5.10 AIR QUALITY

5.10.1 Introduction

This section summarizes the evaluation of potential air emission impacts associated with construction and operation of the Proposed Action. Potential impacts may occur during construction as a result of emissions from construction-related equipment, trucks and other traffic. Additionally, the potential for impacts as a result of emissions directly from South Ferry Terminal operations is discussed.

The analysis of construction impacts of the South Ferry Terminal Project for the 2005/2006 peak construction year adds the increment of the construction-related project emissions to a baseline that includes the construction-related emissions of the other Lower Manhattan Recovery Projects in 2005/2006. As such, the construction impacts analysis in this section presents not only the effects of the project-related construction emissions but also the cumulative effects on air quality of the Lower Manhattan Recovery Projects combined. A broader context of the cumulative effects discussion is presented in Chapter 6: Cumulative Effects, which describes the background of the cumulative effects analysis approach and an overview of the cumulative effects related to noise and vibration, cultural resources, economic interests and access and circulation.

5.10.2 Environmental Performance Commitments

To minimize potential construction impacts, MTA/NYCT will implement Environmental Performance Commitments (EPCs) as part of the South Ferry Terminal Project. These are measures that will be proactively implemented to avoid or reduce potential air quality impacts of the project. These EPCs would be implemented along with MTA/NYCT's *Design for the Environment* (DfE) and *Construction for the Environment* (CfE) guidelines. These guidelines propose the incorporation of energy-saving features in design and the use of ultra-low diesel (ULSD) fuel emission equipment and retrofit technology during construction, coordination protocols, and the implementation of a Construction Environmental Protection Plan (CEPP). EPCs would be implemented within the design, construction , and operation of the South Ferry Terminal Project to proactively reduce potentially adverse effects on air quality through the CEPP. The air quality EPCs include the following:

- Use of ultra-low sulfur diesel (ULSD) fuel in off-road construction equipment with engine horsepower (HP) rating of 60 HP and above.
- Where practicable, usage of diesel engine retrofit technology in off-road equipment to further reduce emissions. Such technology may include diesel oxidation catalyst/diesel particulate filters, engine upgrades, engine replacements, or combinations of these strategies.
- Limit on unnecessary idling times on diesel-powered engines to three minutes.
- Location of diesel-powered exhausts away from fresh air intakes.

- Dust control at construction sites through a soil erosion sediment control plan that includes, among other things:
    - Spraying of a suppressing agent on dust pile (non-hazardous, biodegradable);
    - Containment of fugitive dust; and
    - Adjustment for meteorological conditions as appropriate.

When utilizing ULSD fuel in construction equipment and off-road vehicles, it is anticipated to produce an approximately 10 percent emission reduction in particulate matter (PM). Engine retrofit technologies have been demonstrated to achieve approximately 40 to 50 percent reduction of PM in the case of advanced technologies such as diesel oxidation catalysts and more than 90 percent for diesel particulate filters. Other retrofit technologies are available or are being developed that can provide a similar range of emission reduction for various engine and operational applications. Engine retrofit technologies are generally most effective when the sulfur content in diesel fuel is lowest and when the retrofit technologies are applied to relatively modern engines that are already compliant with the most up-to-date emission standard for such engines, such as the "Tier 2" and "Tier 3" emission standards promulgated by the EPA.

In 1994, EPA adopted the first set of emission standards ("Tier 1") for all non-road diesel engines greater than 50 HP, except those used in locomotives and marine vessels. The Tier 1 standards were phased in for different engine sizes between 1996 and 2000, reducing nitrogen dioxide emissions from these engines by 30 percent. EPA has since adopted more stringent emission standards for nitrogen dioxide, hydrocarbons, and PM from new non-road diesel engines less than 50 HP (phasing in between 1999 and 2000), including marine engines in this size range. EPA also phased in more stringent "Tier 2" emission standards from 2001 to 2006 for all engine sizes and added yet more stringent "Tier 3" standards for engines between 50 and 750 HP from 2006 to 2008. These standards would further reduce non-road diesel engine emissions by 60 percent for nitrogen oxide and 40 percent for PM from Tier 1 emission levels.

Recent developments of advance emission-control technologies led EPA to consider a new round of standards for diesel engines used in construction, agricultural, and industrial operations, with the potential to reduce particulate matter and nitrogen oxide emissions by an additional 90 percent from today's engines by the use of ULSD fuel in non-road engines. These new standards, also referred to as "Tier 4" standards, would begin to be implemented in 2008, and would be fully implemented by 2014. The proposed time frame for implementation of these standards reflects the time needed to develop technologies and make them commercially available.

MTA/NYCT recognizes the substantial advances in engine retrofit technology and the benefit that such technologies could have for reducing construction related emissions in Lower Manhattan. MTA/NYCT will seek to maximize reduction of PM by implementing a policy of using the Best Available Retrofit Technology (BART) and maximizing the benefits of this technology for reducing PM emissions from construction equipment. However, because construction equipment employed at a construction site typically consists of a mix of older and newer engines, the typical mix of construction

equipment is not optimized to take full advantage of the emission reduction that retrofit technologies can provide.

To ensure maximum benefit of emission reduction technologies, MTA/NYCT will implement a policy on its Lower Manhattan Recovery Projects requiring that all diesel powered non-road construction equipment with engine horsepower ratings of 60 HP and above employed on site consist of modern, Tier 2 compliant engines only, and that to further reduce their emissions these engines are retrofitted with the most appropriate retrofit technologies and use ULSD (maximum 15 parts per million of sulfur). The combination of ULSD, the use of only modern Tier 2 compliant engines (rather than a mix of old and modern engines), and the use of the Best Available Retrofit Technology (such as diesel particulate filters) will maximize the emission reduction that can be practicably achieved.

The effects of implementation of the EPCs identified above and MTA/NYCT's policy of using Best Available Retrofit Technology to reduce air emissions have been simulated in three emissions reduction scenarios. These scenarios and the results of their analysis are Presented in Chapter 6: Cumulative Effects.

