A. INTRODUCTION AND METHODOLOGY

This chapter assesses the potential long-term impacts on ambient air quality due to operation of the project alternatives. Potential short-term air quality impacts from construction of the project alternatives are discussed in Chapter 6, "Construction Impacts."

The project build alternatives would provide additional capacity for Amtrak and NJ TRANSIT trains to cross the Hackensack River and generally lead to improved operations along the Northeast Corridor from Swift Interlocking to Secaucus Transfer Station. These improvements in service and reliability would lead to potential increases in ridership which would, in turn, beneficially affect both regional and local air quality. The Portal Bridge project wouldn't lead to an increased number of trains into NYC during the peak hour. Therefore, the project's effects on air quality would not be measurable and subsequently no detailed analysis is presented in this chapter. Potential air quality effects of the Portal Bridge project in concert with the service increases proposed by the Access to the Region's Core (ARC) project are discussed in Chapter 7, "Secondary and Cumulative Effects."

This chapter discusses the regulatory context for air quality analysis and includes a description of the methodology used in the cumulative effects analysis. This chapter also presents a discussion of the existing air quality conditions in the study area, as well as in the vicinity of New York Pennsylvania Station (PSNY) in Manhattan.

POLLUTANTS FOR ANALYSIS

Ambient air quality is affected by air pollutants produced by motor vehicles and stationary sources. Emissions from motor vehicles are referred to as mobile source emissions, while emissions from fixed facilities are referred to as stationary source emissions. Ambient concentrations of carbon monoxide (CO) are predominantly influenced by mobile source emissions. Particulate matter (PM), volatile organic compounds (VOCs), and nitrogen oxides (NO and NO_2, collectively referred to as NO_x) are emitted from both mobile and stationary sources. Fine PM is also formed when emissions of NO_x, sulfur oxides (SO_x), ammonia, organic compounds, and other gases react or condense in the atmosphere. Emissions of sulfur dioxide (SO_2) are associated mainly with stationary sources, as well as sources utilizing non-road diesel fuel, such as diesel trains, marine engines, and non-road vehicles (e.g., construction engines). On-road diesel vehicles currently contribute very little to SO_2 emissions since the sulfur content of on-road diesel fuel, which is federally regulated, is extremely low. Ozone is formed in the atmosphere by complex photochemical processes that include NO_x and VOCs, emitted mainly from industrial processes and mobile sources.

CARBON MONOXIDE

CO, a colorless and odorless gas, is produced in the urban environment primarily by the incomplete combustion of gasoline and other fossil fuels. In urban areas, approximately 80 to 90 percent of CO emissions are from motor vehicles. Since CO is a reactive gas, which does not persist in the atmosphere, CO concentrations can vary greatly over relatively short distances; elevated concentrations are usually limited to locations near crowded intersections, heavily traveled and congested roadways, parking lots, and garages. Consequently, CO concentrations must be predicted on a local, or microscale, basis.

NITROGEN OXIDES, VOLATILE ORGANIC COMPOUNDS, AND OZONE

Nitrogen oxides (NO_x) are emitted from both mobile and stationary sources primarily as a result of the combustion of fossil fuels. Volatile organic compounds (VOCs) include a wide range of organic compounds emitted principally from solvents, coatings, petroleum production and distribution, and combustion of fossil fuels. NO_x and VOC emissions are of principal concern because of their role as precursors in the formation of ozone. Ozone is formed through a series of reactions that take place in the atmosphere in the presence of sunlight. Because the reactions are slow and occur as the pollutants are advected downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. The effects of NO_x and VOC emissions from all sources are, therefore, generally examined on a regional basis.

LEAD

Airborne lead emissions are principally associated with industrial sources and motor vehicles that use gasoline containing lead additives. Most U.S. vehicles produced since 1975, and all produced after 1980, are designed to use unleaded fuel. As these newer vehicles have replaced the older ones, motor vehicle-related lead emissions have decreased. As a result, ambient concentrations of lead have declined significantly. Nationally, the average measured atmospheric lead level in 1985 was only about one quarter the level in 1975. In 1985, the United States Environmental Protection Agency (USEPA) announced new rules that drastically reduced the amount of lead permitted in leaded gasoline. The maximum allowable lead level in leaded gasoline was reduced from the previous limit of 1.1 to 0.5 grams per gallon effective July 1, 1985, and to 0.1 grams per gallon effective January 1, 1986.

