Chapter 10: Air Quality

A. INTRODUCTION

As described in Chapter 1, "Project Description," Memorial Sloan-Kettering Cancer Center (MSK) is proposing to construct a new ambulatory care center (MSK ACC) and The City University of New York (CUNY) is proposing to build a new home for the Hunter College Science and Health Professions program (CUNY-Hunter Building) on the project site located along Franklin Delano Roosevelt (FDR) Drive between East 73rd and East 74th Streets.

The potential for air quality impacts from the proposed project is examined in this chapter. Air quality impacts can be either direct or indirect. Direct impacts result from emissions generated by stationary sources at a development site, such as emissions from on-site fuel-fired boiler systems. Indirect impacts are impacts that are caused by emissions from nearby existing sources or by emissions from on-road vehicle trips generated by a project or changes to future traffic conditions due to the project.

The maximum hourly incremental traffic from the proposed project would exceed the *City Environmental Quality Review (CEQR) Technical Manual* carbon monoxide screening threshold of 170 peak hour trips at nearby intersections in the study area, and the fine particulate matter ($PM_{2.5}$) emission screening threshold discussed in Chapter 17, Sections 210 and 311 of the *CEQR Technical Manual*. Therefore, an analysis of emissions from project-generated traffic was performed. In addition, the proposed project would include a below-grade parking garage. Therefore, an analysis was conducted to evaluate potential future pollutant concentrations in the vicinity of the ventilation outlets with the proposed parking garage.

The proposed project would include fossil fuel-fired combustion equipment consisting of separate boiler installations and potentially cogeneration. Therefore, a stationary source analysis was conducted to evaluate potential future pollutant concentrations from the proposed combustion systems. The stationary source analysis also evaluated the potential impacts of air toxic contaminants emitted by nearby industrial sources on the proposed project, since the project site is located adjacent to manufacturing-zoned properties.

The CUNY-Hunter Building would house teaching and research laboratories. Therefore, this chapter examines the expected use of potentially hazardous materials in the proposed laboratories to be located in the CUNY-Hunter Building, and the procedures and systems that would be employed in the proposed laboratories to ensure the safety of staff and the surrounding community in the event of a chemical spill in one of the proposed laboratories.

The project site is in the vicinity of large sources of emissions. Therefore, potential air quality impacts from these sources on the proposed project were evaluated.

PRINCIPAL CONCLUSIONS

As discussed below, the maximum predicted pollutant concentrations and concentration increments from mobile sources with the proposed project would be below the corresponding guidance thresholds and ambient air quality standards. In addition, an analysis of the project's accessory parking garage determined there would not be any significant adverse air quality impacts. Therefore, the proposed project would not have significant adverse impacts from mobile source emissions.

Based on the stationary source analyses, there would be no potential significant adverse stationary source air quality impacts from pollutant emissions from fossil fuel-fired boiler and cogeneration systems.

An analysis of the proposed CUNY-Hunter Building's laboratory exhaust system determined there would be no significant impacts in the proposed building or on the surrounding community in the event of a chemical spill in a laboratory.

Based on the analysis of the existing and future large emission sources on the proposed project, there would be no significant impacts. In addition, nearby existing sources from manufacturing or processing facilities were surveyed for their potential impacts on the proposed project. There are no existing permitted sources of manufacturing use emissions within the study area that could affect the proposed project. Therefore, there would be no potential for significant adverse impacts on air quality.

B. POLLUTANTS FOR ANALYSIS

Ambient air quality is affected by air pollutants produced by both 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 (nitric oxide, NO, and nitrogen dioxide, 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, and sources utilizing non-road diesel 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. These pollutants are regulated by the U.S. Environmental Protection Agency (EPA) under the CAA, and are referred to as "criteria pollutants."

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.

The proposed project would result in changes in traffic patterns and an increase in traffic volume in the study area. Therefore, a mobile source analysis was conducted to evaluate future CO concentrations with and without the proposed project. In addition, an assessment of CO impacts from the proposed project's parking garage was conducted.

NITROGEN OXIDES, VOCS, AND OZONE

NO_x are of principal concern because of their role, together with VOCs, 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. The contribution of any action or project to regional emissions of these pollutants would include any added stationary or mobile source emissions. The proposed project would not have a significant effect on the overall volume of vehicular travel in the metropolitan area; therefore, no measurable impact on regional NO_x emissions or on ozone levels is predicted. An analysis of proposed project-related emissions of these pollutants from mobile sources was therefore not warranted.

In addition to being a precursor to the formation of ozone, NO_2 (one component of NO_x) is also a regulated pollutant. Since NO_2 is mostly formed from the transformation of NO in the atmosphere, it has mostly been of concern further downwind from large stationary point sources, and not a local concern from mobile sources. (NO_x emissions from fuel combustion consist of approximately 90 percent NO and 10 percent NO_2 at the source.) However, with the promulgation of the 2010 1-hour average standard for NO_2, local sources such as vehicular emissions may become of greater concern for this pollutant. Potential impacts on local NO_2 concentrations from the fuel combustion for the proposed project's boiler system were evaluated.

LEAD

Airborne lead emissions are currently associated principally with industrial sources. Lead in gasoline has been banned under the Clean Air Act (CAA). No significant sources of lead are associated with the proposed project and, therefore, analysis was not warranted.

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

PM is a broad class of air pollutants that includes discrete particles of a wide range of sizes and chemical compositions, as either liquid droplets (aerosols) or solids suspended in the atmosphere. The constituents of PM are both numerous and varied, and they are emitted from a wide variety of sources (both natural and anthropogenic). Natural sources include the condensed and reacted forms of naturally occurring VOC; salt particles resulting from the evaporation of sea spray; wind-borne pollen, fungi, molds, algae, yeasts, rusts, bacteria, and material from live and decaying plant and animal life; particles eroded from beaches, soil, and rock; and particles emitted from volcanic and geothermal eruptions and from forest fires. Naturally occurring PM is generally greater than 2.5 micrometers in diameter. Major anthropogenic sources include the combustion of fossil fuels (e.g., vehicular exhaust, power generation, boilers, engines, and home heating), chemical and manufacturing processes, all types of construction, agricultural activities, as well as wood-burning stoves and fireplaces. PM also acts as a substrate for the adsorption (accumulation of gases, liquids, or solutes on the surface of a solid or liquid) of other pollutants, often toxic and some likely carcinogenic compounds.

