CONFORMITY FINDINGS

EXECUTIVE SUMMARY

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*Demonstrations of Transportation Conformity of
the DVRPC FY 2007 PA and FY 2008 NJ Transportation
Improvement Programs and the Destination 2030 Long Range Plan
with the State Air Quality Implementation Plans of Pennsylvania and New Jersey
and with Applicable National Ambient Air Quality Standards Requirements*

OVERVIEW

This summary documents the demonstration of transportation conformity of the DVRPC *Destination 2030* Long Range Plan (*Plan*) and the FY 2007 Pennsylvania and FY 2008 New Jersey Transportation Improvement Programs (*TIPs*) with the respective State Air Quality Implementation Plans (*SIPs*) and applicable National Ambient Air Quality Standards (NAAQS) requirements under the Clean Air Act (CAA). The three interlocking circles appearing throughout this report represent the unity of these conformity components: the *Plan*, the *TIPs* and the *SIPs*.

This conformity determination was conducted under the guidance of the Transportation Conformity Inter-Agency Consultation Group (TCICG). The TCICG is comprised of representatives of local, state and federal transportation, environmental and planning agencies and reviews the planning assumptions, model parameters and project analyses and oversees the conformity process to insure that the various stakeholders and regulatory agencies are communicating through-out the conformity determination.

Transportation conformity documented in this report is specifically for the following pollutants within the stated designation areas. They are:

▷ Volatile Organic Compounds (VOCs) meeting the 8-hour ozone NAAQS requirements in:
  • the DVRPC portion of the Philadelphia-Wilmington-Atlantic City Ozone Non-attainment Area;

▷ Nitrogen Oxides (NO_x) meeting the 8-hour ozone NAAQS requirements in:
  • the DVRPC portion of the Philadelphia-Wilmington-Atlantic City Ozone Non-attainment Area;

▷ Carbon Monoxide (CO) meeting the CO NAAQS requirements in:
  • the Philadelphia – Camden CO Maintenance Area;
  • the City of Burlington in Burlington County, NJ;
  • the City of Trenton in Mercer County, NJ;

▷ Fine Particulate Matter ($PM_{2.5}$) meeting the $PM_{2.5}$ NAAQS requirements in:

- the DVRPC portion of the Philadelphia-Wilmington, PA-NJ-DE PM$_{2.5}$ Non-attainment Area; and
- the DVRPC portion of the New York-Northern New Jersey-Long Island, NY-NJ-CT PM$_{2.5}$ Non-attainment Area.

This summary serves as an inclusive document that demonstrates transportation conformity of the DVRPC *TIPs* and the *Plan* with all applicable *SIPs* and NAAQS requirements for the above pollutants within the noted areas. The full conformity determination document is available at www.dvrpc.org.

ANALYSIS APPROACH

There are two categories of projects in the *TIPs* and the *Plan*:

REGIONALLY SIGNIFICANT PROJECT: a non-exempt highway or transit project on a facility which, regardless of its length, serves regional needs and is normally included in the regional model.

EXEMPT PROJECT: a project listed in table 2 or 3 of the Final Rule (40 CFR 93) that primarily enhances safety or aesthetics, maintains mass transit, continues current levels of ridesharing, or builds bicycle and pedestrian facilities.

The *Final Rule* stipulates that the emission analysis of transportation plans and programs must model all regionally significant, non-exempt projects. Each project has an associated alphanumeric air quality code for the conformity determination and exempt eligibility identification purposes.

For the area with an implemented *SIP*, the motor vehicle emissions budget (MVEB) prescribed in the *SIP* sets a regional emissions amount that functions as a threshold against which conformity is tested. This process is commonly known as the "budget" test. The *Final Rule* stipulates that each *SIP* is sovereign and that, for a multi-state metropolitan planning organization (MPO), such as DVRPC, conformity applies separately to individual state portions of its planning area under respective *SIPs*.

