APPENDIX H
AIR QUALITY ANALYSIS

Air Quality Analysis

The validated Yakima County Area Model was the analytical tool used to assess the impacts of the various transportation packages on the air quality for the Yakima Urban Area. The urban area is no longer in a non-attainment status and as such has no preset budgets for either PM_{10} or Carbon Monoxide (CO). Despite this, the region still reports and monitors the air quality status of the region.

There are two different maintenance areas for pollutants in the Yakima Urban Area. The PM_{10} boundary is larger than the CO boundary. Both boundaries are shown in Figure 1.

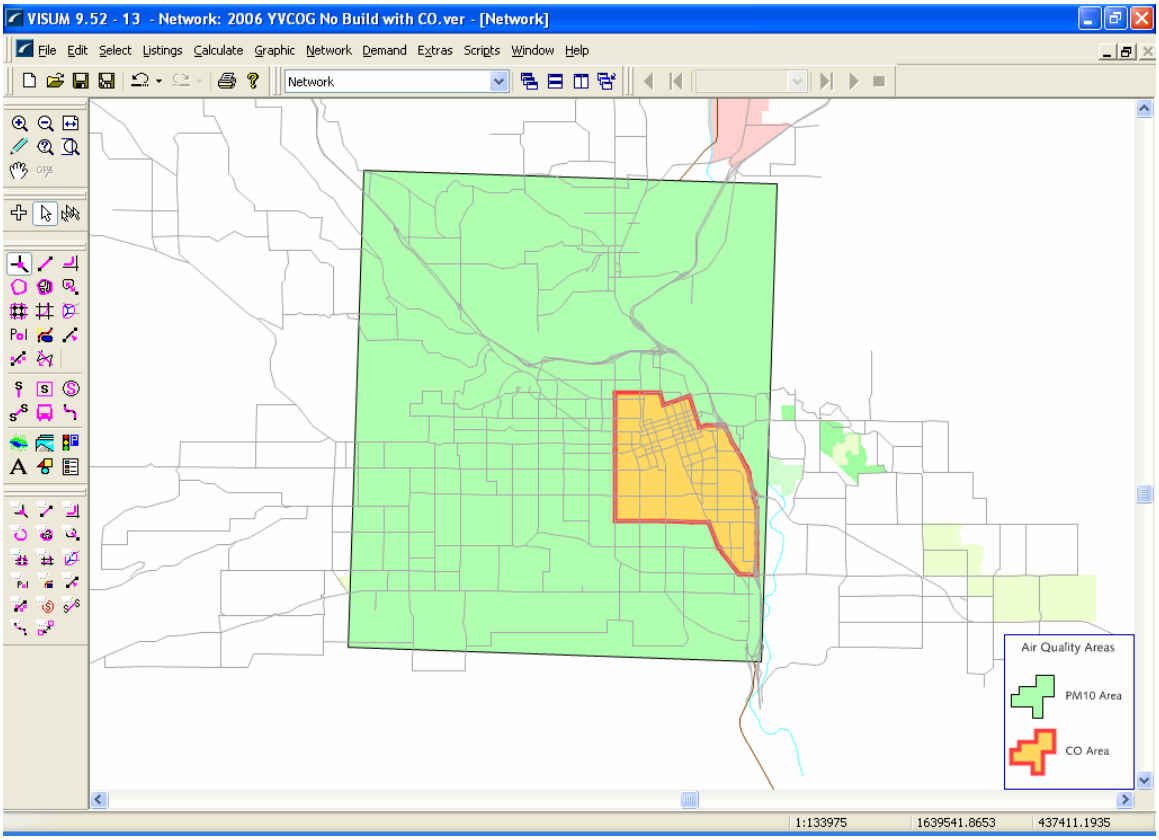

Figure 1. Air Quality Maintenance Areas

The air quality conformity analysis for each forecast year was conducted for the Built condition, which assumes all capacity-adding projects and those projects changing intersection controls; the built scenarios include the WSDOT and local agency Transportation Improvement Programs (TIPs). All analyses were conducted based on the fiscally-constrained M/RTP. Even though it is not included in the fiscally-constrained M/RTP, the addition of the East-west Corridor from the City of Yakima to Terrace Heights was included in the 2030 Build model.

PM Peak Vehicle Miles Traveled to Daily Vehicle Miles Traveled

The model, which covers the entire Yakima County, is a PM Peak hour model which is currently configured to forecast vehicle demand only. In order to assess PM_{10} air quality impacts, the PM Peak Hour average vehicle miles traveled need to be converted into both daily and annual values. Traffic counts were used as the source of creating factors to derive daily values from a PM Peak Hour volume.

A daily VMT value was calculated from using the multiplication factor of 10 on the summarized PMPKHR VMT extracted from the model. The PMPKHR VMT was summed using the PM_{10} boundary and the select links option.

Once daily Vehicle Miles Traveled were created, the total annual VMT was calculated based on monthly conversion factors supplied from historical traffic counts in the region. These factors are shown in 1.

Table 1. Conversion Factors to Monthly Totals

Month	VMT Adjustment Factor	Days per Month
January	0.896	31
February	0.922	28
March	0.982	31
April	1.009	30
May	1.019	31
June	1.061	30
July	1.072	31
August	1.096	31
September	1.029	30
October	1.004	31
November	0.963	30
December	0.951	31

Particulate Matter

PM_{10} emissions are based solely on the total vehicle miles traveled in the region – regardless of link speed. Once the PM Peak Hour VMT is converted to a monthly total, emission rates from the Department of Ecology and Mobile 6 were used to calculate the total pounds of PM_{10} emissions for the boundary area. The rates, which include unpaved road dust, paved road dust and tailpipe emissions are shown in Table 2.