RESPIRABLE PARTICULATE MATTER—PM_{10} AND $PM_{2.5}$

PM is a class of air pollutants that includes discrete particles of a range of sizes and chemical compositions, as either liquid droplets (aerosols) or solids suspended in the atmosphere. PM is emitted from a variety of sources (both natural and anthropogenic). Major anthropogenic sources include the combustion of fossil fuels (e.g., vehicular exhaust, power generation, boilers, engines, and home heating); chemical and manufacturing processes, construction and agricultural activities, as well as wood-burning stoves and fireplaces.

PM is regulated in two size categories: particles with an aerodynamic diameter of less than or equal to 2.5 micrometers, or $PM_{2.5}$; and particles with an aerodynamic diameter of less than or equal to 10 micrometers, or PM_{10}, which includes the smaller $PM_{2.5}$. $PM_{2.5}$ has the ability to reach the lower regions of the respiratory tract, delivering with it other compounds that adsorb to the surfaces of the particles; it is also extremely persistent in the atmosphere. Diesel-powered vehicles are a significant source of respirable PM, most of which is $PM_{2.5,}$ PM concentrations

may, consequently, be locally elevated near roadways with high volumes of heavy diesel powered vehicles.

SULFUR DIOXIDE

SO_2 emissions are primarily associated with the combustion of sulfur-containing fuels: oil and coal. Due to the federal restrictions on the sulfur content in diesel fuel for on-road vehicles, no significant quantities are emitted from vehicular sources. Vehicular sources of SO_2 are not significant and, therefore, an analysis of SO_2 is typically only performed for large stationary sources (e.g., coal-fired power generating facility).

REGULATORY CONTEXT

NATIONAL AND STATE AIR QUALITY STANDARDS

As required by the Clean Air Act, primary and secondary National Ambient Air Quality Standards (NAAQS) have been established for six major air pollutants: CO, NO_2, ozone, respirable PM (both $PM_{2.5}$ and PM_{10}), SO_2, and lead. The primary standards represent levels that are requisite to protect the public health, allowing an adequate margin of safety. The secondary standards are intended to protect the nation's welfare, and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the environment. The primary and secondary standards are the same for NO_2, ozone, lead, and PM, and there is no secondary standard for CO. USEPA revised the NAAQS for PM, effective December 18, 2006. The revision included lowering the level of the 24-hour $PM_{2.5}$ standard from the former level of 65 micrograms per cubic meter ($\mu g/m^3$) to 35 $\mu g/m^3$ and retaining the level of the annual standard at 15 $\mu g/m^3$. The PM_{10} 24-hour average standard was retained and the annual average PM_{10} standard was revoked.

The NAAQS are presented in Table 5.4-1. The NAAQS for CO, NO_2, and SO_2 standards have also been adopted as the ambient air quality standards for New Jersey State and New York State, but are defined on a running 12-month basis rather than for calendar years only. New York and New Jersey also have standards for total suspended particulate matter (TSP) and ozone that correspond to federal standards which have since been revoked or replaced. In addition, New York State has standards for settleable particles (dustfall), non-methane hydrocarbons (NMHC), beryllium, fluorides, and hydrogen sulfide (H_2S).

LOCAL AIR QUALITY REQUIREMENTS

No local air quality impact thresholds have been established for New Jersey and therefore a significant impact would occur if the project would cause a violation of NAAQS, worsen an existing violation, or delay timely attainment of NAAQS.

- In addition to federal and New York State standards described previously, under New York City Environmental Quality Review (CEQR) guidelines, incremental impact criteria, known as *de minimis* criteria, have been established to define the impact significance of estimated incremental increases in CO concentrations. These criteria set the minimum change in CO or $PM_{2.5}$ concentrations that define a significant environmental impact. These criteria have been applied to the cumulative impact analysis presented in Chapter 7, "Secondary and Cumulative Effects."

Table 5.4-1
National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary		Secondary	
	ppm	$\mu g/m^3$	ppm	$\mu g/m^3$
Carbon Monoxide (CO)				
8-hour Average [1]	9	10,000	None	
1-hour Average [1]	35	40,000		
Lead				
3-month Average	NA	1.5	NA	1.5
Nitrogen Dioxide (NO_2)				
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-hour Average [2]	0.08	160	0.08	160
Respirable Particulate Matter (PM_{10})				
Average of 3 Annual Means— revoked, effective December 18, 2006	NA	50	NA	50
24-hour Average [1]	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Average of 3 Annual Means	NA	15	NA	15
24-hour Average [3,4]	NA	35	NA	35
Sulfur Dioxide (SO_2)				
Annual Arithmetic Mean	0.03	80	NA	NA
Maximum 24-hour Average [1]	0.14	365	NA	NA
Maximum 3-hour Average [1]	NA	NA	0.50	1,300

Notes: ppm—parts per million
µg/m3—micrograms per cubic meter
NA—not applicable

All annual periods refer to calendar year.

