DRAFT

Transportation - Air Quality Review

March 2007

METRO

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Purpose
The purpose of this Transportation – Air Quality Review Report is to provide an annual assessment of the impact of transportation generated air pollutants in the Metro region and to identify existing or potential regulatory or other policy initiatives that could affect transportation activities in the Metro area.

Background
The federal Clean Air Act (CAA) provides the framework for national, state, regional and local efforts to ensure healthy air. The CAA provides for the US Environmental Protection Agency to set air quality standards, known as national ambient air quality standards (NAAQS) for air pollutants found harmful to people and the environment. Air quality efforts in the Metro area, as with all urban regions in the country, is focused on demonstrating that the air quality of the region meets these federal standards.

NAAQS, or maximum exposure levels, have been set by the EPA for carbon monoxide (CO), ground level ozone (including the precursors volatile organic compounds (VOC) and oxides of Nitrogen (NOx) and particulate matter (PM). Each air shed is analyzed for total levels of these air pollutants and the amounts that each type of activity generates (for example: transportation, industry, home activities, etc.) Where the total of the pollutant exceeds the NAAQS, each activity, or generating sector type, is given a "budget", or maximum level of the pollutant that sector can release so that all activities do not exceed the NAAQS. Failure to demonstrate compliance with the budget can have significant consequences. For the transportation sector, failure to demonstrate conformity can mean withholding federal transportation funding until steps are taken to address the problem.

In this report, the term transportation is used in a narrow sense. Transportation is defined as on-road motor vehicles (autos, trucks, buses) although other similar vehicles (off-road and construction vehicles, trains, marine vessels and aircraft also generate air pollutants within the region). This narrow definition is used because of Metro's responsibility for the surface transportation as stated in State of Oregon regulations (Division 252, Transportation Conformity) and related federal law (Clean Air Act, metropolitan planning organization, and as a recipient of federal transportation funds).

While the air shed within the Metro area is functionally part of a greater air shed that includes southwest Washington, because of the state boundary, differing state laws, designation of separate metropolitan planning organizations (MPO), the airshed has been divided into two sections. The area south of the Columbia River is the responsibility of Metro (and Oregon Department of Environmental Quality) and the area to the north is the responsibility of the Southwest Washington Regional Transportation Council (and Southwest Clean Air Agency).

Air Quality Regulatory Status of the Metro area
As of March 2007, the Metro area is a maintenance area for carbon monoxide (CO), meaning that while the region meets federal CO standards, it must continue to monitor CO levels through a air quality conformity determination comparing forecast levels of air quality assuming proposed transportation investments with motor vehicle emission

budgets, or maximum allowed levels of the pollutant from the on road and transit elements of the region's transportation system. In 2006, the EPA approved a new CO State Implementation Plan (SIP) finding new CO motor vehicle emission budgets adequate for transportation conformity purposes in the Second Portland Area Carbon Monoxide Maintenance Plan.

Particulate matter, or very small pieces of dirt or soot are also a potential health hazard and NAAQS have been set for these as well. The Metro area on a regional basis, has not exceeded the PM NAAQS and transportation conformity does not have to be demonstrated for this pollutant. (Also see below for further discussion of particulate matter).

Another possible air pollutant of concern within the Metro region is ground level ozone, which is comprised of volatile organic compounds, or VOC, (also known as hydrocarbons) and oxides of Nitrogen (NOx) that are emitted from a variety of sources, including on-road motor vehicles and some transit vehicles. In June 2005, the EPA revoked the 1 hour ozone standard and an 8 hour ozone standard was promulgated. For the Metro area, this meant that the maintenance status for the 1 hour ozone standard to which the Metro area previously had to demonstrate air quality conformity was no longer required. Further, the Metro area was in attainment with the 8 hour ozone standard. In February 2007, the Oregon Environmental Quality Commission approved the Portland Area Ozone Maintenance Plan and this was submitted to the EPA for their concurrence. This Plan does not include motor vehicle emission budgets, or maximum levels of ozone emissions.