As described below, PM is regulated in two size categories: particles with an aerodynamic diameter of less than or equal to 2.5 micrometers ($PM_{2.5}$), and particles with an aerodynamic diameter of less than or equal to 10 micrometers (PM_{10}, which includes $PM_{2.5}$). $PM_{2.5}$ 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, and is also extremely persistent in the atmosphere. $PM_{2.5}$ is mainly derived from combustion material that has volatilized and then condensed to form primary PM (often soon after the release from a source exhaust) or from precursor gases reacting in the atmosphere to form secondary PM.

Diesel-powered vehicles, especially heavy duty trucks and buses, 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. The proposed project would result in significant increases in $PM_{2.5}$ vehicle emissions as defined in Chapter 17, Sections 210 and 311 of the *CEQR Technical Manual*. Therefore, an analysis of potential impacts from PM was performed. In addition, an analysis of $PM_{2.5}$ emissions from the proposed project's boiler system was performed.

SULFUR DIOXIDE

SO_2 emissions are primarily associated with the combustion of sulfur-containing fuels (oil and coal). Monitored SO_2 concentrations in New York City do not exceed national standards. SO_2 is also of concern as a precursor to $PM_{2.5}$ and is regulated as a $PM_{2.5}$ precursor under the New Source Review permitting program for large sources. Due to the federal restrictions on the sulfur content in diesel fuel for on-road and non-road vehicles, no significant quantities are emitted from vehicular sources. Vehicular sources of SO_2 are not significant and, therefore, analysis of SO_2 from mobile and non-road sources was not warranted.

As part of the proposed project, natural gas would be burned in the proposed project's boiler system. The sulfur content of natural gas is negligible; therefore, no analysis was performed to estimate the future levels of SO_2 with the proposed project.

NONCRITERIA POLLUTANTS

In addition to the criteria pollutants discussed above, non-criteria air pollutants, also called air toxics, are of potential concern. Air toxics are those pollutants that are known or suspected to cause serious health effects in small doses. Air toxics are emitted by a wide range of man-made and naturally occurring sources. Emissions of air toxics from industries are regulated by EPA. Federal ambient air quality standards do not exist for non-criteria compounds. However, the New York State Department of Environmental Conservation (DEC) has issued standards for certain non-criteria compounds, including beryllium, gaseous fluorides, and hydrogen sulfide. DEC has also developed ambient guideline concentrations for numerous air toxic non-criteria compounds. The DEC guidance document DAR-1 (October 2010) contains a compilation of annual and short term (1-hour) guideline concentrations for these compounds. The DEC guidance thresholds represent ambient levels that are considered safe for public exposure.

Portions of the proposed project site are adjacent to a zoned industrial area. Therefore, an analysis to examine the potential for impacts on the proposed project from industrial emissions was performed.

C. AIR QUALITY REGULATIONS, STANDARDS, AND BENCHMARKS

NATIONAL AND STATE AIR QUALITY STANDARDS

As required by the CAA, 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 (annual), ozone, lead, $PM_{2.5}$ (24-hr) and PM_{10}, and there is no secondary standard for CO and the 1-hour NO_2 standard. The NAAQS are presented in **Table 10-1**. The NAAQS for CO, annual NO_2, and 3-hour SO_2 have also been adopted as the ambient air quality standards for New York State, but are defined on a running 12-month basis rather than for calendar years only. New York State also has standards for total suspended particulate matter (TSP), settleable particles, non-methane hydrocarbons (NMHC), 24-hour and annual SO_2, and ozone which correspond to federal standards that have since been revoked or replaced, and for the non-criteria pollutants beryllium, fluoride, and hydrogen sulfide (H_2S).

EPA has revised the NAAQS for PM, effective December 18, 2006. The revision included lowering the level of the 24-hour $PM_{2.5}$ standard from 65 $\mu g/m^3$ 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. EPA recently lowered the primary annual-average standard to 12 $\mu g/m^3$, effective March 2013.

EPA has also revised the 8-hour ozone standard, lowering it from 0.08 to 0.075 parts per million (ppm), effective as of May 2008. On January 6, 2010, EPA proposed a change in the 2008 ozone NAAQS, lowering the primary NAAQS from the current 0.075 ppm level to within the range of 0.060 to 0.070 ppm. EPA is also proposing a secondary ozone standard, measured as a cumulative concentration within the range of 7 to 15 ppm-hours aimed mainly at protecting sensitive vegetation. A final decision on this standard has been postponed but is expected to occur in 2013.

EPA lowered the primary and secondary standards for lead to 0.15 $\mu g/m^3$, effective January 12, 2009. EPA revised the averaging time to a rolling 3-month average and the form of the standard to not-to-exceed across a 3-year span.

EPA established a 1-hour average NO_2 standard of 0.100 ppm, effective April 12, 2010, in addition to the annual standard. The statistical form is the 3-year average of the 98th percentile of daily maximum 1-hour average concentration in a year.

EPA established a 1-hour average SO_2 standard of 0.075 ppm, replacing the 24-hour and annual primary standards, effective August 23, 2010. The statistical form is the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour concentrations (the 4th highest daily maximum corresponds approximately to 99th percentile for a year).

Table 10-1
National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary		Secondary	
	ppm	µg/m^3	ppm	µg/m^3
Carbon Monoxide (CO)				
8-Hour Average [1]	9	10,000	None	
1-Hour Average [1]	35	40,000		
Lead				
Rolling 3-Month Average [2]	NA	0.15	NA	0.15
Nitrogen Dioxide (NO_2)				
1-Hour Average [3]	0.100	188	None	
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average [4,5]	0.075	150	0.075	150
Respirable Particulate Matter (PM_{10})				
24-Hour Average [1]	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Annual Mean [6]	NA	12	NA	15
24-Hour Average [7]	NA	35	NA	35
Sulfur Dioxide (SO_2) [8]				
1-Hour Average [9]	0.075	197	NA	NA
Maximum 3-Hour Average [1]	NA	NA	0.50	1,300

Notes:

ppm – parts per million

µg/m^3 – micrograms per cubic meter

NA – not applicable

All annual periods refer to calendar year.

Standards are defined in ppm. Approximately equivalent concentrations in µg/m^3 are presented.

(1) Not to be exceeded more than once a year.

(2) EPA has lowered the NAAQS down from 1.5 µg/m^3, effective January 12, 2009.