PM concentrations (including lead) are in $\mu g/m^3$ since ppm is a measure for gas concentrations. Concentrations of all gaseous pollutants are defined in ppm and approximately equivalent concentrations in $\mu g/m^3$ are presented.

[1] Not to be exceeded more than once a year.
[2] 3-year average of the annual fourth highest daily maximum 8-hr average concentration.
[3] Not to be exceeded by the annual 98th percentile when averaged over 3 years.
[4] USEPA has reduced these standards down from 65 $\mu g/m^3$, effective December 18, 2006.

Source: 40 C.F.R. Part 50: National Primary and Secondary Ambient Air Quality Standards.

NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLANS

As amended in 1990, the Clean Air Act (CAA) defines non-attainment areas (NAA) as geographic regions that have been designated as not meeting one or more of the NAAQS. When an area is designated as non-attainment by USEPA, the state is required to develop and implement a State Implementation Plan (SIP), which delineates how a state plans to achieve air quality that meets the NAAQS under the deadlines established by the CAA.

The project area falls within areas that are designated as non-attainment for ozone and $PM_{2.5}$, and maintenance for CO. The New Jersey Department of Environmental Protection (NJDEP) announced a proposal to revise the ozone SIP to demonstrate that its two multi-state 8-hour ozone nonattainment areas (associated with the New York City and Philadelphia metropolitan areas) will attain the 8-hour ozone NAAQS by their mandatory attainment date of June 15, 2010.

In 2006, USEPA lowered the NAAQS for 24-hour $PM_{2.5}$ from 65 µg/m^3 to 35 µg/m^3. Each state is required to make recommendations to USEPA for designating nonattainment areas for the 24-hour standard. If NJDEP recommendations are adopted by USEPA, Hudson County, which is currently designated as an annual $PM_{2.5}$ nonattainment area would also be designated nonattainment for the 24-hour $PM_{2.5}$ standard. Final USEPA designations are expected by December 18, 2008.

GENERAL CONFORMITY

In November 1993, EPA promulgated the General Conformity Regulations to prohibit Federal entities from taking actions that do not conform to the State Implementation Plans(s) (SIPs) for attainment and maintenance of the national ambient air quality standards (NAAQS). Federal actions with FRA as the lead agency are subject to the General Conformity Rule, pursuant to 40 C.F.R. 51.850-51.860. A conformity determination is needed for each pollutant of concern in the non-attainment or maintenance area affected by a federal action. It is assumed that actions resulting in emissions of pollutants of concern less than established (*de minimis*) screening criteria emissions rates would conform to SIPs. Conforming actions would not:

(i) Cause or contribute to any new violation of any standard in any area;

(ii) Interfere with provisions in the applicable SIP for maintenance of any standard;

(iii) Increase the frequency or severity of any existing violation of any standard in any area; or

(iv) Delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

As an FRA action, the Portal Bridge project must conform to the purpose of State Implementation Plans for ozone, $PM_{2.5}$, and CO to meet and maintain the NAAQS in New Jersey and multi-state nonattainment and maintenance areas. The applicable *de minimis* threshold for each pollutant or its precursor is 100 tons per year with the exception of volatile organic compounds, for which the threshold is 50 tons per year since Hudson County is within an ozone transport zone. The Portal Bridge project would not exceed these *de minimis* thresholds for any criteria pollutant either during construction or operation of the project. By directly and indirectly contributing to an increase in public transportation ridership, the Portal Bridge project would actually result in a net long-term emission decrease in emissions and overall benefits to regional air quality. On a short-term basis, during project construction it is estimated that annual emission burdens of particulate matter and VOC's would be less than one ton per year and emissions of nitrogen oxides (NO_x) would be approximately 15 tons per year.

B. EXISTING CONDITIONS

EXISTING MONITORED AIR QUALITY CONDITIONS

NEW JERSEY

Air quality data were compiled using NJDEP and USEPA AirData databases for 2005, the latest calendar year for which these data are available. Representative sites at which these data were monitored within or near the New Jersey portion of the project area are shown in Table 5.4-2.