A very recent court case, *South Coast Air Quality Management District v. EPA*, December 2006, heard before the US Court of Appeals, has indicated that: "*Because one-hour conformity determinations constitute "controls", under section 172(e), they remain "applicable requirements" that must be retained*." However, further actions, judicial and otherwise, are pending. That is, a final legal ruling has not yet been concluded.

Conclusion: As a result legal uncertainty, the air quality conformity determination for the 2008-2011 MTIP will include only CO air quality conformity determination. A separate analysis of VOC and NOx will be conducted and reported by Metro to the interagency consultation members (TPAC and federal partners such as EPA, FHWA and FTA). Should judicial review be completed during the period prior to the air quality conformity determination report provided for 30 day public and technical review, the ozone element would be added if needed.

Vehicle Miles Traveled per Capita

The EPA approved (January 2006) *Second Portland Area Carbon Monoxide Air Quality Maintenance Plan* requires in its Transportation Control Measures (TCM) section that the Metro area annually monitor our vehicle miles traveled per capita as an independent assessment of transportation emissions. The TCM requires that if vmt/capita increases by 5 percent or more than the year 2000 rate for two years in a row, the region must examine

why such increases have occurred and if measures to better manage vmt/capita should be undertaken. Accordingly, the vmt/capita rate that triggers a review is 20.5 vmt/capita.

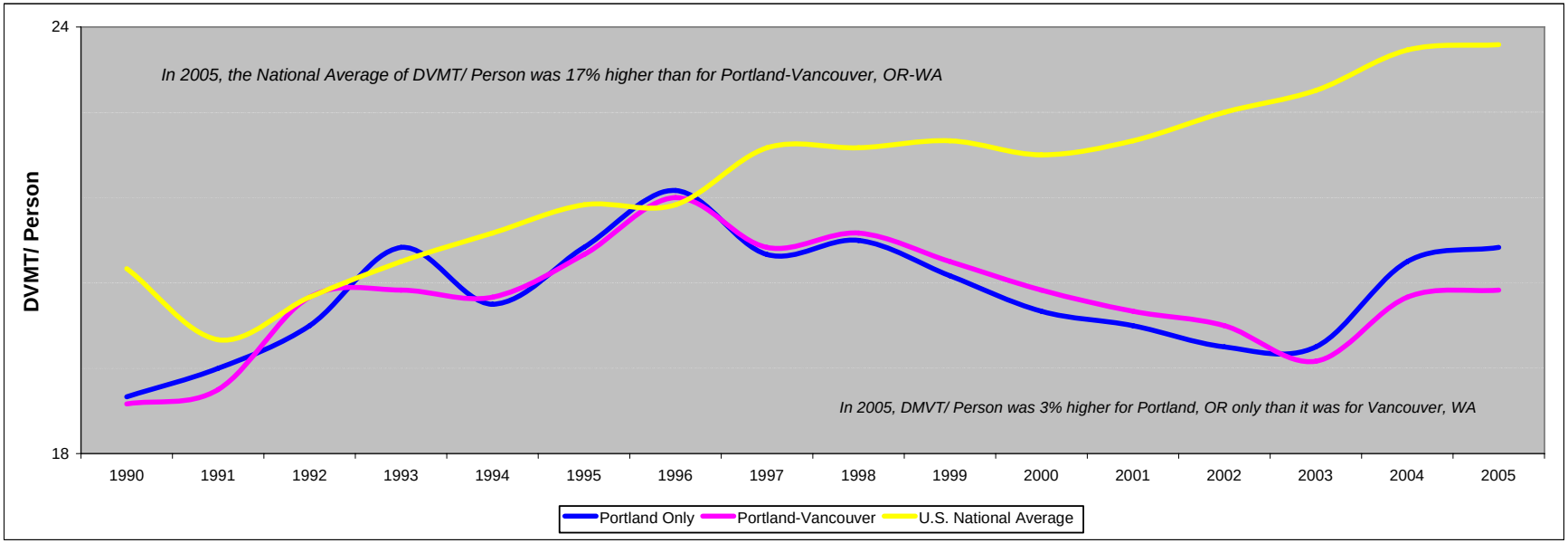
In Metro's 2006 air quality report, the latest (year 2004) vmt/capita rate was reported as 20.7 - above the trigger rate of 20.5 vmt/capita. Further, the most recent measurement (year 2005) is 20.9. Each of these rates is greater than the trigger level.