5.10.3 Pollutants for Analysis

There are a number of air pollutants that are of national, statewide, and regional concern. These pollutants are considered criteria pollutants and are regulated under the National Ambient Air Quality Standards (NAAQS) (see below). These pollutants include:

- Carbon Monoxide (CO);
- Sulfur Dioxide (SO_2);
- Ozone (O_3);
- Lead (Pb);
- Nitrogen Oxides (NO_2);
- Volatile Organic Compounds (VOCs);
- Particulate Matter, (PM); and,
- Fugitive dust from both mobile and stationary sources.

In New York City, ambient concentrations of carbon monoxide, particulate matter, ozone, and lead are predominantly influenced by mobile source emissions; and emissions of nitrogen oxides come from both mobile and stationary sources. Mobile sources include existing non-project related traffic, which includes traffic associated with other Lower Manhattan projects under construction at the same time as the South Ferry Terminal Project, off-site construction equipment and vehicles, and operational traffic, if applicable. Stationary sources include on-site construction equipment and operational sources, such as heating, ventilation, and air conditioning systems (HVAC).

5.10.4 Air Quality Standards

5.10.4.1 National Ambient Air Quality Standards

As required by the Clean Air Act and Amendments of 1990 (CAAA), primary and secondary National Ambient Air Quality Standards (NAAQS) have been established for six major criteria pollutants: carbon monoxide, nitrogen dioxide, ozone, respirable particulate matter, sulfur dioxide, and lead. Table 5-14 shows the standards for these pollutants. These standards have also been adopted as the ambient air quality standards for the State of New York, and include both primary and secondary standards. The primary standards protect the public health, and represent levels at which there are no known noticeable effects on human health. Secondary standards are designed to protect the nation's welfare, and account for air pollutant effects on soil, water, visibility, vegetation and other aspects of the environment. Areas that do not meet the NAAQS are called nonattainment areas; areas that meet both sets of criteria are known as attainment areas (or, for those areas recently determined to be in attainment, maintenance areas).

In 1997, EPA revised the primary NAAQS for particulate matter to include two new $PM_{2.5}$ standards, consisting of both long-term (annual) and short-term (24-hour) components. The annual standard was set at 15 micrograms per cubic meter ($\mu g/m^3$), and the 24-hour standard at $65\mu g/m^3$. These standards were established to meet the statutory dictate of the CAAA that NAAQS be set with a margin of safety adequate to protect human health. As recognized by EPA, the adoption of the $PM_{2.5}$ standard is intended to provide increased protection of public health from emissions caused by fossil fuel combustion, such as that used by construction trucks and stationary equipment.

The implementation of the EPA final revised NAAQS for $PM_{2.5}$ is ongoing in New York State with the validation and review of the requisite ambient air quality monitoring data to establish which areas in the state are in attainment with the new standards. Until the New York State Department of Environmental Conservation (NYSDEC) proposes a State Implementation Plan (SIP) to address compliance with the new $PM_{2.5}$ standards, EPA's Office of Air Quality Planning and Region II has indicated that the states have no further obligations under the CAAA concerning $PM_{2.5}$ To address impacts from $PM_{2.5}$ emissions until such time as NYSDEC adopts a SIP covering $PM_{2.5}$, NYSDEC on December 29, 2003 issued Commissioner's Policy 33 (CP-33) entitled: "*Assessing and Mitigating Impacts of Fine Particulate Matter Emissions*" which became effective on February 13, 2004. The policy provides guidance to NYSDEC staff in the review of an application for a permit or major air permit modification under the State Environmental Quality Review Act (SEQRA). The policy defines certain de minimis thresholds for evaluating the potential for significant adverse impacts resulting from the emission of fine particulate matter. Although this guidance was developed for facility operations and not for the analysis of temporary construction activities, such as the South Ferry Terminal Project construction, this guidance, in absence of other guidance, can be used to provide a context for characterizing $PM_{2.5}$ emissions from construction activities.

If primary PM_{10} emissions from the operation of a project do not equal or exceed 15 tons per year, then the policy considers $PM_{2.5}$ impacts from the project to be insignificant and no further assessment is required. New York State and EPA have not yet determined whether New York City is within attainment of the PM NAAQS. Existing monitoring data indicate that the region is well within the 24-hour PM standard, but the 3-year annual average PM concentrations in New York City range from just below to just above the standard of 15 ug/m^3.

Projects requiring permits that have the potential to emit PM_{10} of 15 tons per year or more during operation require modeling analyses of $PM_{2.5}$ air quality impacts for both stationary and mobile sources attributable to the project. If the maximum $PM_{2.5}$ impacts of the project constitute more than two percent of the annual NAAQS standard of 15 µg/m^3, i.e., 0.3 µg/m^3, or more than five (5) µg/m^3 on a 24-hour basis, operation of the project is considered to have a potentially significant adverse impact.

5.10.4.2 New York State Implementation Plan (SIP)

The CAAA requires each state to submit to the EPA a State Implementation Plan (SIP) for attainment of NAAQS. The National and New York State ambient air quality standards are presented in Table 5-14. The 1977 and 1990 amendments require comprehensive plan revisions for areas where one or more of the standards have yet to be attained. The New York City metropolitan area (NYMA), which includes the Counties of Bronx, Kings, New York, Queens, Richmond, Nassau, and Westchester, has been designated as being in attainment of NAAQS for criteria pollutants sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and lead (Pb). The NYMA was also designated by EPA on November 15, 1990 as severe-17 nonattainment for ozone with required attainment year 2007, and moderate nonattainment for CO[1]. New York County (Manhattan) alone was classified as a PM_{10} moderate nonattainment area on January 20, 1994.

In 1992, NYSDEC, in conjunction with the City of New York, submitted the carbon monoxide SIP with revisions to EPA and obtained final approval. Effective May 20, 2002, the EPA re-designated the entire NYMA, including, New York County, as a CO attainment area with a maintenance plan that provides for continued attainment of the CO NAAQS. The reminder of New York State has been in attainment for CO since 1990.