In the absence of an implemented *SIP*, areas must perform what is known as the "interim" emissions test. The *Final Rule* dictates that only certain interim test types and methodologies are allowed in a given non-attainment area, that they must be applied uniformly throughout the area and that the US DOT determination on transportation conformity must be on the entire non-attainment area. The *Final Rule* further requires that all affected MPOs in the non-attainment area must work together to demonstrate conformity jointly until respective *SIPs* are implemented.

Within the DVRPC region, the NAAQS requirements for ozone, CO and PM$_{2.5}$ must be met. In the nine-county DVRPC planning area, governing *SIPs* are in place for ozone and CO in the Pennsylvania and New Jersey sub-regions. For these criteria pollutants, DVRPC utilizes the budget test to demonstrate conformity using applicable *SIP* MVEBs. In 2006, New Jersey has implemented a PM$_{2.5}$ *SIP* for selected portions of the state. Those areas in New Jersey with effective *SIP* PM$_{2.5}$ MVEBs now include Mercer County within the DVRPC planning area. Therefore, in Mercer, the budget test is also employed to demonstrate PM$_{2.5}$ conformity.

Otherwise, for the DVRPC portion within the Philadelphia-Wilmington, PA-NJ-DE $PM_{2.5}$ Non-attainment Area, DVRPC coordinates its conformity efforts with WILMAPCO, and the two MPOs demonstrate conformity collectively for the entire non-attainment area. For this iteration of the conformity demonstration, DVRPC and WILMAPCO have jointly decided to use the "no-greater-than-2002-baseline" interim test. Also, the two MPOs have jointly decided to use the four-season annual inventory method. This annual inventory method is applied to all $PM_{2.5}$ emissions analyses in the DVRPC (except Mercer) and WILMAPCO planning areas.

The mobile source ozone emissions analysis years for VOCs and NO_x are 2010 (8-hour ozone standard attainment year), 2020 (the *interim* year selected to keep all analysis years no more than ten years apart) and 2030 (the *horizon* year of the *Plan*). VOCs and NO_x, which are heat-sensitive ozone precursors, are estimated for a July day. The current ozone MVEB year governing the DVRPC region is 2005 in both Pennsylvania and New Jersey. All emissions estimates are tested against these budgets.

CO emissions are also calculated for 2010, 2020 and 2030. Additionally, CO emission factors are estimated for years that CO MVEBs have been established in respective *SIPs*, the MVEB years of which are 2013 and 2017 in the Pennsylvania sub-region. New Jersey now has EPA-approved limited maintenance plans in place for CO in Burlington, Camden and Mercer Counties and is no longer required to perform regional emissions analysis for CO in the New Jersey sub-region. CO is estimated for a January day since its effects are more prevalent during the winter months.

In the $PM_{2.5}$ demonstration, analysis years vary due to the different emissions tests being applied by area. The current analysis years in the Philadelphia-Wilmington, PA-NJ-DE $PM_{2.5}$ Non-attainment Area are 2010, 2020 and 2030. These years are a required part of the interim test and will be used until applicable $PM_{2.5}$ *SIPs* are implemented in the non-attainment area. For the New York-Northern New Jersey-Long Island, NY-NJ-CT $PM_{2.5}$ Non-attainment Area, the year 2009 is analyzed instead. 2009 is a $PM_{2.5}$ MVEB budget year for Mercer County. To demonstrate conformity, projected $PM_{2.5}$ emissions in all analysis years must not exceed 1) the 2002 baseline emissions results in the Philadelphia-Wilmington, PA-NJ-DE $PM_{2.5}$ Non-attainment Area; and, 2) the 2009 budgeted emissions in the New York-Northern New Jersey-Long Island, NY-NJ-CT $PM_{2.5}$ Non-attainment Area.

PLANNING ASSUMPTIONS

All planning assumptions utilized in this demonstration are the latest and most current as of March 26, 2007, which is the start date of the DVRPC conformity analysis. The DVRPC Transportation Conformity Interagency Consultation Group (TCICG) has reviewed and concurred on all latest planning assumptions utilized.