Conclusion: The CO Maintenance Plan calls for monitoring vmt/capita rates and should the rates exceed a 5 percent increase for two years, an assessment of the vmt/capita rates should be made. As this trigger has been activated by two years of vmt/capita rates higher than the 5 percent increase level, further investigation of the underlying data and verification of the reported trend ought to be initiated. As indicated last year, the geographic scope of the report has changed for the last two reported years, so that areas including Damascus, Sherwood and other outlying areas are now reported when in past years these were not. It could be that there is discontinuous data is being reported. Further analysis could help understand these data and help determine whether actions to encourage fewer vmt/capita should be considered. A special analysis of these data will be prepared and provided to representatives of the interagency consultation group for review, comment and possible actions.

Daily Vehicle Miles of Travel Per Person* - 1990 To 2005
Portland, OR Only, Portland-Vancouver OR-WA, And The U.S. National Average Data

(Data Shown In Miles)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Portland Only	18.8	19.2	19.8	20.9	20.1	20.9	21.7	20.8	21	20.5	20	19.8	19.5	19.5	20.7	20.9
Portland-Vancouver	18.7	18.9	20.2	20.3	20.2	20.8	21.6	20.9	21.1	20.7	20.3	20	19.8	19.3	20.2	20.3
U.S. National Average	20.6	19.6	20.2	20.7	21.1	21.5	21.5	22.3	22.3	22.4	22.2	22.4	22.8	23.1	23.7	23.8



Sources: Portland, OR only and Portland-Vancouver, OR-WA data are both from the FHWA in Washington, DC and from ODOT's Highway Performance Monitoring System (HPMS) program in Salem, Oregon - 1990 through 2005. National DVMT/ Person data is from the FHWA booklet "Highway Statistics," 1990-2005; Table HM-72, 'Urbanized Areas - Selected Characteristics', Publication No. FHWA-PL-03-013 (for 2004 booklet). The national average of DVMT/ Person is calculated from 'Total DVMT' divided by 'Estimated Population,' as it appears on Sheet 9 of Table HM-72; which lists all the Federal-Aid Urbanized Areas in the U.S. "A 'Federal-Aid Urbanized Area' is an area with 50,000 or more persons that at a minimum encompasses the land area delineated as the urbanized area by the Bureau of the Census" (from Roadway Footnotes for HM-72, page V-85 of 'Highway Statistics 2004').
The internet website location of the 'Highway Statistics' series (as of December 21, 2006) is: http://www.fhwa.dot.gov/policy/ohpi/hss/index.htm

FHWA Oregon Air Quality Review 2006

In the summer and fall of 2006, the Oregon Federal Highway Administration (FHWA) office, assisted by a representative of the EPA, conducted an air quality review of ODOT and metropolitan planning organizations (MPOs) within Oregon. The Review concluded with the following recommendations that are relevant to the Metro area, including actions that agencies should:

- begin investigating possible new particulate matter standards;
- anticipate the new MOVES air quality model being completed by the EPA (that will replace the current model called MOBILE6.2);
- improve coordination and information about air toxic program developments;
- investigate the possibility of statewide coordination meetings;
- work with DEQ to review State regulations (OAR Chapter 340 Section 252, Transportation Conformity) to address differences between new federal requirements and existing state requirements that are based on superceded federal requirements;
- investigate whether the pending loss of emissions reduction credit for vehicle inspection/maintenance program and oxygenated fuels could result in inability to demonstrate conformity with motor vehicle emission budgets;
- improve documentation of conformity determination reports, following the outline included in regulations and by having responses organized this way as well;
- review CMAQ eligibility requirements and improve demonstration that proposed projects meet standards.
- FHWA recommended continuation of the Metro annual air quality review as a "best practice".