To improve ozone levels, both New York State and City implemented measures to reduce levels of hydrocarbons and nitrogen oxides in an effort to attain the NAAQS ozone standard. Moreover, the CAAA requires a series of SIP revisions, including air quality control measures for target year emission reductions of ozone precursor emissions (volatile organic compounds and nitrogen oxides), and for an ozone attainment demonstration by 2007. In June 1997, NYSDEC submitted the ozone SIP revision for the entire state, which addressed the status of these requirements. For respirable particulates (PM_{10}), New York State submitted a SIP to EPA in September 1995, which documented

[1] Severe-17 nonattainment for ozone is an area that has a 1-hour ozone level above 0.190 ppm up to 0.280 ppm at time of designation (1990), and has 17 years (year 2007) to attain the standard. Moderate attainment for CO is an area that has a CO level of 9.1 ppm up to 16.4 ppm.

Table 5-14
National and New York State
Ambient Air Quality Standards

Pollutant	Primary	Secondary
Carbon Monoxide (CO) Maximum 1-hour Average[1] Maximum 8-hour Average[1]	35 ppm 9 ppm	
Sulfur Dioxide (SO_2) Maximum 3-hour Average[1] Maximum 24-hour Average[1] Annual Arithmetic Mean	n/a 365 $\mu g/m^3$ 80 $\mu g/m^3$	1300 $\mu g/m^3$ n/a n/a
Respirable Particulates (PM_{10}) Maximum 24-hour[2] Annual Geometric Mean **Respirable Particulates** ($PM_{2.5}$) Maximum 24-hour[3] Annual Geometric Mean	150 $\mu g/m^3$ 50 $\mu g/m^3$ 65 $\mu g/m^3$ 15 $\mu g/m^3$	
Total Suspended Particulate (TSP)[4] Maximum 24-hour Annual Geometric Mean	250 $\mu g/m^3$ 75 $\mu g/m^3$	n/a n/a
Ozone (O_3) 1-hour Average[5] 8-hour Average	0.12 ppm 0.08 ppm	
Nitrogen Dioxide (NO_2) Annual Arithmetic Mean	100 $\mu g/m^3$	
Lead (Pb) Quarterly Average	1.5 $\mu g/m^3$	

Notes:
1 Not to be exceeded more than once a year.
2 Not to be exceeded by 99th percentile of 24-hr PM_{10} concentrations in a year (averaged over 3 years)
3 Not to be exceeded by 99th percentile of 24-hr $PM_{2.5}$ concentrations in a year (averaged over 3 years)
4 TSP standards are regulated by New York standards only.
5 Applied only to areas that were designated nonattainment for ozone in July 1997.

ppm: parts per million; $\mu g/m^3$: micrograms per cubic meter
Annual standards never to be exceeded; short-term standards not to be exceeded more than once per year. Primary standards protect the public health, and represent levels at which there are no known noticeable effects on human health. Secondary standards are designed to protect the environment from any known or anticipated adverse effects of a pollutant, including effects on the natural and man-made environments.
Source: Code of Federal Regulations Title 40, Part 50, July, 1991, Ambient Air Quality Standards; New York State NYCRR Title 6, Environmental Conservation, Part 257, Air Quality Standards.

required control measures and detailed how the State will achieve attainment of the PM standard.

5.10.4.3 Impact Criteria

In addition to the NAAQS, State and local agencies have developed criteria to assess the degree of impacts on air quality. These criteria (known as *de minimis* criteria) set the minimum change in air concentration that defines an environmental impact.

For CO, the New York City de minimis criteria treats an increase of 0.5 ppm or more in the maximum eight-hour average CO concentration, or an increase of more than half the difference between No Action concentrations and eight-hour standard (when No Action concentrations are below eight ppm) at a location, as a potential impact for which mitigation is recommended.

No standards are currently available for assessing the impacts of $PM_{2.5}$ emissions during construction. As indicated previously, NYSDEC Policy CP-33 was developed to assess impacts of long-term, permanent $PM_{2.5}$ emissions associated with the operation of a project and provides guidance to NYSDEC staff to review air permit applications. Policy 33 does not refer to the construction stage of a project, the $PM_{2.5}$ emissions of which are typically short-term and temporary. However as the policy's technical guidance criteria represent the only metric currently available with regard to $PM_{2.5}$ emissions in New York, the CP-33 criteria can be used as a context analysis of $PM_{2.5}$ levels during construction of the South Ferry Terminal Project.

MTA/NYCT is committed to reducing $PM_{2.5}$ emissions. This is consistent with the philosophy of improving environmental sustainability in Lower Manhattan not only as it relates to the construction of the South Ferry Terminal but also to the benefit of Lower Manhattan as a whole and in combination with the other Lower Manhattan Recovery Projects. In this regard, the EPCs and proactive technology improvements discussed earlier in this section, including ULSD, Tier 2 engines, BART, electrification of construction equipment, and dust suppression measures, will reduce emissions of PM_{10}, and thereby also reduce emissions of particulate matter. MTA/NYCT is committed to continue implementing such advanced technologies, where practicable, as it has in the past, such as retrofitting its buses with emission reduction technologies. The continuous improvement mandate that is an intrinsic aspect of MTA/NYCT's ISO 14001 certification also applies to the environmental performance. This provides a framework for implementing emission reduction measures.

An analysis of potential $PM_{2.5}$ incremental emissions of the South Ferry Terminal Project in combination with the incremental $PM_{2.5}$ emissions of the other Lower Manhattan Recovery Projects is presented in Chapter 6: Cumulative Effects.

5.10.4.4 Conformity Rules

The CAAA established the criteria and procedures that FHWA, FTA, and metropolitan planning organizations (MPOs) use to determine the conformity of federally funded or

approved highway and transit plans, programs, and projects to state air quality implementation plans (SIPs). Conformity is intended to ensure that transportation plans, programs, and projects do not produce new air quality violations, or delay timely attainment on NAAQS. All federally supported activities must conform to the implementation plan's purpose of attaining and maintaining these standards.