(3) 3-year average of the annual 98th percentile daily maximum 1-hr average concentration. Effective April 12, 2010.

(4) 3-year average of the annual fourth highest daily maximum 8-hr average concentration.

(5) EPA has proposed lowering this standard further to within the range 0.060-0.070 ppm, and adding a secondary standard measured as a cumulative concentration within the range of 7 to 15 ppm-hours aimed mainly at protecting sensitive vegetation. A final decision on this standard has been postponed but is expected to occur in 2013..

(6) EPA lowered the primary annual standard from 15 µg/m^3, effective March 2013.

(7) Not to be exceeded by the annual 98th percentile when averaged over 3 years.

(8) EPA revoked the 24-hour and annual primary standards, replacing them with a 1-hour average standard. Effective August 23, 2010.

(9) 3-year average of the annual 99th percentile daily maximum 1-hr average concentration.

Source: 40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards.

NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLANS

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 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, followed by a plan for maintaining attainment status once the area is in attainment.

In 2002, EPA re-designated New York City as in attainment for CO. Under the resulting maintenance plan, New York City is 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.

Manhattan has been designated as a moderate NAA for PM_{10}. On January 30, 2013, New York State requested that EPA approve its withdrawal of the 1995 SIP and redesignation request for the 1987 PM_{10} NAAQS, and that EPA make a clean data finding instead, based on data monitored from 2009-2011 indicating PM_{10} concentrations well below the 1987 NAAQS. Although not yet a redesignation to attainment status, if approved, this determination would remove further requirements for related SIP submissions.

On December 17, 2004, EPA took final action designating the five New York City counties and Nassau, Suffolk, Rockland, Westchester and Orange Counties, as a $PM_{2.5}$ non-attainment area under the CAA due to exceedance of the annual average standard. EPA determined that the New York–Northern New Jersey–Long Island $PM_{2.5}$ nonattainment area has attained the 1997 annual NAAQS, effective December 15, 2010. As stated earlier, EPA has recently lowered the annual average primary standard to 12 $\mu g/m^3$. EPA will make initial attainment designations by December 2014. Based on analysis of 2009-2011 monitoring data, it is likely that the region will be in attainment for the new standard.

In November 2009 EPA designated the New York City Metropolitan Area as nonattainment with the 2006 24-hour $PM_{2.5}$ NAAQS. The nonattainment area includes the same 10-county area originally designated as nonattainment with the 1997 annual $PM_{2.5}$ NAAQS. Based on recent monitoring data, EPA determined that the area has attained the standard. This determination removes further requirements for related SIP submissions would be suspended.

Nassau, Rockland, Suffolk, Westchester, Lower Orange County Metropolitan Area (LOCMA), and the five New York City counties had been designated as a severe non-attainment area for ozone (1-hour average standard). On June 15, 2004, EPA designated these same counties as moderate non-attainment for the 8-hour average ozone standard. On February 8, 2008, DEC submitted final revisions to the SIP to EPA to address the 1997 8-hour ozone standard. On June 18, 2012, EPA determined that the New York–New Jersey–Long Island Nonattainment Area has attained both the 1990 1-hour ozone NAAQS (0.12 ppm) and the 1997 8-hour ozone NAAQS (0.08 ppm). Although not yet a redesignation to attainment status, this determination removes further requirements under the 8-hour standard.

In March 2008 EPA strengthened the 8–hour ozone standards. EPA designated the counties of Suffolk, Nassau, Bronx, Kings, New York, Queens, Richmond, Rockland, and Westchester (NY portion of the New York–Northern New Jersey–Long Island, NY-NJ-CT NAA) as a marginal non-attainment area for the 2008 ozone NAAQS, effective July 20, 2012. SIPs are due in 2015.

New York City is currently in attainment of the annual-average NO_2 standard. EPA has designated the entire state of New York as "unclassifiable/attainment" for the new 1-hour NO_2 standard effective February 29, 2012. Since additional monitoring is required for the 1-hour standard, areas will be reclassified once three years of monitoring data are available (2016 or 2017).

EPA has established a 1-hour SO_2 standard, replacing the former 24-hour and annual standards, effective August 23, 2010. Based on the available monitoring data, all New York State counties currently meet the 1-hour standard. EPA plans to make final attainment designations in June 2013.

DETERMINING THE SIGNIFICANCE OF AIR QUALITY IMPACTS

The State Environmental Quality Review Act (SEQRA) regulations and the *CEQR Technical Manual* state that the significance of a predicted consequence of a project (i.e., whether it is material, substantial, large or important) should be assessed in connection with its setting (e.g., urban or rural), its probability of occurrence, its duration, its irreversibility, its geographic scope, its magnitude, and the number of people affected.[1] In terms of the magnitude 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 (see **Table 10-1**) would be deemed to have a potential significant adverse impact.

In addition, in order to maintain concentrations lower than the NAAQS in attainment areas, or to ensure that concentrations will not be significantly increased in non-attainment areas, threshold levels have been defined for certain pollutants; any action predicted to increase the concentrations of these pollutants above the thresholds would be deemed to have a potential significant adverse impact, even in cases where violations of the NAAQS are not predicted.

$PM_{2.5}$ INTERIM GUIDANCE CRITERIA

DEC has published a policy to provide interim direction for evaluating $PM_{2.5}$ impacts.[2] This policy applies only to facilities applying for permits or major permit modifications under SEQRA that emit 15 tons of PM_{10} or more annually. The policy states that such a project will be deemed to have a potentially significant adverse impact if the project's maximum impacts are predicted to increase $PM_{2.5}$ concentrations by more than 0.3 $\mu g/m^3$ averaged annually or more than 5 $\mu g/m^3$ on a 24-hour basis. Projects that exceed either the annual or 24-hour threshold will be required to prepare an Environmental Impact Statement (EIS) to assess the severity of the impacts, to evaluate alternatives, and to employ reasonable and necessary mitigation measures to minimize the $PM_{2.5}$ impacts of the source to the maximum extent practicable.