Conclusion: As indicated below, region-wide levels of particulate matter appear to be low when compared with levels in other metropolitan areas in the country and do not appear to be a likely problem for the Metro area. The MOVES air quality model will be investigated once it is made available. Some aspects of the air toxics program (benzene) have recently been addressed by the EPA (see below) and these actions, as well as those by the DEQ concerning low emission vehicle standards, should also help with lowering air toxics in the region. Metro would be willing to participate in statewide coordination meetings, however, it would still support holding separate interagency consultations on issues of specific concern to the region. Metro would very much welcome revision of statewide OAR to reflect new federal standards. Metro could incur risk when federal and state requirements are different. Regarding the loss of credits for vehicle inspection/maintenance and oxygenated fuels, Metro will be assessing these losses and the region's ability to meet emission budgets for CO. However, early indications are that because of improvements to the emission rates from newer cars in the region's vehicle fleet, substantial reductions in CO will be occurring in the future – well below the motor vehicle emission budgets. The conformity determination report completed in 2005 followed the State OAR regulation outline and future conformity determinations will do so as well. Additional efforts will be made to improve documentation and report readability. Additional work is being completed to improve documentation of CMAQ eligibility.

Benzene
Benzene, especially as emitted from motor vehicles has been a pollutant of concern for the Pacific Northwest and the Metro area. Gasoline from Alaska, naturally high in benzene, has been found to be a major contributor. A fact sheet about benzene is available from DEQ at: http://www.deq.state.or.us/aq/Factsheets/06-AQ-018_benzene.pdf

Conclusion: After substantial analysis and discussion, the EPA has agreed to apply benzene limitations to gasoline supplied in the Pacific Northwest similar to those in other parts of the country so that the level of benzene emitted from motor vehicles can be reduced.

Particulate Matter
Small particles, especially soot generated by burning fuels, have been found to be a health concern. Accordingly, standards for particulate matter (PM) of varying sizes have been established by the EPA. However, the Metro area's air shed has been relatively free of such particulates and has not been subject to the PM standards. Recently an EPA analysis of the level of soot in areas around the country found that the Portland metropolitan area had among the lowest levels of such particles in the country and was among the few that even met World Health Organization recommended standards. That said, there are concerns about soot generated from Asia which have been found in the Pacific Northwest and hotspots, or localized pockets where particulates from diesel and other sources may need to be addressed.

Conclusion: While the region does not currently exceed federal standards, there are continuing concerns about particulate matter. These may be addressed, at least in part, but other programs listed in this review, including the diesel emissions initiative listed below.

Second Portland Area Carbon Monoxide Maintenance Plan.
This second plan for the Portland area, produced by the Oregon DEQ, revised the motor vehicle emission budgets (and these were used for the 2006-2009 MTIP conformity determination approved by the USDOT on November 2005), transportation control measures and other maintenance plan aspects and was approved by EPA effective February 23, 2006.

Conclusion: Motor vehicle emission budgets consistent with the new EPA required air quality model (MOBILE6.2h) are in place. This provides consistent and comparable maximum carbon monoxide emissions from transportation sources with model results. In addition, transportation control measures have been updated and while rigorous, are now consistent with current and expected future conditions.

Oregon Low Emission Vehicle Standards.
This Oregon DEQ program is rules that require, beginning in 2009, that new cars and light duty trucks sold in Oregon meet California vehicle emission standards. This action

is the result of the West Coast Governors agreement to address the harmful effects of global warming by reducing greenhouse gas emissions. The proposed standards will also reduce smog forming emissions and air toxics emanating from motor vehicles.

Conclusion. Again, this is an example of actions, that when implemented, could address some of the federal and state air toxic concerns.

Air Toxics

The DEQ, in cooperation with the EPA has completed the *Portland Air Toxics Assessment* (PATA). This work included the use of an air quality model to assess twelve air toxics in the Metro region.

Below is a table from the PATA study outlining primary air toxic elements, potential health effects and contributing sources.