DVRPC uses a multi-step, multi-source methodology to produce long-range population and employment estimates at the county-level. These estimates, in turn, become the control totals for municipal-level and traffic analysis zone (TAZ) level estimates.

Population forecasting at the regional level involves review and analysis of six major components: births, deaths, domestic in-migration, domestic out-migration, international immigration, and changes in group-quarter populations (e.g. dormitories, military barracks, prisons and nursing homes).

DVRPC uses both the cohort survival concept and a modified Markov transition probability model, based on the US Census 2000 and the Current Population Survey research, to age individuals and determine the flow of people. DVRPC also relies on member counties to provide information on any known, expected and/or forecasted changes in group-quarter populations. Current and future population estimates for the DVRPC planning area were adopted by the DVRPC Board in February 2005.

Employment estimates are influenced by political and socioeconomic factors at local, national and global levels. The Bureau of Economic Analysis (BEA) provides the most complete and consistent time-series data on county sectoral employment and is DVRPC's primary data source for employment forecasts. The OBERS (formerly the Offices of Business Economics and of Economic Research Services) shift-share model in combination with the Woods and Poole Economics' sectoral forecasts also provides the basis for DVRPC's employment forecasts. As in the population forecasts, county-level totals are used as control totals for municipal and TAZ-level sector distribution forecasts. These forecasts incorporate various supplemental data from public and private sectors including data from the US Census, BEA, Dun & Bradstreet, Bureau of Labor Statistics, Occupational Privilege Tax database, Woods & Poole Economics Complete Economic and Demographic Data Source, and other public and private sector statistics, and are also reviewed by member counties for final adjustments based on local knowledge. Current and future employment estimates were adopted by the DVRPC Board in February 2005.

As part of the latest planning assumptions, current transit operations policies and other road toll structures are also considered. All fares entering the transit network are "blended" by operating entity. For each operator, different existing fare types (e.g. cash, token, transfer charge, daily, weekly, and monthly passes) are blended into a single fare policy based on the percentage of each fare type and use in the 2000 fare structure. Then, the future fare for each operator is held constant in current dollars. All current operating plans, ridership and service levels of transit systems are built into the transit network and are incorporated into the future year networks as well. Future year transit networks are also augmented with any new services identified in the corresponding DVRPC *TIPs* and the *Plan*.

Other transportation related costs such as automobile operating costs, gasoline costs, parking costs, and road/bridge tolls are also based on current and available data, and are held constant in current dollars into the future analysis years.

TRAVEL SIMULATION

Regional emissions analysis begins with travel simulations. The enhanced DVRPC travel simulation, validated in 2005 using the US Census 2000 information, home interview survey and traffic count data, is a classic four-step transportation modeling application that operates within an iterative (Evans algorithm) structure with respect to highway travel time, and is disaggregated into separate peak, mid-day and evening time periods. In the four-step modeling process, trip generation is based on constant trip rates imbedded in a cross-classification structure. Trip distribution uses a doubly constrained gravity model, stratified into three person (home-based work, home-based non-work, and non-home-based) and four vehicle trip purposes. Modal split employs a binary probit-like formulation stratified by trip purpose, transit submode, and auto ownership. The highway assignment component is based

on the equilibrium method using minimum travel-time path. Free flow highway speeds are stratified by functional class and density of development.

Then, the Evans algorithm re-executes the trip distribution and the modal split highway components. This process is based on updated speeds after each iteration of the highway assignment and determines a weight value upon each performed iteration. This weight is then used to prepare a convex combination of the link volumes and trip tables for the current iteration and a running weighted average of the previous iterations. This algorithm converges rapidly to an equilibrium solution on highway travel speeds and congestion levels. When the equilibrium is attained, the model assigns the weighted average transit trip tables to the transit networks and produces link and route passenger volumes. Transit assignment is unrestrained and uses minimum paths based on the modal split model definition of impedance. The methodology and detailed TAZ level estimates are further explained in the DVRPC report: *2000 Travel Simulation for the Delaware Valley Region* (in preparation). The iterative DVRPC travel demand simulation process has been reviewed and approved by the TCICG.