In addition, the City has developed interim guidance criteria for evaluating the potential $PM_{2.5}$ impacts for projects subject to CEQR. The interim guidance criteria currently employed for determination of potential significant adverse $PM_{2.5}$ impacts under CEQR are as follows:

- 24-hour average $PM_{2.5}$ concentration increments which are predicted to be greater than 5 $\mu g/m^3$ at a discrete receptor location would be considered a significant adverse impact on air

[1] *CEQR Technical Manual*, Chapter 17, section 400, May 2010; and State Environmental Quality Review Regulations, 6 NYCRR § 617.7

[2] CP33/Assessing and Mitigating Impacts of Fine Particulate Emissions, DEC 12/29/2003.

quality under operational conditions (i.e., a permanent condition predicted to exist for many years regardless of the frequency of occurrence);

- 24-hour average $PM_{2.5}$ concentration increments which are predicted to be greater than 2 $\mu g/m^3$ but no greater than 5 $\mu g/m^3$ would be considered a significant adverse impact on air quality based on the magnitude, frequency, duration, location, and size of the area of the predicted concentrations;
- Annual average $PM_{2.5}$ concentration increments which are predicted to be greater than 0.1 $\mu g/m^3$ at ground level on a neighborhood scale (i.e., the annual increase in concentration representing the average over an area of approximately 1 square kilometer, centered on the location where the maximum ground-level impact is predicted for stationary sources; or at a distance from a roadway corridor similar to the minimum distance defined for locating neighborhood scale monitoring stations); or
- Annual average $PM_{2.5}$ concentration increments which are predicted to be greater than 0.3 $\mu g/m^3$ at a discrete receptor location (elevated or ground level).

Actions under CEQR predicted to increase $PM_{2.5}$ concentrations by more than the CEQR or DEC interim guidance criteria above will be considered to have a potential significant adverse impact. The New York City Department of Environmental Protection (DEP) recommends that its actions subject to CEQR that fail the interim guidance criteria prepare an EIS and examine potential measures to reduce or eliminate such potential significant adverse impacts.

The proposed project's annual emissions of PM_{10} are estimated to be well below the 15-ton-per-year threshold under DEC's $PM_{2.5}$ policy guidance. The above DEP and DEC interim guidance criteria have been used to evaluate the significance of predicted impacts of the proposed project on $PM_{2.5}$ concentrations and determine the need to minimize particulate matter emissions from the proposed project.

D. METHODOLOGY FOR PREDICTING POLLUTANT CONCENTRATIONS

MOBILE SOURCES

INTERSECTION ANALYSIS

The prediction of vehicle-generated emissions and their dispersion in an urban environment incorporates meteorological phenomena, traffic conditions, and physical configuration. Air pollutant dispersion models mathematically simulate how traffic, meteorology, and physical configuration 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 since it is necessary to predict the reasonable worst-case condition, most dispersion analyses predict conservatively high concentrations of pollutants, particularly under adverse meteorological conditions.

The mobile source analyses for the proposed project employ 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 project. The assumptions used in the PM analysis were based on the City's $PM_{2.5}$ interim guidance criteria.

VEHICLE EMISSIONS

Engine Emissions

Vehicular CO and PM engine emission factors were computed using the EPA mobile source emissions model, MOVES.[3] 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 type and grade, 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 MOVES incorporate the most current guidance available from DEC.

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 each vehicle exhaust system are lower than emission standards. Vehicles failing the emissions test must undergo maintenance and pass a repeat test to be registered in New York State.

County-specific hourly temperature and relative humidity data obtained from DEC were used.

Road Dust

The contribution of re-entrained road dust to PM_{10} concentrations, as presented in the PM_{10} SIP, is considered to be significant; therefore, the PM_{10} estimates include both exhaust and road dust. In accordance with the $PM_{2.5}$ interim guidance criteria methodology, $PM_{2.5}$ emission rates were determined with fugitive road dust to account for their impacts in local microscale analyses. However, fugitive road dust was not included in the neighborhood scale $PM_{2.5}$ microscale analyses, since DEP considers it to have an insignificant contribution on that scale. Road dust emission factors were calculated according to the latest procedure delineated by EPA[4] and the *CEQR Technical Manual*.

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 project (see Chapter 9, "Transportation"). Traffic data for the future No Build and Build conditions was employed in the respective air quality modeling scenarios. The weekday AM (7:45 AM to 8:45 AM), midday (1:00 PM to 2:00 PM), and PM (5:30 PM to 6:30 PM) peak periods were analyzed.

For particulate matter, off-peak traffic volumes in the future No Build and Build conditions were determined by adjusting the peak period volumes by the 24-hour distributions of actual vehicle counts collected at appropriate locations, and off-peak increments from the proposed project

[3] EPA, Motor Vehicle Emission Simulator (MOVES), User Guide for MOVES2010b, June 2012.

[4] EPA, Compilations of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, Ch. 13.2.1, NC, http://www.epa.gov/ttn/chief/ap42, January 2011.

were determined by adjusting the peak period volumes by the 24-hour distribution of the parking garage arrivals and departures associated with the proposed project.

DISPERSION MODEL FOR MICROSCALE ANALYSES

Maximum CO concentrations adjacent to streets within the surrounding area, resulting from vehicle emissions, were predicted using the CAL3QHC model Version 2.0.[5] 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. The CAL3QHC model has been updated with an extended module, CAL3QHCR, which allows for the incorporation of hourly meteorological data into the modeling, instead of worst-case assumptions regarding meteorological parameters. This refined version of the model, CAL3QHCR, is employed if maximum predicted future CO concentrations are greater than the applicable ambient air quality standards or when *de minimis* thresholds are exceeded using the first level of CAL3QHC modeling.

To determine motor vehicle generated PM concentrations adjacent to streets within the traffic study area, the CAL3QHCR model was applied. This refined version of the model can utilize hourly traffic and meteorology data, and is therefore more appropriate for calculating 24-hour and annual average concentrations.

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 direction in which pollutants are dispersed, and atmospheric stability accounts for the effects of vertical mixing in the atmosphere. These factors, therefore, influence the concentration at a particular prediction location (receptor).

Tier I Analyses—CAL3QHC

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[6], CAL3QHC 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 0.70 to account for persistence of meteorological conditions and fluctuations in traffic volumes. 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,

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

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

regardless of frequency of occurrence. These assumptions ensured that worst-case meteorology was used to estimate impacts.

Tier II Analyses—CAL3QHCR

A Tier II analysis performed with the CAL3QHCR model includes the modeling of hourly concentrations based on hourly traffic data and five years of monitored hourly meteorological data. The data consists of surface data collected at LaGuardia Airport and upper air data collected at Brookhaven, New York for the period of 2007-2011. All hours were modeled, and the highest resulting concentration for each averaging period is presented.

