

# Chapter 15 - Air Quality Conformity

## Background

This Chapter documents the results of the transportation conformity analysis in the Richmond, Virginia 8-hour ozone maintenance area for the Richmond Area Metropolitan Planning Organization (RAMPO) *2031 Long-Range Transportation Plan (LRTP)*. The Richmond 8-hour ozone maintenance area includes the counties of Hanover, Henrico, Chesterfield, Charles City and Prince George, along with the cities of Richmond, Petersburg, Colonial Heights and Hopewell, and the town of Ashland (see Map 2-1 in Chapter 2).

The two MPOs, Richmond and Tri-Cities, along with the Virginia Department of Transportation (VDOT) are responsible for developing conformity demonstrations for transportation plans and programs within this area. For information and background on the air quality attainment status of Richmond area, see Chapter 2 and the discussion of the Clean Air Act amendments.

Ground-level ozone is formed when two sets of pollutants, nitrogen oxides (NO<sub>x</sub>) and volatile organic compounds (VOC), react photo-chemically in the presence of heat and sunlight. Ground-level ozone is a major component of smog, and can damage lung tissue, aggravate respiratory disease, and make people more susceptible to respiratory infections. Vehicle emissions are one of the major contributors of these ozone precursors.

As a result of Richmond area's maintenance status (effective as of June, 2007), the MPO and VDOT must demonstrate that the area's transportation-related NO<sub>x</sub> and VOC emissions fall below the motor vehicle emissions budgets in the state implementation plan (SIP). The SIP establishes emissions budgets for various source categories, including stationary, area-wide, and mobile sources. Projected emissions levels for the LRTP must be within this established mobile budget in order to be in conformance with the SIP. Once the budget tests are satisfied and attainment can be demonstrated, the region is said to "conform" to the SIP.

The approved mobile source emissions budget for the Richmond 8-hour ozone maintenance area is shown in Figure 15-1 below.

*Figure 15-1 Motor Vehicle Emissions Budgets  
for the Richmond, Virginia 8-Hour Ozone Maintenance Area*

Budget Year	VOC (tons/day)	NO <sub>x</sub> (tons/day)
2011	32.343	43.661
2018	23.845	26.827

## Model Methodology and Procedures

The EPA promulgated a final rule establishing “criteria and procedures for determining conformity to state and federal implementation plans of transportation plans, programs, and projects funded or approved under Title 23 U.S.C. or the Federal Transit Act.” This rule (40 CFR Part 51, Subpart T) was developed to implement section 176(c) of the Clean Air Act (CAA), as amended, which requires that federal agencies and MPOs not approve any transportation project, program, or plan that does not conform with an approved State Implementation Plan (SIP).

The Transportation Conformity Rule identifies the following criteria and procedures that apply to transportation conformity determinations:

- Conformity determinations must be based upon the latest planning assumptions in force at the time of the determination.
- The LRTP must be fiscally-constrained.
- The latest emissions model must be used for the conformity analysis.
- The conformity determination must be made in accordance with the consultation procedures outlined in the Rule. These procedures include (1) providing reasonable opportunity for consultation with state agencies, local air quality and transportation agencies, DOT and EPA and (2) establishing a proactive public involvement process that provides an opportunity for public review and comment prior to taking formal action on a conformity determination.
- The steps necessary to demonstrate that the LRTP provides for timely implementation of transportation control measures (TCMs) and is not interfering with this implementation is detailed.
- A currently conforming LRTP and currently conforming TIP is required at the time of project approval.
- Each project must come from a conforming transportation plan and program.
- The LRTP and TIP must be consistent with the motor vehicle emissions budget in the applicable SIP.
- All regionally significant projects included in the LRTP or TIP must be included in the regional emissions analysis.
- Certain types of projects (i.e., safety, transit, and intersection improvements) that do not have adverse emission impacts are allowed to be exempt from being included in the regional emissions analysis and can proceed forward in the absence of a conforming LRTP or TIP.

Demonstrating conformity requires estimating the region-wide emissions for VOC and NO<sub>x</sub> from motor vehicle activity on the forecasted transportation system in various analysis years. To accomplish this, the transportation network as identified in the Richmond and Tri-Cities LRTPs (with proposed projects constructed and in place in future years) are analyzed to simulate travel patterns and estimate future transportation system demand. Emissions resulting from the vehicle activity on the network are calculated and compared to the motor vehicle emissions budgets in the SIP. A determination of conformity can be made when the emissions levels resulting from the proposed projects contained in the LRTP are equal to or less than the appropriate budget.

The conformity analysis uses a traditional 4-step transportation demand model, an emissions factor model, and post-processing software to estimate total regional emissions for the study area network. Emission rates for the vehicle fleet were prepared using MOBILE 6.2, EPA’s latest approved emissions factor model. These rates were then applied to the estimated vehicle-miles-traveled (VMT) from Cube/Voyager, the Richmond area travel demand forecasting model, to compute the daily emissions totals from the modeled network. These emission totals were added to emissions calculated “off-line” (outside of the travel demand model) for collector and local roads, since these roadways are not typically part of a modeled network. The total daily emissions computed were used to perform the emission tests required for a demonstration of conformity.

The models, processors, and analysis methods used to demonstrate conformity are discussed in detail in VDOT’s technical report titled *Richmond, Virginia 8-Hour Ozone Maintenance Area, Transportation Conformity Analysis for the 2031 Long-Range Transportation Plan*.

## Emission Budget Estimates

The Build scenario emissions for each analysis year must be less than the VOC and NO<sub>x</sub> emissions budgets established in the Maintenance SIP. Figure 15-2 provides a summary of the emissions budgets test for the 2031 LRTP for the Richmond 8-hour ozone maintenance area. The table includes VOC and NO<sub>x</sub> comparisons between 2011 Build emissions and the 2011 emissions budget, between 2018 Build emissions and the 2018 emissions budget, between 2021 Build emissions and the 2018 emissions budget, and between 2031 Build emissions and the 2018 emissions budget.

**Figure 15-2 Emission Levels and Conformity Tests for the 2031 LRTP**

	VOC	NO <sub>x</sub>
Emission Test	(tons/day)	(tons/day)
2011 Build / 2011 Emissions Budget	26.371 / 32.343	36.413 / 43.661
2018 Build / 2018 Emissions Budget	18.332 / 23.845	19.990 / 26.827
2021 Build / 2018 Emissions Budget	16.477 / 23.845	17.460 / 26.827
2031 Build / 2018 Emissions Budget	16.364 / 23.845	15.279 / 26.827

As Figure 15-2 shows, the 2031 LRTPs for the Richmond and Tri-Cities areas meet the requirements of the motor vehicle emissions budgets tests for both VOC and NO<sub>x</sub>. Based on these results, the Richmond 2031 LRTP is found to be in conformity with the 8-hour ozone maintenance SIP. As seen in this plan, a balanced, multimodal transportation system provides the best means for reducing harmful mobile emissions and meeting air quality conformity requirements.