Due to the project scale, scope or governing characteristics, certain non-exempt, regionally significant projects (such as park & ride facilities or bikeway improvements) cannot be represented and evaluated by the travel demand model properly. Therefore, travel impacts and emissions analyses of such projects are performed using off-network analysis tools, which are a set of travel impact and emissions analysis methodologies. The Pennsylvania Air Quality Off-Network Estimator (PAQ-ONE) and the New Jersey Air Quality Off-Network Estimator (NJAQ-ONE) are a set of such off-network methodologies developed for the Pennsylvania and New Jersey State Departments of Transportation (PennDOT and NJ DOT, respectively). Both PAQ-ONE and NJAQ-ONE contain independent MOBILE6.2 modules to determine emissions estimates. Once the characteristic changes in travel are calculated, the transportation results are fed to the emissions module to create emissions factors based on the county-level data and local assumptions. Final off-network emissions estimate outputs show the changes in VOCs, NO_x, CO and $PM_{2.5}$ in both kg/July-day and tons/July-day for individual projects. Because of their summer settings, however, PAQ-ONE and NJAQ-ONE outputs are not suitable for winter analyses.

EMISSIONS ESTIMATION

The calculated travel impact changes from the travel simulation process are passed through the post-processor routine and are prepared for an emissions estimate model.

In demonstrating conformity, use of the newest version of the MOBILE emissions estimate model is required under the *Final Rule*. MOBILE6.2 is the latest version of the family of MOBILE mobile-source emissions estimate models developed by US EPA and reflects many cumulative technological enhancements, emissions control updates and trend shifts introduced since 1996. These changes include expanded vehicle type categories and state inspection and maintenance program specification options; more detailed vehicle activity information and fuel program definition; and revised base emissions rates.

Taking advantage of these updated changes, the input parameters to the MOBILE6.2 model specify best available local data to accurately reflect the local conditions. Local temperature and humidity

data are particularly important, because MOBILE6.2 relies on these values to estimate A/C usage. Other settings accept the US EPA's default values, which represent "the worst-case conditions." Collectively, these local and default settings generate dependable regional emissions estimates suitable for demonstrating transportation conformity in the DVRPC region. As for specific parameter values, inputs for individual pollutants can and will vary.

As noted earlier, both PAQ-ONE and NJAQ-ONE also contain independent MOBILE6.2 modules to determine emissions estimates. Final off-network emissions estimate outputs from these off-network tools show the daily changes in VOCs, NO$_x$, CO and PM$_{2.5}$ for the project sets included in the *TIPs* and the *Plan*.

FINDINGS

The DVRPC *TIPs* and the *Plan* are found to be in conformity with the current Pennsylvania and New Jersey *SIPs* under the CAA. The forecasted emissions levels of VOCs, NO$_x$, CO and PM$_{2.5}$ do not exceed the respective budgets and baseline established by state departments of environmental protection (state DEPs) in accordance with the *Final Rule* under the current NAAQS governing applicable pollutants. The transportation conformity analysis meets all applicable conformity criteria including, but not limited to, the following:

- that the *Plan* and the *TIPs* are fiscally constrained [40 CFR 93.108];
- that this determination is based on the latest planning assumptions [40 CFR 93.110];
- that this determination is based on the latest emissions estimation model available [40 CFR 93.111];
- that DVRPC has made the determination according to the applicable consultation procedures [40 CFR 93.112];
- that the *Plan* and the *TIPs* do not interfere with the timely implementation of TCMs [40 CFR 93.113]; and
- that the *Plan* and the *TIPs* are consistent with the motor vehicle emissions budgets in the applicable implementation plans [40 CFR 93.118].

Table E-1. VOCs Emission Analysis Results (Tons/July Day) †

	2005	2010	2020	2030
	SIP MVEB	Estimated	Estimated	Estimated
PA	79.69	51.42	24.56	22.01
NJ	42.99	21.18	12.03	11.30

Source: DVRPC, 2007

Note: † The 1-hour ozone *SIP* MVEB applies to all future analysis years. All emissions are rounded off to the nearest hundredth. Off-network adjustments have been made.