ANALYSIS YEAR

The microscale analyses were performed for existing conditions and 2019, the year by which the proposed project is likely to be completed. The future analysis was performed with and without the proposed project.

BACKGROUND CONCENTRATIONS

Background concentrations are those pollutant concentrations originating from distant sources that are not directly included in the modeling analysis, which directly accounts for vehicular emissions on the streets within 1,000 feet and in the line of sight of the analysis site. Background concentrations must be added to modeling results to obtain total pollutant concentrations at an analysis site.

The background concentrations for the area of the project are presented in **Table 10-2**. PM backgrounds are the highest measured concentrations from the latest available three years of monitored data (2009–2011), consistent with the NAAQS. All other pollutants are based on the latest available five years of monitored data (2007–2011). Consistent with the NAAQS for each pollutant, for averaging periods shorter than a year, the second highest value is used. These values were used as the background concentrations for the mobile source analysis.

Table 10-2
Maximum Background Pollutant Concentrations
For Mobile Source Sites (µg/m^3)

Pollutant	Average Period	Location	Concentration	NAAQS
CO	1-hour	Queens College 2, Queens	3.4 ppm	35 ppm
	8-hour		2.0 ppm	9 ppm
PM_{10}	24-hour	P.S. 19, Manhattan	44	150

Notes: Consistent with the NAAQS, PM values are the highest of the latest available 3 years; all other pollutants are the highest of the latest 5 years.
Sources: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2007–2011.

ANALYSIS SITES

One analysis site was selected for microscale analysis, at York Avenue and East 74th Street. This site was selected because it is the location in the study area where the largest levels of project-generated traffic are expected, and, therefore, where the greatest air quality impacts and maximum changes in concentrations would be expected. The intersection was analyzed for CO and PM.

RECEPTOR PLACEMENT

Multiple receptors (i.e., precise locations at which concentrations are predicted) were modeled at each of the selected sites; receptors were placed along the approach and departure links at spaced intervals. Ground level receptors were placed at sidewalk or roadside locations near intersections with continuous public access, at a pedestrian height of 1.8 meters. Receptors in the analysis models for predicting annual average neighborhood-scale $PM_{2.5}$ concentrations were placed at a distance of 15 meters, from the nearest moving lane at each analysis location, based on the DEP guidance for neighborhood-scale corridor $PM_{2.5}$ modeling.

PARKING GARAGE

The proposed project would include an accessory parking facility with up to 250 spaces. However, as described in Chapter 9, "Transportation," the parking accumulation accounts for only 166 spaces permitted as-of-right at the project site. Emissions from vehicles using the parking facility could potentially affect ambient levels of pollutants at adjacent receptors. Since the parking facility would be used by automobiles, the primary pollutant of concern is CO. Because cold-starting automobiles leaving a parking facility would emit far higher levels of CO than vehicles entering a facility, the impact from a parking facility would be greatest during the periods with the largest number of departing vehicles. An analysis was performed using the methodology delineated in the 2012 *CEQR Technical Manual* to calculate pollutant levels.

Potential impacts from the proposed parking facility on CO concentrations were assessed at multiple receptor locations. The CO concentrations were determined for the time periods, when overall usage would be the greatest, considering the hours when the greatest number of vehicles would enter and exit the project site. Departing vehicles were assumed to be operating in a "cold-start" mode, emitting higher levels of CO than arriving vehicles. Emissions from vehicles entering, parking, and exiting the parking facility were estimated using the EPA MOVES mobile source emission model. All arriving and departing vehicles were conservatively assumed to travel at an average speed of 5 miles per hour within the parking facility. In addition, all departing vehicles were assumed to idle for 1 minute before exiting.

A "near" and "far" receptor was placed on the sidewalk adjacent to the parking lot and on the sidewalk directly opposite the parking facility across, respectively. In addition, receptors were placed on building façades at a height of 6 feet above the vent. To determine compliance with the NAAQS, CO concentrations were determined for the maximum 1- and 8-hour average periods. A persistence factor of 0.70 was used to convert the calculated 1-hour average maximum concentrations to 8-hour averages, accounting for meteorological variability over the average 8-hour period.

Background CO concentrations from the nearest DEC monitoring station were added to the modeling results to obtain the total ambient levels. The on-street CO concentration was determined using the methodology in the Air Quality Appendix of the *CEQR Technical Manual*, utilizing traffic volumes derived from a previous traffic study conducted in the area.

STATIONARY SOURCES

BOILER, COGENERATION AND EMERGENCY GENERATOR SYSTEMS

Stationary source analyses were conducted for the fossil fuel-fired boiler and cogeneration systems for the proposed project. The proposed project would include individual boiler

installations serving the MSK ACC and the CUNY-Hunter Building which would fire natural gas with No. 2 fuel oil as a back-up in the event of a utility curtailment or emergency. In addition, the MSK ACC would include a natural gas-fired cogeneration plant with a capacity of approximately 1 megawatt (MW). A 65 kilowatt (KW) microturbine with heat recovery is also under consideration for the CUNY-Hunter Building to provide a portion of the proposed building's energy needs. Four emergency diesel-fueled generators, two units with a capacity of 2.5 megawatts (MW) for the MSK ACC and two units for the CUNY-Hunter Building with a capacity of 1.5 MW, would be installed to serve the proposed project in the event of the loss of utility electrical power.

The analysis of the proposed project's boiler and cogeneration systems was performed using the EPA/AMS AERMOD dispersion model.[7] AERMOD is a state-of-the-art dispersion model, applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources). AERMOD is a steady-state plume model that incorporates current concepts about flow and dispersion in complex terrain, including updated treatment of the boundary layer theory, understanding of turbulence and dispersion, and includes handling of the interaction between the plume and terrain.

The AERMOD model calculates pollutant concentrations from one or more points (e.g., exhaust stacks) based on hourly meteorological data, and has the capability to calculate pollutant concentrations at locations where the plume from the exhaust stack is affected by the aerodynamic wakes and eddies (downwash) produced by nearby structures. The analyses of potential impacts from the exhaust stacks were made assuming stack tip downwash, urban dispersion and surface roughness length, with and without building downwash, and elimination of calms.