Table 5.4-2
Most Recent Monitored Ambient Air Quality Data – New Jersey

Pollutant	Location	Averaging Period	Concentration	NAAQS
CO	Jersey City, Hudson County	8-hour	3.0 ppm	9 ppm
		1-hour	5.8 ppm	35 ppm
SO_2	Jersey City, Hudson County	Annual	21 µg/m^3	80 µg/m^3
		24-hour	86 µg/m^3	365 µg/m^3
		3-hour	131 µg/m^3	1,300 µg/m^3
PM_{10}	Jersey City, Hudson County	24-hour	47 µg/m^3	150 µg/m^3
$PM_{2.5}$	Jersey City, Hudson County	Annual	17 µg/m^3	15 µg/m^3
		24-hour[1]	44 µg/m^3	35 µg/m^3
NO_2	Bayonne, Hudson County	Annual	48.9 µg/m^3	100 µg/m^3
Lead	New Brunswick, Middlesex County	3-month	0.12 µg/m^3	1.5 µg/m^3
Ozone	Bayonne, Hudson County	8-hour	0.091 ppm	0.08 ppm

Note:
[1] The most recent monitoring data does not exceed the 2005 standard of 65µg/m^3. However, the concentration does exceed the revised 24-hour $PM_{2.5}$ standard of 35µg/m^3.
Source: NYSDEC, 2004-2005 New York State Ambient Air Quality Data.

With the exception of $PM_{2.5}$ and ozone, monitored levels for the criteria pollutants do not exceed National or State ambient air quality standards in the project area.

NEW YORK

Data compiled by New York State Department of Environmental Conservation (NYSDEC) are presented for 2005, the most recent calendar year for which data are available. Representative sites at which these data were monitored (within or closest to the project study area) are shown in Table 5.4-3. With the exception of $PM_{2.5}$, monitored levels for the criteria pollutants do not exceed National or State ambient air quality standards in the project area.

Table 5.4-3
Most Recent Monitored Ambient Air Quality Data – New York

Pollutant	Location	Averaging Period	Concentration	NAAQS
CO	PS 59, New York County	8-hour	1.6 ppm	9 ppm
		1-hour	2.3 ppm	35 ppm
SO_2	PS 59, New York County	Annual	29 µg/m^3	80 µg/m^3
		24-hour	110 µg/m^3	365 µg/m^3
		3-hour	178 µg/m^3	1,300 µg/m^3
PM_{10}	JHS 126, King County	24-hour[1]	47 µg/m^3	150 µg/m^3
$PM_{2.5}$	PS 59, New York County	Annual	17 µg/m^3	15 µg/m^3
		24-hour[3]	40.1 µg/m^3	35 µg/m^3
NO_2	PS 59, New York County	Annual	68 µg/m^3	100 µg/m^3
Lead	Susan Wagner, Richmond	3-month	0.01 µg/m^3	1.5 µg/m^3
Ozone	IS 52, The Bronx	8-hour	0.077 ppm	0.08 ppm
		1-hour[2]	0.108 ppm	0.12 ppm

Notes:
[1] Ambient monitoring data are not yet available from NYSDEC for 2005. The latest available value was used instead.
[2] The 1-hour ozone NAAQS has been replaced with the 8-hour standard; however, the maximum monitored concentration is provided for informational purposes.
[3] The most recent monitoring data does not exceed the 2005 standard of 65µg/m^3. However, the concentration does exceed the revised 24-hour $PM_{2.5}$ standard of 35µg/m^3.
Source: NYSDEC, 2004-2005 New York State Ambient Air Quality Data.

C. NO ACTION ALTERNATIVE

Section B of Chapter 3, "Project Alternatives," describes several regional transportation projects that are expected to be completed by 2030. In the future without the proposed project, air quality in the region should continue to improve due to the effect of federally mandated emission control programs scheduled to be implemented over the next several years. Many of these programs were part of the 1990 Clean Air Act Amendments or are included as part of each state's SIP to meet the NAAQS. These programs cover a wide range of sources, both mobile and stationary, and will affect emissions of NO_x , SO_2, CO, particulate matter, and volatile organic compounds. However, without the proposed project, the transportation problems associated with the existing Portal Bridge will continue to adversely affect rail service along the Northeast Corridor. Without the proposed enhancements to the bridge and its approaches, the potential air quality benefits associated with improved rail service and diversion from automobile traffic would not be maximized.

D. PROBABLE IMPACTS OF THE BUILD ALTERNATIVES

While all of the build alternatives would result in an increase in capacity over the Hackensack River and greatly improve operations between Swift Interlocking and Secaucus Transfer Station, the project would not increase the number of peak hour trains into PSNY. Therefore, the project would not substantially increase the number of new transit riders and would not measurably reduce vehicle-miles-traveled in the region. As a result there would be no measurable effect on air quality due to the proposed build alternatives. While the proposed improvements would lead to an improvement in service along the Northeast Corridor that could increase passenger travel and reduce auto usage in the region, the air quality benefits would be modest. The Portal Bridge project would, however, allow other projects such as the ARC project to increase the number of trains to NYC, thereby providing substantial regional air quality benefits. These benefits and potential local adverse impacts are discussed in detail in Chapter 7, "Secondary and Cumulative Effects." ✷