According to EPA 40 CFR Parts 51 and 93 and Amendments, August 15, 1997, "conformity to a SIP means that transportation projects will not produce new air quality violations, or delay timely attainment for the NAAQS." Under the CAAA Section 93.105 (b), states are required to provide consultation procedures in the implementation plan or interagency consultation groups (ICG) where representatives from "MPOs, State, and local transportation agencies, and other organizations with responsibilities for developing submitting, or implementing provisions of an implementation plan required by the CAAA must consult with each other and with local or regional offices of the EPA, FHWA, and FTA on the development of the implementation plan, the transportation improvement plan (TIP), and associated conformity determinations."

The New York Metropolitan Transportation Council (NYMTC) is the MPO for the City of New York, Nassau, Suffolk, Putnam, Rockland, and Westchester Counties. The conformity requirements of the NYMTC region have been temporarily waived, as a result of the events of September 11, 2001, the loss of NYMTC's files containing regional transportation air quality data, and resources destroyed by acts of terrorism. This waiver expires on September 30, 2005, pursuant to Public Law 107-230 (Stat. 1469) enacted October 1, 2002. Following enactment of the waiver, the New York ICG established procedures to ensure concurrence with the region's air quality goals.

On February 12, 2004, the MTA/NYCT met with the New York ICG and provided supporting documents for the project's conformity status (see Appendix G). On March 3, 2004, the New York ICG notified MTA/NYCT that the project is classified as "exempt" for the purposes of transportation conformity under 40 CFR Part 93.126, "*Reconstruction or renovation of transit buildings and structures*." FTA and the FHWA approved the State TIP on December 22, 2003.

5.10.5 Overview of Analysis Methodology

5.10.5.1 Introduction

The impact analysis methodology includes a modeling approach that has been approved by the EPA for evaluation of air quality impacts of transportation projects in New York City, New York State, and throughout the region and country. This approach is a two-step process. A screening tool known as an air emissions burden analysis is conducted to determine the total volume of mobile and stationary emissions from the project. Second, the emissions quantities are then converted through dispersion analysis to estimate maximum concentration levels at receptor locations. These maximum concentration levels are added to background concentration levels (which include emissions from the other four major Lower Manhattan Recovery Projects), and the total concentration levels are compared to NAAQS thresholds to determine if the South Ferry Terminal Project

would cause air quality impacts.

Mobile source analysis is limited to the analysis of the construction of the South Ferry Terminal Project plus background emissions. During operation, the Terminal would not generate any mobile source emissions, as it would not generate substantial new traffic nor would it induce traffic (see Section 5.9 Transportation and Pedestrian Circulation).

5.10.5.2 Key Laws, Regulations, Guidelines and Models

The key regulations, guidelines and models applicable to the air quality analysis conducted for this project include:

- National Environmental Policy Act (NEPA);
- EPA National Ambient Air Quality Standards (NAAQS);
- Clean Air Act Amendments (CAAA) of 1990 and associated federal conformity rules;
- NYSDEC State Implementation Plan (SIP);
- NYSDEC adverse impact criteria;
- Construction impacts of projects on air quality are assessed in accordance with 40 CFR Part 93, Section 123 (Procedures for determining localized CO and PM_{10} or $PM_{2.5}$ concentrations (hot-spot analysis));
- NYSDOT Environmental Procedures Manual;
- NYCDEP Interim Guidance Criteria and NYSDEC Threshold to Determine Project $PM_{2.5}$ Impact;
- NYCDEP Report #34, Mobile Source Emission Inventory for New York City;
- EPA NONROAD model for construction equipment;
- EPA AP-42 Emission Inventory (for fugitive dust emissions);
- ISC (Industrial Source Complex) Model for stationary source impact analysis;
- CAL3QHC or CAL3QHCR, as appropriate, for mobile source emissions dispersion; and
- MOBILE6.2 for CO and $PM_{2.5}$ analysis.

5.10.5.3 Data Sources

The data utilized for the analysis include:

- Existing air quality data collected from NYSDEC, EPA, and NYCDEP.
- Project information, including the proposed construction schedule and details of plan, construction equipment list (heavy equipment and trucking), and anticipated locations of staging and lay down areas.
- Data regarding other ongoing and proposed future projects in the area from sponsors of those projects, including such information as project descriptions, design and engineering plans, schedules, environmental issues and construction management plans.
- Traffic survey data, studies and information from the MTA/NYCT project team, PANYNJ, NYSDOT, NYCDOT, and other agencies.

- New York City survey data of Vehicle Miles Traveled (VMT) during various time periods (daytime and nighttime) and vehicle distribution from NYCDEP Report #34 (SRR 81-0723-29) "Mobile Source Emissions Inventory."
- Stationary source data, including information regarding the South Ferry Station air tempering system plans.

5.10.5.4 Analysis Approach

The study of air quality impacts from the South Ferry Terminal Project focuses on the following categories of impact:

- Effects of the project on CO concentrations due to potential changes or diversions in traffic;
- Potential effects on regional emissions of CO, VOC, and NO_2 associated with the project, most notably associated with potential changes in vehicular travel patterns in the study area attributable to the project;
- Air quality impacts associated with the use of heavy-duty diesel vehicles or equipment, and traffic diversions during the construction period. Potential air pollutants that could be generated during construction include PM and fugitive dust emissions from deconstruction and construction activities, and mobile source CO and PM emissions generated by traffic; and,
- Operational stationary emission sources associated with air tempering systems.

Coordination activities involved in the development of this methodology included the establishment of interagency working groups that focused on the sharing of project data and analysis results to support the development of a consistent approach to air quality analysis that would be applied to other Lower Manhattan projects undertaken in the future and sharing available data and analysis results.