Important Pollutants Identified by PATA	Health Effects	Contributing Sources
Polycyclic Aromatic Hydrocarbons (PAH)	Chronic eye irritation. Reproductive system damage. Lung cancer.	Residential wood combustion (woodstoves, fireplaces)
Benzene	Immune system damage. Genetic damage. Blood disorders including anemia & excessive bleeding. Increased incidence of leukemia.	On-road engines (cars, trucks, buses, motorcycles), residential wood combustion (woodstoves, fireplaces)
Diesel particulate	Chronic respiratory effects. Lung cancer.	Construction equipment, on-road engines (cars, trucks, buses, motorcycles), recreational boats
Acrolein	General respiratory congestion. Chronic eye, nose & throat irritation.	Structural fires
1,3-Butadiene	Increase in cardiovascular diseases. Effects on the central nervous system. Eye, nose & throat irritation. Cancer.	On-road engines (cars, trucks, buses, motorcycles), lawn & garden equipment, recreational boats
Chloroform	Effects on the liver, including hepatitis & jaundice. Effects on the central nervous system effects, such as depression & irritability. Effects on the kidneys. Cancer.	Wastewater treatment
Acetaldehyde	Cancer.	On-road engines (cars, trucks, buses, motorcycles), construction equipment
Perchloroethylene	Severe respiratory irritation. Effects on the central nervous system. Severe liver & kidney damage. Increased incidence of menstrual disorders & pregnancy problems.	Dry cleaners, consumer products
Chromium	Nose irritation including chronic runny nose, nosebleeds & ulcers. Pregnancy & childbirth complications. Lung cancer.	Metal industries, oil & natural gas burning, electroplating, welding
Formaldehyde	Chronic eye, nose & throat irritation. Increased incidence of menstrual disorders & pregnancy problems. Lung & nasal cancer.	On-road engines (cars, trucks, buses, motorcycles), construction equipment, railroads, airports, recreational boats

Conclusion: The region, like all metropolitan areas, has air toxics. Some of these are generated by surface transportation vehicles. As state or federal standards have not been established, it is a challenge to understand the appropriate level of concern and action. The region can continue to monitor state and federal research and regulatory efforts in order to continue regional efforts to maintain and improve air quality.

EPA Hazardous Air Pollutants from Mobile Sources

In February 2007, EPA finalized a rule to reduce hazardous air pollutants from mobile sources (see http://www.epa.gov/otaq/toxics.htm#mobile , Control of Hazardous Air Pollutants from Mobile Sources). The rule limits the benzene content of gasoline and reduce toxic emissions from passenger vehicles and gas cans. EPA states that this rule will reduce mobile source air toxics and volatile organic compound emissions (precursors to ozone) and particulate matter.

Additionally, EPA has developed a variety of programs to reduce air quality hazards in communities, such as Clean School Bus USA, the Voluntary Diesel Retrofit Program, Best Workplaces for Commuters, and National Clean Diesel Campaign.

Conclusion: The Metro region's economy has a large component that is transportation dependent. These regulations and other non-regulatory approaches should help reduce air toxics related to transportation so that the community's health can be improved and transportation can remain a vital component of the region's economy.

Diesel Emissions Reductions

As noted by the Oregon DEQ, diesel is the primary fuel used by the commercial transportation sector. In the United States over ninety percent of all freight is moved by diesel engines. Diesel engines also power most non-road equipment such as construction, agricultural, marine and locomotives.

While there are substantial operational advantages to the use of diesel fuel, emissions from diesel are a major contributor to particulate matter. Specifically, diesel emissions contain very tiny particles known to be toxic when breathed deeply into the lungs. Studies link fine particles to increased hospital admissions for respiratory diseases, heart attacks and heart disease. In addition to particles, diesel emissions are also known to contain more than 40 toxic air contaminants with known or suspected cancer-causing substances.

The DEQ has identified techniques and technologies that can reduce diesel emissions. These options range in cost and application and include cleaner fuels (cleaner diesel and biodiesel), catalysts and particle filters. More information is available from DEQ at: http://www.deq.state.or.us/aq/diesel/index.htm. There are tax credits and the Federal Highway Administration has provided for addressing diesel transportation emissions by allowing federal flexible funding sources to support diesel emission reduction programs.

Conclusion: While diesel emissions are a known problem, there are steps being taken by DEQ and FHWA in particular, to help reduce diesel emissions from transportation sources.