A. INTRODUCTION

This chapter examines the potential for air quality impacts from the Proposed Action. Air quality impacts can be either direct or indirect. Direct impacts could stem from emissions generated by stationary sources at a development site, such as emissions from fuel burned on site for heating systems. Indirect impacts could be caused by emissions from nearby existing stationary sources (impacts on the Proposed Action) and mobile-source emissions due to motor vehicle trips generated by the Proposed Action or other changes to future traffic conditions due to the Proposed Action.

The potential impact of the operation of the Proposed Action on air quality due to traffic, heating systems, and the extension of the Battery Park Underpass (BPU), was examined. Overall, the Proposed Action is not expected to have a significant adverse impact on air quality.

B. MOBILE SOURCES

Although the Proposed Action would not generate significant traffic volumes, the maximum hourly incremental traffic from the Proposed Action would exceed the *City Environmental Quality Review (CEQR) Technical Manual* air quality screening threshold of 100 peak hour trips because of traffic diversions. Therefore, a quantified assessment of on-street mobile source emissions was performed in order to determine if these increments would have the potential to cause a significant impact on air quality. The traffic diversion from the Proposed Action would exceed the CEQR analysis threshold at three locations in the southern portion of the traffic study area. The intersection with the greatest incremental increase in traffic diversion—Water and Broad Streets—was selected for mobile source analysis.

Since the increment is related to the redistribution of general traffic and not the introduction of new trips of any particular vehicle type, the main pollutant of concern would be carbon monoxide (CO). As 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. Therefore, a mobile source analysis was conducted at the intersection of Water Street and Broad Street, which was identified as the location with the highest traffic volume increments, to evaluate future CO concentrations with and without the Proposed Action.

RELEVANT AIR QUALITY REGULATIONS AND STANDARDS

NATIONAL AND STATE AIR QUALITY STANDARDS

As required by the Clean Air Act (CAA), primary and secondary National Ambient Air Quality Standards (NAAQS) have been established for CO. The primary standards for CO were set at an

8-hour average of 9 parts per million (ppm) and a 1-hour average of 35 ppm, representing a level that is requisite to protect the public health, allowing an adequate margin of safety. Secondary standards, 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, were not defined for CO. These standards have also been adopted as the ambient air quality standards for New York State.

NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLAN (SIP)

The CAA, as amended in 1990, 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 the U.S. Environmental Protection Agency (EPA), 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.

EPA has re-designated New York City as in attainment for CO. The CAA requires that a maintenance plan ensure continued compliance with the CO NAAQS for former non-attainment areas. New York City is also committed to implementing site-specific control measures throughout the City to reduce CO levels, should unanticipated localized growth result in elevated CO levels during the maintenance period.

DETERMINING THE SIGNIFICANCE OF AIR QUALITY IMPACTS

Any action predicted to increase the concentration of a criteria air pollutant to a level that would exceed the concentrations defined by the NAAQS would be deemed to have a potential significant adverse impact. In addition, in order to maintain CO concentrations lower than the NAAQS in the New York attainment area, a threshold level has been defined for CO; any action predicted to increase CO concentrations above the threshold would be deemed to have a potential significant adverse impact, even in cases where violations of the NAAQS are not predicted.

New York City has developed *de minimis* criteria to assess the significance of the increase in CO concentrations that would result from proposed projects or actions, as set forth in the *CEQR Technical Manual*. These criteria set the minimum change in CO concentration that defines a significant environmental impact. Significant increases of CO concentrations in New York City are defined as: (1) an increase of 0.5 ppm or more in the maximum 8-hour average CO concentration at a location where the predicted No Action 8-hour concentration is equal to or between 8 and 9 ppm; or (2) an increase of more than half the difference between baseline (i.e., No Action) concentrations and the 8-hour standard, when No Action concentrations are below 8.0 ppm.

METHODOLOGY FOR PREDICTING POLLUTANT CONCENTRATIONS

The prediction of vehicle-generated CO emissions and their dispersion in an urban environment incorporates meteorological phenomena, traffic conditions, and physical configurations. Air pollutant dispersion models mathematically simulate how traffic, meteorology, and geometry combine to affect pollutant concentrations. The mathematical expressions and formulations contained in the various models attempt to describe an extremely complex physical phenomenon as closely as possible. However, because all models contain simplifications and approximations of actual conditions and interactions, and it is necessary to predict the reasonable worst-case condition, most of these dispersion models predict conservatively high concentrations of pollutants, particularly under adverse meteorological conditions.

The mobile source analysis for the Proposed Action employed a model approved by EPA that has been widely used for evaluating air quality impacts of projects in New York City, other parts of New York State, and throughout the country. The modeling approach includes a series of conservative assumptions relating to meteorology, traffic, and background concentration levels resulting in a conservatively high estimate of expected pollutant concentrations that could ensue from the Proposed Action.