Several air quality models were utilized in the analyses, including the EPA-developed NONROAD model and the AP-42 Emission Factor Inventory for construction equipment; MOBILE6.2 Models for CO and PM emissions analyses; ISC (Industrial Source Complex) model for off-road and stationary sources impact analysis; and CAL3QHC or CAL3QHCR, as appropriate, for mobile source emissions dispersion analysis. Construction emissions and air quality impacts resulting from on-site construction activities, off-site (on-road) trucking movements, traffic diversion, construction management, equipment utilization, and contractor's activities were evaluated based on the assumed construction methods and activities described in Chapter 4: Construction Methods and Activities and detailed in Appendix F.

The combined impact concentrations resulting from all on-road, off-road (on-site) mobile sources, and stationary sources, as predicted by CAL3QHC or CAL3QHCR and ISCST3, respectively, were further determined by totaling the results from these models at each individual receptor location for various pollutants. A conservative estimate was calculated by adding the maximum background values to these predicted impact

concentrations to obtain the total concentrations for each criteria pollutant and compare to the NAAQS thresholds.

5.10.6 Existing Conditions

The baseline air quality conditions for the affected environment within the study area were evaluated under the pre-9/11 Reference Condition (see Chapter 2: Analysis Framework) and also under current conditions. The air analyses included:

- Review and evaluation of existing ambient air quality data, including criteria pollutants and hazardous chemicals that are monitored by NYSDEC, NYSDEP, and EPA for the study area. In May 2002, the EPA redesignated the NYMA as a CO attainment area with a maintenance plan after a three-year period of review. This action confirms that City, State, and Federal agencies determined that CO levels under pre-9/11 conditions to be in attainment with the NAAQS.
- Selection of sites for air quality emission and impact analysis based on a screening analysis of traffic and construction conditions. The selection of sites is based on those locations most likely to be affected by project construction activities, based on existing traffic congestion levels. At each analyzed site, a series of multiple receptor sites were analyzed in accordance with Federal and State guidelines.

The study area is defined as an approximate 1 kilometer (km) x 1 km grid around the site, or locations within a distance of 500 meters or 0.3 mile from the project site. This area is considered the area that could potentially be affected by project-related air quality impacts, and is described as Wall Street to the north, the Battery Maritime Building to the south, the west end of Battery Park to the west, and FDR Drive to the east. Receptor sites within this study area include sites that are within public access areas (parks), as well as sites close to construction work zones where project impacts are predicted to occur.

5.10.6.1 New York State Monitoring Data

Several environmental agencies and authorities have monitored ambient air quality in Lower Manhattan for many years. Existing air quality in the study area, performed by NYSDEC, has been published in annual reports such as the *New York State Air Quality Report, Ambient Air Monitoring System.* Representative monitored concentrations for the study area are shown in Table 5-15 and Table 5-16 for 2001 (pre-9/11) and 2003 (existing) conditions, respectively. As shown, the carbon monoxide, sulfur dioxide, nitrogen dioxide and lead concentrations are well below (within) the standards, and no monitored data exceeded the NAAQS. Ozone concentrations exceeded the 1-hour and 8-hour standards in 2001 and 2003, thereby classifying the NYMA as an ozone nonattainment area. The PM_{10} levels measured in the study area were below (within) the NAAQS, while monitored $PM_{2.5}$ concentrations exceeded the annual standard in both 2001 and 2003. However, both $PM_{2.5}$ levels (measured at Canal Street) and PM_{10} levels (measured at Albany and West Streets), show dramatic decreases in ambient concentrations from 2001 to 2003.

5.10.6.2 Post 9/11 Monitoring Data

In addition to the New York State Monitoring System, ambient air quality conditions in Lower Manhattan and areas near to the WTC site continue to be monitored by the EPA and the City of New York on a daily basis to observe and document air pollutant levels in the local area since September 11, 2001. The EPA monitoring program includes asbestos, VOC, PM_{10}, $PM_{2.5}$, dust, PCB, lead, and airborne metals. NYCDEP is also continuing to monitor the ambient outdoor air for asbestos. The monitoring program indicates that the EPA and NYCDEP monitored air and occupational health levels are not detectable or below the relevant standards. The South Ferry Terminal Project and the other Lower Manhattan Recovery Projects are not expected to generate appreciable air toxics except those associated with the burning of diesel fuel, demolition, dust, and particulate matter As described previously, MTA/NYCT is committed to the implementation of EPCs to address air toxic concerns associated with these pollutants.

Table 5-15
Representative Monitored Ambient Air Quality Data (2001)

	NYSDEC 2001 Monitored Data			
Pollutant	**Monitoring Station**	**NAAQS**	**Period**	**1st/2nd Highest**
Carbon Monoxide (CO)	Post Office 350 Canal Street (New York County)	35 ppm 9 ppm	1-hour 8-hour	4.8 / 4.4 ppm 3.7 / 3.0 ppm
Particulates ($PM_{2.5}$)	Post Office 350 Canal Street (New York County)	65 $\mu g/m^3$ 15 $\mu g/m^3$	24-hour Annual	52 $\mu g/m^3$ 18.0 $\mu g/m^3$
Particulates (PM_{10})	Albany Street at West Street (New York County)	150$\mu g/m^3$ 50$\mu g/m^3$	24-hour Annual	80 / 67 $\mu g/m^3$ 30.0 $\mu g/m^3$
Ozone (O_3)	Susan Wagner H.S. Brielle Ave & Manor Road (Richmond County)	0.12 ppm 0.08 ppm	1-hour 8-hour	0.133 / 0.127 ppm 0.097 ppm
Nitrogen Dioxide (NO_2)	Mabel Dean High School 240 2nd Avenue (New York County)	100 $\mu g/m^3$	Annual Average	76 $\mu g/m^3$
Lead (Pb) Quarterly Average	Susan Wagner H.S. Brielle Ave & Manor Road (Richmond County)	1.5 $\mu g/m^3$	Quarterly Average	0.02 $\mu g/m^3$
Sulfur Dioxide (SO_2)	Mabel Dean High School 240 2nd Avenue (New York County)	1300$\mu g/m^3$ 365$\mu g/m^3$ 80$\mu g/m^3$	3-hour 24-hour Annual	166.4 / 166.4 $\mu g/m^3$ 119.7 / 117.0 $\mu g/m^3$ 36.4 $\mu g/m^3$

ppm = parts per million
$\mu g/m^3$ = micrograms per cubic meter
Source: New York State Air Quality Report, Ambient Air Monitoring Systems, 2001 Annual Report and USEPA, AirData Web Site, Monitor Value Report.