Table E-2. NOx Emission Analysis Results (Tons/July Day) †

	2005	2010	2020	2030
	SIP MVEB	Estimated	Estimated	Estimated
PA	**144.73**	82.13	26.53	16.20
NJ	**63.44**	44.79	12.97	8.52

Source: DVRPC, 2007

Note: † The 1-hour ozone *SIP* MVEB applies to all future analysis years. All emissions are rounded off to the nearest hundredth. Off-network adjustments have been made.

Table E-3. CO Emission Analysis Results (Tons/January Day) †

	2007	2010	2013		2017		2020	2030
	SIP MVEB	Estimated	*SIP* MVEB	Estimated	*SIP* MVEB	Estimated	Estimated	Estimated
Philadelphia	**331.25**	236.74	**278.23**	207.25	**260.97**	185.15	177.77	171.63

Source: DVRPC, 2007

Note: † All CO budgets are based on MOBILE6.2. All emissions are rounded off to the nearest hundredth.

Table E-4. Direct PM2.5 and NOx Emission Analysis Results (Tons/Year) †

		2002 Baseline	2009 *SIP* MVEB »	Estimated	2010 Estimated	2020 Estimated	2030 Estimated
Direct PM₂.₅	**PA**	998.2	-	-	596.0	423.7	413.6
	NJ; except Mercer ‡	486.7	-	-	263.7	183.1	176.4
	DE (WILMAPCO) §	208.6	-	-	97.8	89.3	96.6
	Mercer only »	-	89	86	80	55	54
PM₂.₅ Precursor (NOₓ)	**PA**	59,346.0	-	-	29,293.9	9,263.1	5,561.1
	NJ; except Mercer ‡	30,499.9	-	-	12,050.3	3,484.3	2,298.4
	DE (WILMAPCO) §	11799.1	-	-	4,687.0	1,805.0	1,507.0
	Mercer only »	-	4,328	4,072	3,645	1,048	697

Source: DVRPC, 2007

Note: † Associated 2002 Baseline or 2009 MVEBs apply to all future analysis years. All emissions are rounded off to the nearest tenth except for those in Mercer. See note on » below.
   ‡ Results are for Burlington, Camden and Gloucester Counties only, which are the New Jersey portion of the Philadelphia-Wilmington, PA-NJ-DE PM₂.₅ Non-attainment Area.
   § Results are for New Castle County in Delaware only, and are provided by WILMAPCO. It is the Delaware portion of the Philadelphia-Wilmington, PA-NJ-DE PM₂.₅ Non-attainment Area.
   » NJ *SIP* MVEBs and the emissions results are for Mercer County only, which is the DVRPC portion of the New York-Northern New Jersey-Long Island, NJ-NJ-CT PM₂.₅ Non-attainment Area. Emissions results are rounded off to the nearest integer in accordance with the *SIP*.

Therefore, hereby demonstrated is transportation conformity of:

▷   the DVRPC *DESTINATION 2030* Long Range Plan;

▷   the FY 2007 Pennsylvania *TIP*; and

▷   the FY 2008 New Jersey *TIP*

with the corresponding state *SIPs* and the *Final Rule* requirements under CAA including:

•   the 8-hour ozone NAAQS in the DVRPC portion of the Philadelphia-Wilmington-Atlantic City Ozone Non-attainment Area;

- the 8-hour CO NAAQS in the Philadelphia CO Maintenance Area, in the City of Burlington in Burlington County, NJ and in the City of Trenton in Mercer County, NJ;
- the $PM_{2.5}$ NAAQS in the Philadelphia-Wilmington, PA-NJ-DE $PM_{2.5}$ Non-attainment Area; and
- the $PM_{2.5}$ NAAQS in the DVRPC portion of the New York-Northern New Jersey-Long Island, NY-NJ-CT $PM_{2.5}$ Non-attainment Area.

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