The AERMOD model also incorporates the algorithms from the PRIME model, which is designed to predict impacts in the "cavity region" (i.e., the area around a structure which under certain conditions may affect an exhaust plume, causing a portion of the plume to become entrained in a recirculation region). The Building Profile Input Program (BPIP) program for the PRIME model (BPIPRM) was used to determine the projected building dimensions for modeling with the building downwash algorithm enabled. The modeling of plume downwash accounts for all obstructions within a radius equal to five obstruction heights of the stack.

For the analysis of the 1-hour NO_2 concentrations, the Plume Volume Molar Ratio Method (PVMRM) module was applied within AERMOD, following EPA modeling guidance.[8] PVMRM analyzes chemical transformation of NO_x within the model, calculating the transformation of NO emitted from the stack to NO_2 at any given receptor, with a representative ozone background concentration to estimate NO_x transformation within the source plume. In place of a representative ozone background concentration, hourly ozone background concentrations were incorporated to estimate NO_x transformation within the source plume. Ozone concentrations were not monitored at any station in Manhattan and were therefore

---

[7] EPA, AERMOD: Description Of Model Formulation, 454/R-03-004, September 2004; and

EPA, User's Guide for the AMS/EPA Regulatory Model AERMOD, 454/B-03-001, September 2004 and Addendum December 2006.

[8] EPA, Notice Regarding Modeling for New Hourly NO_2 NAAQS, Updated Feb. 25, 2010; EPA, Guidance Concerning the Implementation of the 1-hour NO_2 NAAQS for the Prevention of Significant Deterioration Program; and EPA, Applicability of Appendix W Modeling Guidance for the 1-hour NO_2 NAAQS.

obtained from the DEC Queens College II monitoring station, which is the nearest ozone monitoring station with complete data through 2010. An initial NO_2 to NO_x ratio of 10 percent at the source exhaust was assumed, based on available data.

Total hourly NO_2 concentrations were determined following a methodology that is accepted by the EPA as appropriate to determine the compliance with the 1-hour NO_2 NAAQS.[9] Based on this methodology, the 98th percentile of background monitored concentrations averaged over the latest three years was added to the modeled concentrations, which were determined using the 98th percentile of daily concentrations for each modeled year, calculated within the AERMOD model at each receptor location, averaged over the latest five years. The highest of the resulting total concentrations was then compared with the 1-hour NO_2 NAAQS standard.

Although the emergency generators would be used only for testing purposes outside of an actual emergency use, the short-term air quality impacts of the proposed generator were modeled (annual impacts are considered insignificant based on the anticipated usage). However, 1-hour NO_2 and 1-hour SO_2 concentrations from the emergency generators were not modeled based on guidance from EPA. According to the EPA guidance, the generators can be considered an "intermittent source," which would be operated on such a limited basis that it would not be considered to contribute significantly to the 1-hour daily maximum concentrations, due to the form of the 1-hour NO_2 and 1-hour SO_2 standards.

Discrete receptors (i.e., locations at which concentrations are calculated) were modeled along the façades of nearby buildings to represent operable window locations, intake vents, and otherwise accessible locations such as terraces. Rows of receptors were placed at spaced intervals on the nearby buildings at multiple elevations.

Emission Rates and Stack Parameters

Table 10-3 presents the emission rates and stack exhaust parameters used in the AERMOD analysis. Based on energy modeling, boiler emission rates were scaled for each month based on monthly energy consumption (for the 24-hour average emission rates) and worst-case 24-hour fuel usage (for the 1-hour and 3-hour average emission rates). The emission rates for 24-hour and 1-hour time periods shown in the table represent maximum emissions associated with the use of No. 2 fuel oil during the month of January. Emission rates from the cogeneration systems were based on the maximum capacity. The emergency generators would be tested periodically for a short period to ensure its availability and reliability in the event of a sudden loss in utility electrical power. They would not be utilized in a peak load shaving program, minimizing the use of this equipment during non-emergency periods.

The reasonable worst-case short-term and annual scenario assumes continuous operation of the cogeneration plants for 8,760 hours per year at 100 percent load on natural gas. The boiler plants would operate on natural gas with No. 2 oil as a back-up fuel in the event of a utility gas curtailment or emergency. Energy modeling was used to estimate short-term and annual emissions from the boilers (annual emissions from oil operation are assumed to be negligible).

[9] http://www.epa.gov/ttn/scram/guidance/clarification/Additional_Clarifications_AppendixW_Hourly-NO2-NAAQS_FINAL_03-01-2011.pdf

Table 10-3
Emission Rates and Stack Parameters

Parameter	MSK ACC			CUNY-Hunter		
	Boiler System	Cogeneration System	Emergency Generators[8]	Boiler System	Cogeneration System	Emergency Generators[8]
Stack Height (ft)	443.0[1]	416.0[1]	439.0	336.3[1]	309.3[1]	330.3
Stack Diameter (ft)	2.828	2.236	0.7	4.0	1.0	0.7
Exhaust Velocity (ft/s)	19.48	115.62	935.0	23.72	42.62	520.9
Exhaust Temperature (K)[2]	426.4	553.2	763.9	426.4	582.0	677.0
NO_x Emission Rate (g/s)	1.03[3]	0.0156[4]	N/A	0.105[3]	0.00116[4]	N/A
$PM_{2.5}$ Emission Rate (g/s) (24-hour)	0.0866[5]	0.00948	0.00233	0.00695[5]	0.00070	0.00115
$PM_{2.5}$ Emission Rate (g/s) (Annual)	0.00882[6]	0.00948	N/A	0.00140[6]	0.00070	N/A
SO_2 Emission Rate (g/s)	0.011 [7]	0.00488	0.0000061	0.00111 [7]	0.00036	0.0000037

Notes:
(1) The stack height is based on an exhaust that is 30 feet and 3 feet above the highest tier of the building for the boiler and cogeneration units, respectively.
(2) The exhaust temperature was estimated based on typical exhaust temperature for commercial boilers.
(3) Emission rate is based on EPA AP-42 boiler emission factor and peak hourly heat input during the month of January, assuming No. 2 oil is used.
(4) Emission rate is based on manufacturer's data and peak hourly heat input during the month of January.
(5) Emission rate for the 24-hour averaging period is based on EPA AP-42 emission factor and the estimated maximum daily heat input averaged over 24 hours during the month of January.
(6) Emission rate for the annual averaging period is based on EPA AP-42 emission factor and annual energy consumption.
(7) Emission rate is based on EPA AP-42 emission factor, and peak hourly heat input during the month of January, assuming No. 2 oil is used.
(8) Emergency generator stack parameters and emission rates use building design and manufacture's data. Emission rates assumed a 1-hour operation.