Table 5-16
Representative Monitored Ambient Air Quality Data (2003)

Pollutant	NYSDEC 2003 Monitored Data			
	Monitoring Station	NAAQS	Period	1st/2nd Highest
Carbon Monoxide (CO)	PS 59 288 E. 57th Street (New York County)	35 ppm 9 ppm	1-hour 8-hour	4.6 / 4.0 ppm 2.6 / 2.5 ppm
Particulates ($PM_{2.5}$)	Post Office 350 Canal Street (New York County)	65 $\mu g/m^3$ 15 $\mu g/m^3$	24-hour Annual	42 $\mu g/m^3$ 15.9 $\mu g/m^3$
Particulates (PM_{10})	Albany Street at West Street (New York County)	150$\mu g/m^3$ 50$\mu g/m^3$	24-hour Annual	50 / 48 $\mu g/m^3$ 25.0 $\mu g/m^3$
Ozone (O_3)	Susan Wagner H.S. Brielle Ave & Manor Road (Richmond County)	0.12 ppm 0.08 ppm	1-hour 8-hour	0.127 / 0.120 ppm 0.086 ppm
Nitrogen Dioxide (NO_2)	PS 59 288 E. 57th Street (New York County)	100$\mu g/m^3$	Annual Average	78 $\mu g/m^3$
Lead (Pb) Quarterly Average	JHS 126 424 Leonard Street (Kings County)	1.5 $\mu g/m^3$	Quarterly Average	0.03 $\mu g/m^3$
Sulfur Dioxide (SO_2)	PS 59 288 E. 57th Street (New York County)	1300 g/m^3 365$\mu g/m^3$ 80$\mu g/m^3$	3-hour 24-hour Annual	184.6 / 184.6 $\mu g/m^3$ 122.2 / 122.2 $\mu g/m^3$ 41.6 $\mu g/m^3$

ppm = parts per million
$\mu g/m^3$ = micrograms per cubic meter
Source: New York State Air Quality Report, Ambient Air Monitoring Systems (2003) and USEPA, AirData Web Site, Monitor Value Report.

5.10.7 Potential Environmental Impacts

5.10.7.1 Analysis Year 2005/2006 (Construction)

No Build Condition
Under the No Build Condition, construction of the South Ferry Terminal Project would not occur. Construction of the other Lower Manhattan Recovery Projects, including the WTC Memorial and Redevelopment, the Permanent WTC PATH Terminal, the Fulton Street Transit Center, and the Route 9A reconstruction activities, would occur during the 2005/2006 peak year. Construction activities would generate emissions from construction equipment and construction trucks associated with a broad range of activities, including transportation of spoils and construction/deconstruction materials. In addition, it is anticipated that traffic volumes and associated air emissions would increase between

2003 and 2006, as Lower Manhattan continues to recover from the events of September 11 and resumes its economic growth.

Concentrations of the various pollutants were calculated for various receptor sites in the study area, with the receptor sites predominantly located where traffic was anticipated to be more congested. The total ambient pollutant concentrations at these receptor sites were calculated by adding the emissions from mobile and stationary sources to ensure consistency of background values used for other nearby projects in the study area. The calculated concentrations at the receptor locations were then compared to the NAAQS and impact thresholds to characterize ambient air quality conditions in 2005/2006 without the South Ferry Terminal Project.

Tables 5-17 through 5-20 present the predicted concentrations of CO, NO_2, PM_{10}, and SO_2 at the receptor locations during the peak construction year of 2005/2006, with the emissions associated with construction activities of the Lower Manhattan Recovery Projects plus background concentrations, but without the South Ferry Terminal Project construction emissions. The use of ULSD was assumed in the calculations for all projects; thus, the results represent a 10 percent reduction in PM concentrations over that which is achieved if standard fuel were used. The analysis results show that the pollutant levels predicted for receptor locations within the South Ferry study area would not exceed any of the NAAQS for CO (1-hour and 8-hour), NO_2 (annual average), PM_{10} (24-hour and annual average), and SO_2 (3-hour, 24-hour, and annual average).

Table 5-17
Predicted 2005/2006 Construction CO Concentrations
No Build Condition

	1-Hour (ppm)		8-Hour (ppm)	
	Total Conc.*	**NAAQS**	**Total Conc.****	**NAAQS**
Ground Level Locations				
Broadway & Battery Place	5.5	35.0	3.5	9.0
Greenwich Street & Battery Place	4.8		3.1	
South Street & Broad Street	4.6		3.1	
Battery Maritime Building	5.0		3.2	
Castle Clinton	4.8		3.2	
Battery Place & west edge of construction zone	5.3		3.4	
Battery Park, Battery Pl. & 1st Pl .	5.2		3.3	
Building Air Intakes and Elevated Receptors on State Street				
1 Broadway	4.6	35.0	3.1	9.0
Between Battery Place and Bridge St.	4.7		3.1	
Between Bridge Street and Pearl St.	4.7		3.1	
Between Pearl Street and State St.	4.6		3.1	
Corner of Pearl Street and State St.	4.8		3.1	

*Concentration, including 1-hour background concentration 4.4 ppm.
**Concentration, including 8-hour background concentration 3.0 ppm.