Table 2. PM_{10} Emission Rates

Month	Unpaved Road Dust(lbs/mi)	Paved Road Dust(lbs/mi)	2010 Tailpipe (g/mi)	2015 Tailpipe (g/mi)	2020 Tailpipe (g/mi)	2030 Tailpipe (g/mi)
January	0.3490	0.0013	0.046	0.0346	0.0297	0.0277
February	0.3690	0.0013	0.046	0.0346	0.0297	0.0277
March	0.3810	0.0039	0.046	0.0346	0.0297	0.0277
April	0.4100	0.0014	0.046	0.0346	0.0297	0.0277
May	0.1700	0.0014	0.046	0.0346	0.0297	0.0277
June	0.2230	0.0014	0.046	0.0346	0.0297	0.0277
July	0.2790	0.0014	0.046	0.0346	0.0297	0.0277
August	0.3310	0.0014	0.046	0.0346	0.0297	0.0277
September	0.3840	0.0014	0.046	0.0346	0.0297	0.0277
October	0.4130	0.0014	0.046	0.0346	0.0297	0.0277
November	0.3450	0.0013	0.046	0.0346	0.0297	0.0277
December	0.3490	0.0013	0.046	0.0346	0.0297	0.0277

The roadway dust emission rates do not vary into the future, however the tailpipe emission rates do lower slightly into the future. This is a reflection of a cleaner vehicle fleet in the future. With this emission rates and vehicle miles traveled, total annual emissions of PM_{10} were calculated for each forecast year in the model.

Table 3. PM_{10} Annual Emissions

Emission	Units	2010 Existing	2015 M/RTP Build	2020 M/RTP Build	2030 M/RTP Build
Total (tailpipe) VMT[1]	vehicle-miles	1,590,510	1,864,180	1,992,590	1,942,640
VMT on unpaved roads	vehicle-miles	3,823	3,823	3,823	3,823
Miles of unpaved roads	miles	50.4	50.4	50.4	50.4
VMT on paved roads	vehicle-miles	1,586,687	1,860,357	1,988,767	1,938,817
Tailpipe emission rate	gm/veh-mile[2]	0.046	0.0346	0.0297	0.0277
Unpaved Road Dust	tons/year	232	232	232	232
Paved Road Dust	tons/year	458	536	573	559
Tailpipe	tons/year	29	26	24	22
Total PM_{10}	tons/year	719	794	829	813

As shown in 3, over 28% the total PM_{10} emissions are due to unpaved roadway dust and another 63% is due to road dust on paved roadways. Four percent of the total PM10 emissions are due to tailpipe emissions.

The M/RTP includes several types of improvements that will help reduce future levels of PM10. These include reducing the amount of travel through transportation demand management (TDM) and commute trip reduction (CTR) programs. These programs encourage use of transit, vanpools, carpools, bicycles, and walking. Future increases in

alternative modes will help reduce the total VMT for the region. This will reduce both road dust and tailpipe emissions. The Yakima Valley region is also working to reduce the mileage of unpaved roadways. Local agencies in the metropolitan area have annual programs to pave or otherwise overlay existing gravel roadways. The M/RTP also supports acquisition and use of street cleaners to cut down on the PM10 levels from travel on paved roadways. These actions will help the region minimize future PM10 emissions from mobile sources.

It should be noted that the unpaved lane-miles are unchanged in this analysis. This was due to insufficient data to estimate how many miles of gravel roadways would be paved in the future. If more data becomes available, the amount of unpaved road-miles could be reduced in future analysis.

Carbon Monoxide

Similar to PM_{10} emissions, the CO conformity analysis was performed for 2010, 2015, 2020 and 2030. Unlike PM_{10}, CO rates are based upon both travel speed on roadway links as well as the vehicle miles traveled. These rates, which are calculated using the Mobile 6 model with the vehicle fleet and testing programs for the region, varying by each mile per hour as well as by year. The rates decrease into the future, reflecting the assumption of a newer and cleaner automobile fleet in the future. All CO conformity analyses were performed by Department of Ecology and provided to YVCOG by Yakima Regional Clean Air Agency.

The travel speed and volume is calculated on each roadway link within the maintenance area using time of day factors to create hour by hour demands on the roadways. With this volume and speed data, the total CO produced is calculated for each link in the maintenance area based upon the rates from Mobile 6 and summed. Unlike PM_{10}, Carbon Monoxide is reported on a daily basis.

There is currently no set budget for carbon monoxide in the Yakima metropolitan area. For the conformity analysis, the test is whether or not the plan increases or decreases the emissions for the region. As shown in Table 4, the total CO produced in the region is less than the Baseline condition for each forecast year. Therefore, the M/RTP projects will have a positive affect on reducing CO levels over Baseline conditions.

Table 4. Carbon Monoxide Emissions by Scenario

Analysis Condition	Pounds of CO/Day
2010 Base Year	22,110
2015 M/RTP Build	19,773
2020 M/RTP Build	18,398
2030 M/RTP Build	16,096

As shown in Table 5, the although the M/RTP will not generally lower both the Vehicle Miles and Vehicle Hours traveled in the Carbon Monoxide maintenance area as time proceeds, better emissions from cars in the future is the key reason in the reduction of the CO emissions. In the next M/RTP model set, transit will be a quantitative off-set to the increasing VMT and VHT.

Table 5. Vehicle Miles and Hours Traveled in CO Maintenance Area

Scenario	VMT	VHT
2010 Base Year	458,410	13,050
2015 M/RTP Build	504,680	14,440
2020 M/RTP Build	548,160	15,750
2030 M/RTP Build	526,690	14,930