 emissions inventory in the area).

Table 2 – Monitor Sites Traffic Assessment

Monitor Name	Major Roads within 1 mile	Average Daily Traffic	Trucks (percent)
Freya and Ferry	N. Freya St	23,000	2%
	E. Sprague Ave	14,300	5%
	290	7,500	9.5%
	I-90	110,000	10.4%
	N. Havana St.	7,100	2%
TOTAL		161,900	8.3% (weighted)
Monroe and College	N. Monroe St	17,900	2% (averaged)
	Maple St (N&S)	22,200	3.6% (weighted)
	N Washington St	14,400	5%
	290	13,000	2%
	I-90	94,000	10.4%
	Division Street	46,000	2.9%
TOTAL		207,500	6.4% (weighted)

Monitor Comparison

Next, these traffic volumes and the 2nd maximum PM_{10} values for 2008 were compared to the estimated 2030 traffic volumes for US 395. The year 2008 was used for the traffic impacts associated with the monitors to correspond with the most recent year for which monitoring values are available. Projected ADT and truck percentages for the project in 2030 were derived from the regional transportation model and the Washington State Pavement Management System (WSPMS) respectively. For comparison purposes, the location of the interchange of US 395 and I-90 was used, as it has the highest overall ADT in the project area (this does not include the highest-volume segment of US 395 itself, but the combination of US 395 volume and I-90

volume is higher at the interchange between the two highways). All segments of US 395 are assumed to have approximately 10% trucks in 2030.

Table 3: Monitor and Project Comparison

Locations	2008 2nd Max PM_{10}*	2008 Traffic Impact			2030 Projected Traffic		
		ADT	Truck %	# of trucks	ADT	Truck %	# of Trucks
Freya and Ferry	65	161,900	8.3%	13,470	--	--	--
Monroe and College	38	207,500	6.4%	13,247	--	--	--
US 395	--	--	--	--	115,100	10%	11,510
I-90	--	--	--	--	147,700	10.4%	15,361
TOTAL US 395 interchange at I-90	--	--	--	--	262,800	10.2%	26,871

* measured in $\mu g/m^3$

The monitor locations are impacted by lower traffic volumes and truck volumes than those expected for the project in 2030. At the same time, as shown in Table 3, each of these monitor locations is currently measuring PM10 values well below the 150 µg/m3standard. Even if the only emissions source impacting these monitors was vehicle traffic, ADT could more than double without leading to a violation of the NAAQS. However, as noted above, vehicle traffic on paved roadways is not the only source of PM10 emissions impacting the monitors; in fact, it is only a minor contributor to the area's PM10 emissions inventory (3% in 2002).

It is also important to note that the traffic volumes used in the analysis will occur in 2030, after full implementation of EPA's 2007 heavy duty truck emissions standards. EPA's MOBILE6.2 model shows that emissions per mile of travel from Class 8 heavy-duty trucks will be almost 80% lower in 2030 than they were in 2008[15]. Another way of looking at this is that 26,871 trucks in 2030 will produce the same emissions as only 5,777 trucks in 2008. In other words, even though the projected truck volume in 2030 is roughly twice the volume impacting the monitors in 2008, the total emissions from those trucks in 2030 will be much lower than the level measured from a smaller number of trucks in 2008.

Finally, one important purpose of this project is to remove traffic from arterial streets like Division, and to provide an alternative limited-access route. Road dust emissions rates are lower on limited access facilities than on arterials. Table II-13 of the 2002 emissions inventory

[15] This percentage reduction is slightly lower than the reduction identified in the "Control Measures" section above, because that reduction applies to new trucks, while the MOBILE6.2 results reflect the entire in-use truck fleet (new and existing trucks).

provides silt loading values used to calculate emissions rates for various road types; roadways with traffic volumes below 10,000 ADT have silt loadings that are 2 to 20 times higher than roadways over 10,000 ADT. Therefore, to the extent that this project diverts traffic from lower-volume arterials to the new US 395 facility, it will reduce per-mile emissions of road dust.

Conclusion

The foregoing analysis concluded that the peak traffic volumes associated with the project are higher than those near existing air quality monitoring locations. However, these monitors are recording values that are well below the NAAQS, and paved road traffic is only a minor contributor to the area's overall PM10 emissions. In addition, heavy truck emissions rates are expected to be much lower by the time these peak traffic volumes occur, and the shifting of vehicle travel from lower-volume arterial streets to US 395 would reduce road dust emissions rates. Therefore, the US 395 North Spokane Corridor project would not be expected to cause a new violation of the PM10 air quality standards.

As noted before, this analysis followed the instructions of the March 29, 2006 EPA/FHWA guidance for qualitative analysis of PM emissions which provides guidance on how to analyze PM emissions to assess likely future localized PM pollutant concentrations and used the "comparison to another location with similar characteristics" methodology. The results of that comparison, with consideration of other local and national factors detailed throughout this document, provide the conclusion of the analysis.