Table 5-18
Predicted 2005/2006 Construction NO_2 Concentrations
No Build Condition

	Annual Average (ug/m^3)	
	Total Concentration*	**NAAQS**
Ground Level Locations		
Broadway & Battery Place	81.2	100.0
Greenwich Street & Battery Place	76.5	
South Street & Broad Street	73.7	
Battery Maritime Building	74.8	
Castle Clinton	74.8	
Battery Place & west edge of construction zone	88.4	
Battery Park, Battery Pl. & 1st Pl .	80.7	
Building Air Intakes and Elevated Receptors on State Street		
1 Broadway	73.4	100.0
Between Battery Place and Bridge St.	73.7	
Between Bridge Street and Pearl St.	74.0	
Between Pearl Street and State St.	72.0	
Corner of Pearl Street and State St.	70.5	

*Including annual average background concentration of 70.0 ug/m^3.

Table 5-19
Predicted 2005/2006 Construction PM_{10} Concentrations
No Build Condition

	24-Hour (ug/m^3)		Annual Avg. (ug/m^3)	
	Total Conc.*	**NAAQS**	**Total Conc.****	**NAAQS**
Ground Level Locations				
Broadway & Battery Place	49.1	150.0	22.1	50.0
Greenwich Street & Battery Place	49.3		22.1	
South Street & Broad Street	49.1		22.1	
Battery Maritime Building	49.1		22.2	
Castle Clinton	50.2		22.1	
Battery Place & west edge of construction zone	49.2		22.1	
Battery Park, Battery Pl. & 1st Pl .	49.1		22.1	
Building Air Intakes and Elevated Receptors on State Street				
1 Broadway	49.1	150.0	22.1	50.0
Between Battery Place and Bridge St.	52.2		22.1	
Between Bridge Street and Pearl St.	49.1		22.1	
Between Pearl Street and State St.	49.1		22.1	
Corner of Pearl Street and State St.	49.1		22.1	

*Concentration, including 24-hour background concentration 49 ug/m^3.
**Concentration, including annual average background concentration 22 ug/m^3.

Table 5-20
Predicted 2005/2006 Construction SO_2 Concentrations
No Build Condition

	3-Hour (ug/m^3)		24-Hour (ug/m^3)		Annual Avg. (ug/m^3)	
	Total Conc.*	NAAQS	Total Conc.**	NAAQS	Total Conc.***	NAAQS
Ground Level Locations						
Broadway & Battery Pl	212.0	1300	118.0	365	34.0	80
Greenwich St & Battery Pl	212.0		118.0		34.0	
South Street & Broad St	212.0		118.0		34.0	
Battery Maritime Building	212.0		118.0		34.0	
Castle Clinton	215.0		120.0		34.0	
Battery Place & west edge of construction zone	212.0		118.0		34.0	
Battery Pl.& 1st Pl.	212.0		118.0		34.0	
Building Air Intakes and Elevated Receptors on State Street						
1 Broadway	212.0	1300	118.0	365	34.0	80
Between Battery Pl and Br St.	212.1		118.0		34.0	
Between Bridge St and Pearl St.	212.0		118.0		34.0	
Between Pearl St and State St.	212.0		118.0		34.0	
Corner of Pearl St and State St.	212.0		118.0		34.0	

*Including 3-hour background concentration 212 ug/m^3.
**Including 24-hour background concentration 118 ug/m^3.
***Including annual average background concentration 34 ug/m^3.

Proposed Action

Total annual CO, VOC, NO_2, PM_{10}, $PM_{2.5}$, and SO_2 emissions were estimated from the on-site construction equipment sources and off-site (on-road) trucking and vehicle movements of proposed construction activities for the South Ferry Terminal Project (see detailed construction estimates in Appendix F). These emissions represent the air emissions burden analysis results, and are shown in Table 5-21.

Table 5-21
Summary of Predicted Annual Air Pollutant Emissions

On-Site (tons/year)		Off-Site (tons/year)		Total Annual Emissions (tons/year)	
CO	43.8	CO	27.9	CO	71.8
VOC	9.3	VOC	1.7	VOC	11.0
PM_{10}	8.3	PM_{10}	2.0	PM_{10}	10.3
$PM_{2.5}$	7.6	$PM_{2.5}$	1.9	$PM_{2.5}$	9.5
SO_2	14.9	SO_2	6.3	SO_2	21.2
NO_2	23.7	NO_2	7.2	NO_2	30.9

These total construction emissions from the South Ferry Terminal Project were converted from tons per year to parts per million (ppm) and then added to No Build Condition concentrations. The combined calculated concentrations at the receptor locations were then compared to the NAAQS or air impact thresholds to characterize air quality conditions in 2005/2006 with the South Ferry Terminal Project. Tables 5-22 through 5-25 present the results of the analysis. The use of ULSD was assumed in the calculations for all projects; thus, the results represent a 10 percent reduction in PM concentrations over that which is achieved if standard fuel were used. The analysis results show that, under the Proposed Action condition, the pollutant levels predicted for receptor locations within the South Ferry study area would not exceed any of the NAAQS for CO (1-hour and 8-hour), NO_2 (annual average), PM_{10} (24-hour and annual average), and SO_2 (3-hour, 24-hour, and annual average).

Table 5-22
Predicted 2005/2006 Construction CO Concentrations
Proposed Action

	1-Hour (ppm)		8-Hour (ppm)	
	Total Conc.*	**NAAQS**	**Total Conc.****	**NAAQS**
Ground Level Locations				
Broadway & Battery Place	6.0	35.0	3.7	9.0
Greenwich Street & Battery Place	5.1		3.3	
South Street & Broad Street	5.1		3.3	
Battery Maritime Building	5.7		3.4	
Castle Clinton	5.0		3.3	
Battery Place & west edge of construction zone	6.0		3.7	
Battery Park, Battery Pl. & 1st Pl .	5.7		3.5	
Building Air Intakes and Elevated Receptors on State Street				
1 Broadway	4.7	35.0	3.1	9.0
Between Battery Place and Bridge St.	4.8		3.1	
Between Bridge Street and Pearl St.	5.0		3.2	
Between Pearl Street and State St.	4.8		3.1	
Corner of Pearl Street and State St.	5.2		3.5	

*Concentration, including 1-hour background concentration 4.4 ppm.
**Concentration, including 8-hour background concentration 3.0 ppm.