Meteorological Data

The meteorological data set consisted of five consecutive years of meteorological data: surface data collected at La Guardia Airport (2007–2011) and concurrent upper air data collected at Brookhaven, New York. The meteorological data provide hour-by-hour wind speeds and directions, stability states, and temperature inversion elevation over the five-year period. These data were processed using the EPA AERMET program to develop data in a format which can be readily processed by the AERMOD model. The land uses around the site where meteorological surface data were available were classified using categories defined in digital United States Geological Survey (USGS) maps to determine surface parameters used by the AERMET program.

Receptor Locations

A comprehensive receptor network (i.e., locations with continuous public access) was developed for the modeling analyses. Discrete receptors were analyzed, including locations on the proposed project site and other nearby buildings, at operable windows, air intakes, and at publicly accessible ground-level locations. The model also included elevated and ground-level receptor grids in order to address more distant locations and to identify the highest ground-level impact.

Background Concentrations

To estimate the maximum expected total pollutant concentrations, the calculated impacts from the emission sources must be added to a background value that accounts for existing pollutant concentrations from other sources (see **Table 10-4**). The background levels are based on concentrations monitored at the nearest DEC ambient air monitoring stations over a recent five-year period for which data are available (2007-2011), with the exception of PM_{10}, which is based on three years of data (2009-2011), consistent with current DEP guidance. Consistent with the form of the standard, for the 1-hour NO_2 averaging period, the 3-year average of the annual 98th percentile daily maximum 1-hour average concentration was used. The 1-hour average SO_2 concentration is based on the 3-year average of the annual 99th percentile of the daily maximum

1-hour SO_2 concentrations. For the 3-hour SO_2 and 24-hour PM_{10} concentrations, the highest second-highest measured values over the specified period were used. The annual average background values are the highest measured average concentrations for these pollutants. The measured background concentration was added to the predicted contribution from the modeled source to determine the maximum predicted total pollutant concentration. It was conservatively assumed that the maximum background concentrations occur on all days.

Table 10-4
Maximum Background Pollutant Concentrations
For Stationary Source Analysis

Pollutant	Average Period	Location	Concentration (µg/m^3)	NAAQS (µg/m^3)
NO_2	Annual	PS 59, Manhattan	54.50	100
	1-hour		126.9	188
SO_2	3-hour	PS 59, Manhattan	162.4	1,300
	1-hour		133.6	196
PM_{10}	24-hour	PS 59, Manhattan	44	150
Source: New York State Air Quality Report Ambient Air Monitoring System, NYSDEC, 2007–2011.				

$PM_{2.5}$ impacts are assessed on an incremental basis and compared with the $PM_{2.5}$ interim guidance criteria. Therefore, a background concentration for $PM_{2.5}$ is not included.

CHEMICAL SPILL ANALYSIS

Introduction

Emissions from the proposed CUNY-Hunter Building fume hood exhaust system, in the event of an accidental chemical spill in one of the laboratories, were evaluated. Impacts were evaluated using information, procedures and methodologies contained in the *CEQR Technical Manual*. Maximum concentrations were compared to the short-term exposure levels (STELs) or to the ceiling levels recommended by the U.S. Occupational Safety and Health Administration (OSHA) for the chemicals examined. The types and quantities of materials that are to be used in the research laboratories were obtained from CUNY personnel.

The following section details the expected usage of potentially hazardous materials, as well as the systems that would be employed at the proposed project to ensure the safety of the staff and the surrounding community in the event of an accidental laboratory chemical spill in the science laboratories. A quantitative analysis employing mathematical modeling was performed to determine potential impacts of a chemical spill on nearby places of public access, including nearby buildings, and potential impacts due to recirculation into air intake systems of the new CUNY-Hunter Building.

Laboratory Fume Hood Exhausts

All laboratories in which hazardous chemicals are used would be equipped with fume hoods. Fume hoods are enclosures that are maintained under negative pressure and continuously vented to the outside. Their function is to protect the staff from potentially harmful fumes. By providing a continuous exhaust from laboratory rooms, they also prevent any fumes released within the laboratory from escaping into other areas of the proposed CUNY-Hunter Building, or through windows to the outside.

Conceptual design information from the laboratory ventilation system was used as the basis for analyzing potential spills. The design specifies the following parameters for the exhaust system:

- Type of exhausts – common exhaust plenum tied into approximately four cannon fans;
- Exhaust flow rate – approximately 152,406 cubic feet per minute leaving the canon fans;
- Exhaust velocity – 5,439 feet per minute per fan; and
- Effective stack height – 58 feet above stack exhaust (approximate).

Planned Operations

An inventory of chemicals which may be present in a typical laboratory in the proposed CUNY-Hunter Building was examined. From the chemical inventory, 12 chemicals were selected for further examination, based on their toxicity and potential for air quality impacts. Common buffers, salts, enzymes, nucleotides, peptides, and other bio-chemicals were not considered in the analysis since they are not typically categorized as air pollutants. Nonvolatile chemicals (a vapor pressure of less than 10 mm Hg) were excluded as well. **Table 10-5** shows the hazardous chemicals selected. The vapor pressure shown for each chemical is a measure of the material's volatility—its tendency to evaporate, or to form fumes or vapors, which is a critical parameter in determining potential impacts from chemical spills. The exposure standards (OSHA permissible exposure limit [PEL], National Institute for Occupational Safety and Health [NIOSH], immediately dangerous to life or health [IDLH], and OSHA and/or NIOSH short-term exposure level [STEL] and ceiling values) are measures of the material's toxicity—more toxic substances have lower exposure standards.