DISPERSION MODEL FOR MICROSCALE ANALYSES

Maximum CO concentrations adjacent to the selected intersection near the Proposed Action, resulting from vehicle emissions, were predicted using the CAL3QHC model Version 2.0.[1] The CAL3QHC model employs a Gaussian (normal distribution) dispersion assumption and includes an algorithm for estimating vehicular queue lengths at signalized intersections. CAL3QHC predicts emissions and dispersion of CO from idling and moving vehicles. The queuing algorithm includes site-specific traffic parameters, such as signal timing and delay calculations (from the 2000 *Highway Capacity Manual* traffic forecasting model), saturation flow rate, vehicle arrival type, and signal actuation (i.e., pre-timed or actuated signal) characteristics to accurately predict the number of idling vehicles.

METEOROLOGY

In general, the transport and concentration of pollutants from vehicular sources are influenced by three principal meteorological factors: wind direction, wind speed, and atmospheric stability. Wind direction influences the accumulation of pollutants at a particular prediction location (receptor), and atmospheric stability accounts for the effects of vertical mixing in the atmosphere.

CO calculations were performed using the CAL3QHC model. In applying the CAL3QHC model, the wind angle was varied to determine the wind direction resulting in the maximum concentrations at each receptor.

Following the EPA guidelines,[2] CO computations were performed using a wind speed of 1 meter per second, and the neutral stability class D. The 8-hour average CO concentrations were estimated by multiplying the predicted 1-hour average CO concentrations by a factor of 0.79 to account for persistence of meteorological conditions and fluctuations in traffic volumes, according to New York City Department of Environmental Protection (DEP) guidance. A surface roughness of 3.21 meters was chosen. At each receptor location, concentrations were calculated for all wind directions, and the highest predicted concentration was reported, regardless of frequency of occurrence. These assumptions ensured that worst-case meteorology was used to estimate impacts.

---

[1] *User's Guide to CAL3QHC, A Modeling Methodology for Predicted Pollutant Concentrations Near Roadway Intersections*, Office of Air Quality, Planning Standards, EPA, Research Triangle Park, North Carolina, Publication EPA-454/R-92-006.

[2] *Guidelines for Modeling Carbon Monoxide from Roadway Intersections*, EPA Office of Air Quality Planning and Standards, Publication EPA-454/R-92-005.

ANALYSIS YEAR

The microscale analysis was performed for 2009, the year by which the Proposed Action is likely to be completed. The future analysis was performed both without the Proposed Action (the No Build condition) and with the Proposed Action (the Build condition).

VEHICLE EMISSIONS DATA

Vehicular CO engine emission factors were computed using the EPA mobile source emissions model, MOBILE6.2.[1] This emissions model is capable of calculating engine emission factors for various vehicle types, based on the fuel type (gasoline, diesel, or natural gas), meteorological conditions, vehicle speeds, vehicle age, roadway types, number of starts per day, engine soak time, and various other factors that influence emissions, such as inspection maintenance programs. The inputs and use of MOBILE6.2 incorporate the most current guidance available from the New York State Department of Environmental Conservation (DEC) and DEP.

Vehicle classification data were based on field studies. Appropriate credits were used to accurately reflect the inspection and maintenance program. The inspection and maintenance programs require inspections of automobiles and light trucks to determine if pollutant emissions from the vehicles exhaust systems are below emission standards. Vehicles failing the emissions test must undergo maintenance and pass a repeat test to be registered in New York State.

All taxis were assumed to be in hot stabilized mode (i.e., excluding any start emissions). The general categories of vehicle types for specific roadways were further categorized into subcategories based on their relative breakdown within the fleet.[2]

An ambient temperature of 50.0 degrees Fahrenheit was used. This temperature, calculated based on the latest guidance from EPA and DEC, represents the average temperature measured during the 10 highest 8-hour CO events measured at DEC monitoring stations.

Since predicted vehicle speeds were not available, a conservatively high estimate of emissions was based on the assumption that vehicles would be traveling at 10 miles per hour.

TRAFFIC DATA

Traffic data for the air quality analysis were derived from existing traffic counts, projected future growth in traffic, and other information developed as part of the traffic analysis for the Proposed Action (see Chapter 13, “Traffic and Transportation”). Traffic data for the future without and with the Proposed Action were employed in the respective air quality modeling scenarios. The weekday morning (8:30 to 9:30 AM) peak period was analyzed. This time period was selected for the mobile source analysis because it produced the maximum anticipated project-related traffic increment and therefore has the greatest potential for significant air quality impacts.

---

[1] EPA, User’s Guide to MOBILE6.1 and MOBILE6.2: Mobile Source Emission Factor Model, EPA420-R-03-010, August, 2003.

[2] The MOBILE6.2 emissions model utilizes 28 vehicle categories by size and fuel. Traffic counts and predictions are based on broader size categories, and then broken down according to the fleet-wide distribution of subcategories and fuel types (diesel, gasoline, or alternative).