Table 5-23
Predicted 2005/2006 Construction NO_2 Concentrations
Proposed Action

	Annual Average (ug/m^3)	
	Total Concentration*	**NAAQS**
Ground Level Locations		
Broadway & Battery Place	91.7	100.0
Greenwich Street & Battery Place	78.6	
South Street & Broad Street	81.7	
Battery Maritime Building	82.1	
Castle Clinton	77.7	
Battery Place & west edge of construction zone	94.6	
Battery Park, Battery Pl. & 1st Pl .	86.1	
Building Air Intakes and Elevated Receptors on State Street		
1 Broadway	76.1	100.0
Between Battery Place and Bridge St.	77.3	
Between Bridge Street and Pearl St.	77.8	
Between Pearl Street and State St.	72.3	
Corner of Pearl Street and State St.	70.5	

*Including annual average background concentration 70.0 ug/m^3.

Table 5-24
Predicted 2005/2006 Construction PM_{10} Concentrations
Proposed Action

	24-Hour (ug/m^3)		Annual Avg. (ug/m^3)	
	Total Conc.*	**NAAQS**	**Total Conc.****	**NAAQS**
Ground Level Locations				
Broadway & Battery Place	119.7	150.0	25.9	50.0
Greenwich Street & Battery Place	70.6		22.8	
South Street & Broad Street	78.0		24.8	
Battery Maritime Building	79.1		24.6	
Castle Clinton	68.1		23.1	
Battery Place & west edge of construction zone	110.4		25.4	
Battery Park, Battery Pl. & 1st Pl .	89.2		25.4	
Building Air Intakes and Elevated Receptors on State Street				
1 Broadway	65.8	150.0	23.0	50.0
Between Battery Place and Bridge St.	58.8		23.3	
Between Bridge Street and Pearl St.	64.6		23.3	
Between Pearl Street and State St.	54.7		22.1	
Corner of Pearl Street and State St.	60.6		22.1	

*Concentration, including 24-hour background concentration 49 ug/m^3.
**Concentration, including annual average background concentration 22 ug/m^3.

Table 5-25
Predicted 2005/2006 Construction SO_2 Concentrations
Proposed Action

	3-Hour (ug/m^3)		24-Hour (ug/m^3)		Annual Avg. (ug/m^3)	
	Total Conc.*	NAAQS	Total Conc.**	NAAQS	Total Conc.***	NAAQS
Ground Level Locations						
Broadway & Battery Pl	216.5	1300	119.2	365	34.1	80
Greenwich St & Battery Pl	213.7		118.4		34.0	
South Street & Broad St	213.8		118.5		34.1	
Battery Maritime Building	215.1		118.5		34.1	
Castle Clinton	213.7		118.4		34.0	
Battery Place & west edge of construction zone	216.4		119.2		34.1	
Battery Pl.& 1st Pl.	214.6		118.9		34.0	
Building Air Intakes and Elevated Receptors on State Street						
1 Broadway	212.7	1300	118.3	365	34.0	80
Between Battery Pl and Br St.	212.5		118.2		34.0	
Between Bridge and Pearl St.	212.9		118.3		34.0	
Between Pearl St and State St.	212.8		118.1		34.0	
Corner of Pearl St and State St.	213.5		118.2		34.0	

* Including 3-hour background concentration 212 ug/m^3.
** Including 24-hour background concentration 118 ug/m^3.
*** Including annual average background concentration 34 ug/m^3.

5.10.7.2 Analysis Year 2008 (Initial Operation)

No Build Condition
Under the No Build Condition, the South Ferry Terminal Project would not be constructed and would not be operational in 2008. It is expected that existing land uses in the study area would continue to evolve, and that a number of other projects in the study area could be under construction or completed in 2008. Under the No Build Condition, the South Ferry Station would continue to operate similar to current conditions. The Station would generate no additional traffic and any stationary emissions would be minor.

Proposed Action
The South Ferry Terminal Project would not generate nor induce substantial new traffic. Therefore, no further localized mobile sources analysis for operational impacts is warranted. The terminal would be a beneficial project with respect to mobile sources during operation, as it is expected to contribute to increased transit efficiency, which may indirectly result in

small and negligible reductions in traffic, and associated vehicular emissions in the locale and in the region.

The ventilation systems for the South Ferry Terminal may be passive or active (air tempering) systems that draw fresh air into and out of the tunnels and terminal area. These ventilation facilities would not emit air contaminants during normal operations, since they would be exhausting air from the normal station and tunnel operations, which is similar to ambient outdoor conditions. In accordance with National Fire Protection Association (NFPA) Standard 130, an emergency ventilation system would be provided for the new terminal and tunnels. The objective of the emergency ventilation system is to preserve safe egress routes for passengers/employees and safe ingress routes for emergency service personnel during tunnel fire events. Depending on the location of the fire, smoke would be exhausted from the ventilation structure at Peter Minuit Plaza and/or the vent grate in Battery Place. The area in the vicinity of the smoke exhaust would be cleared by emergency personnel. The fire event would be a temporary condition and would not result in long-term operational air quality impacts.

5.10.7.3 Analysis Year 2025 (Long Term Operation)

No Build Condition
Under the No Build Condition, the South Ferry Terminal Project would not be constructed and would not be operational in 2025. It is expected that existing land uses in the study area would continue to evolve, and that all Lower Manhattan Recovery projects would have been completed and operational for several years. Under the No Build Condition, the South Ferry Station would continue to operate similar to current conditions. The Station would generate no additional traffic and any stationary emissions would be minor.

Proposed Action
The South Ferry Terminal Project would not generate or induce substantial new traffic. Therefore, no further localized mobile sources analysis for operational impacts is warranted. The terminal would be a beneficial project with respect to mobile sources during operation, as it is expected to contribute to increased transit efficiency, which may indirectly result in small and negligible reductions in traffic, and associated vehicular emissions in the locale and in the region. In addition, the air tempering systems and ventilation plants that would be associated with the terminal would not be expected to generate substantial emissions.