BACKGROUND CONCENTRATIONS

Background concentrations are those pollutant concentrations not directly accounted for through the modeling analysis (which directly accounts for vehicular emissions on the streets within 1,000 feet and in the line of sight of the receptor location). Background concentrations must be added to modeling results to obtain total pollutant concentrations at a study site.

The 8-hour average background concentration used in this analysis was 2.5 ppm. This value is the highest of the second highest CO concentrations measured annually in 2003, 2004, and 2005 at all DEC background monitoring stations in New York City.

ANALYSIS SITE

The intersection of Water Street and Broad Street was selected for analysis because of all intersections in the project area, this location exhibited the largest levels of predicted project-related traffic increments, and, therefore, the greatest air quality impacts and maximum changes in concentrations would be expected at that location.

RECEPTOR PLACEMENT

Multiple receptors (i.e., precise locations at which concentrations are predicted) were modeled at the selected site; receptors were placed along the approach and departure links at spaced intervals. Receptors were placed at sidewalk or roadside locations near intersections with continuous public access.

ANALYSIS RESULTS AND CONCLUSIONS

The highest 8-hour average CO concentration adjacent to the Water Street and Broad Street intersection in 2009 was predicted to be 3.6 ppm in the No Build condition, and was predicted to increase to a maximum of 3.9 ppm in the Build condition due to the traffic diversion related to the Proposed Action. The total concentration of 3.9 ppm would be lower than the relevant NAAQS level of 9 ppm, and the maximum increment of 0.5 ppm would be lower than the *de minimis* level of 3.0 ppm. Since this location and time period exhibited the highest predicted traffic volume increments under the worst predicted level of service of any of the peak time periods and intersections, impacts at other locations or during other peak periods are expected to be even lower. The open spaces that would be created or enhanced as part of the Proposed Action would not experience significant adverse impacts with respect to air quality because, as described above, traffic volumes would not be high enough to cause impacts with respect to mobile sources. Therefore, the Proposed Action would not have any significant adverse impacts on air quality from the proposed changes in traffic patterns.

C. HEATING SYSTEMS

The only building included in the Proposed Action where the emissions from heating systems were screened for potential air quality impacts was the New Market Building. The pavilions are the only other structures that would need heating systems. These are small stand-alone structures under the Franklin D. Roosevelt (FDR) Drive. The pavilions would be heated either with steam, electric, or small gas heating systems. These small systems would be installed according to all applicable laws and regulations and would not be expected to have a significant adverse impact on air quality.

A screening analysis was performed to determine if emissions from the heating system of the New Market Building would have the potential to significantly impact air quality. The methodology described in the *CEQR Technical Manual* was used for the analysis and considered impacts on sensitive uses (both existing residential development as well as other residential developments under construction). The *CEQR* methodology determines the threshold of development size below which the action would not have a significant adverse impact. The screening procedure is used to evaluate whether a significant adverse impact is likely based on information regarding the type of fuel to be burned, the maximum development size, and the height of the heating system's exhaust stack. Based on the distance from the development to the nearest building of similar or greater height, if the maximum development size is greater than the threshold size in the *CEQR Technical Manual*, there is the potential for significant air quality impacts, and a refined dispersion modeling analysis would be required. Otherwise, the source passes the screening analysis, and no further analysis is required.

The project site was evaluated and any nearby projected residential development of similar or greater height was analyzed as a potential receptor. The maximum development floor area of the site, 40,000 square feet, was used as input for the screening analysis. It was assumed that steam, electric, natural gas, or No. 2 fuel oil would be used in the heating system, and that the stack would be located 3 feet above roof height (as per the *CEQR Technical Manual*) at a maximum height of 53 feet.

Based on the initial screening, there would be no significant adverse air quality impacts from the heating system at buildings located at a distance of 65 feet or more from the stack. Since there would be no residential or other sensitive buildings at such a close proximity to the New Market Building, the heating system is not predicted to cause any significant adverse air quality impacts.

D. BATTERY PARK UNDERPASS

As part of the Proposed Action, the BPU portal at BMB Plaza would be moved approximately 350 feet to the northeast by extending the tunnel and moving the ramp. This would extend the overall length of the tunnel and increase the associated overall quantity of pollutants emitted from the tunnel ventilation systems by approximately 15 percent. This change would not be expected to have a significant adverse impact on air quality, since the tunnel ventilation would be expanded proportionately, and therefore, although the overall quantity of pollution traveling through the ventilation system would increase, the dilution of pollutants would increase as well and the ensuing concentrations would remain the same. Therefore, this component of the Proposed Action would not result in any significant adverse impacts on air quality.

E. CONCLUSIONS

Overall, the Proposed Action is not expected to have a significant adverse impact on air quality. For a discussion of the effect of construction activity on air quality, see Chapter 17, "Construction." ✷