Table 10-5
Expected Hazardous Materials in the Proposed Laboratories

Chemical [CAS #]	Vapor Pressure mm Hg	PEL PPM	STEL PPM	IDLH PPM	Ceiling PPM
Acetone [67-64-1]	180	1,000	-	-	-
Acetonitrile [75-05-8]	73	40	-	500	-
Chloroform [67-66-3]	160	50	2	500	50
Formaldehyde [50-0-0]	26	1	-	20	0.1
Ethyl Alcohol [64-17-5]	44	1,000	-	3,300	-
Hexane [110-54-3]	124	500	-	1,100	-
Isopropanol [67-63-0]	33	400	-	2,000	-
Methanol [67-56-1]	96	200	250	6,000	-
2-Propanol [67-63-0]	33	400	-	2,000	-
Tetrahydrofuran [110-86-1]	132	200	250	2,000	-
Toluene [108-88=3]	21	500	150	500	-
Xlyene [106-42-3]	9	100	150	900	-

Notes:
PEL—Permissible Exposure Limit; Time Weighted Average (TWA) for up to a 10-hour workday during a 40-hour workweek.
STEL—Short-Term Exposure Limit is a 15-minute TWA exposure that should not be exceeded at any time during a workday.
IDLH—Immediately Dangerous to Life or Health.
Ceiling—Level set by NIOSH or OSHA not to be exceeded in any working exposure.
PPM = parts per million.
Where a hyphen (-) appears there is no recommended corresponding guideline value.

Estimates of Worst-Case Emission Rates

The dispersion of hazardous chemicals from a spill within one of the proposed laboratories was analyzed to assess the potential for exposure of the general public and staff within the new CUNY-Hunter Building as well as nearby buildings to hazardous fumes in the event of an accident. Evaporation rates for volatile hazardous chemicals expected to be used in the proposed laboratory were estimated using the model developed by the Shell Development Company[10], as referenced in the *CEQR Technical Manual*. The Shell model, which was developed specifically to assess air quality impacts from chemical spills, calculates evaporation rates based on physical properties of the material, temperature and rate of air flow over the spill surface. Room temperature conditions (20°C) and an air-flow rate of 0.5 meters/second were assumed for calculating evaporation rates.

Based on relative STELs and the vapor pressures of the chemicals listed in **Table 10-5**, a subset of the most potentially hazardous chemicals, shown in **Table 10-6**, were selected for the "worst-case" spill analysis. Besides the relative toxicities, other factors such as molecular weight, container size, and frequency of use were also considered. Chemicals with high vapor pressures evaporate most rapidly. Among the chemicals with high vapor pressures compiled for **Table 10-5**, the chemicals selected also have the lowest STELs. Since the chemicals selected for detailed analysis are most likely to have the highest emissions rates and the lowest exposure standards, if the analysis of a potential spill of these chemicals resulted in no significant impacts, it would indicate that the other chemicals listed in **Table 10-5** would also not present any significant potential impacts in the event of a spill.

Table 10-6
Chemicals Selected for Worst-Case Spill Analysis

Chemical	Quantity (liters)	Evaporation Rate (gram/meter^2/sec)	Emission Rate(1) (gram/sec)
Acetonitrile	0.20	0.30	0.33
Chloroform	0.92	1.37	1.53
Formaldehyde	0.08	0.084	0.093

Notes:
(1) Average emission rate.
(2) Quantity of spill was calculated based on assumed spill area of 12 sq. ft. and chemical vapor pressure.

The analysis conservatively assumes that a chemical spill in a fume hood would extend to an area of 12 square feet (approximately 1.1 square meters). The emission rates were determined using the evaporation rates and assuming this maximum spill area. For modeling purposes, the emission rates shown in **Table 10-6** are calculated for a 15-minute time period. The vapor from the spill would be drawn into the fume hood exhaust system and released into the atmosphere via the roof exhaust fans. The high volume of air drawn through this system provides a high degree of dilution for hazardous fumes before they are released above the roof. The effective exhaust stack height of the fans would be approximately 58 feet above the top of the exhaust stack.

[10] Fleischer, M.T., An Evaporation/Air Dispersion Model for Chemical Spills on Land, Shell Development Company, December 1980.

Recirculation Modeling

The potential for recirculation of the fume hood emissions back into the building air intakes was assessed using the Wilson method.[11] This empirical procedure, which has been verified by both wind-tunnel and full-scale testing, is a refinement of the 1981 ASHRAE Handbook procedure, and takes into account such factors as plume momentum, stack-tip downwash, and cavity recirculation effects. The procedure determines the worst-case, absolute minimum dilution between exhaust vent and air intake. Three separate effects determine the eventual dilution: internal system dilution, obtained by combining exhaust streams (i.e., mixing in plenum chambers of multiple exhaust streams, introduction of fresh air supplied from roof intakes); wind dilution, dependent on the distance from vent to intake and the exit velocity; and dilution from the stack, caused by stack height and plume rise from vertical exhaust velocity. The critical wind speed for worst-case dilution is dependent on the exit velocity, the distance from vent to intake, and the cross-sectional area of the exhaust stack.

Dispersion Modeling

Maximum concentrations at elevated receptors downwind of the fume exhausts were estimated using the EPA/AMS AERMOD dispersion model[12] (see previous description of model). Hourly meteorological data collected at the LaGuardia Airport station from 2007 through 2011 were used in this analysis. The analysis of potential impacts from a chemical spill was conducted assuming stack tip downwash, urban dispersion and surface roughness length, with and without building downwash, and with elimination of calms.

Discrete receptors (i.e., locations at which concentrations are calculated) were chosen on nearby buildings for the laboratory spill analysis. The model receptor network consisted of locations along the sides and roof of the buildings, at operable windows, intake vents, and otherwise accessible locations such as terraces. Rows of receptors were placed in the model at spaced intervals on the buildings at multiple elevations. 7-Minute digital elevation model (DEM) files were obtained for the receptor area. A terrain pre-processor program was used to determine the representative elevations for each receptor. All receptors were referenced to Universal Transverse Mercator (UTM) coordinates. The receptor network included existing buildings as well as approved buildings in the study area that are assumed to be constructed in the No Build condition.

The power law relationship was used to convert the calculated 1-hour average maximum concentrations to short-term 15-minute averages. The 15-minute average concentrations were then compared to the STELs or to the ceiling levels for the chemicals examined.

INDUSTRIAL SOURCES

To assess air quality impacts on the proposed development associated with emissions from nearby industrial sources, an investigation of industrial sources was conducted. Initially, land use and Sanborn maps were reviewed to identify potential sources of emissions from manufacturing/industrial operations. Next, a field survey was conducted to identify buildings

[11] D.J. Wilson, A Design Procedure for Estimating Air Intake Contamination from Nearby Exhaust Vents, ASHRAE TRAS 89, Part 2A, pp. 136-152, 1983.

[12] EPA, AERMOD: Description of Model Formulation, 454/R-03-004, September 2004; and EPA, User's Guide for the AMS/EPA Regulatory Model AERMOD, 454/B-03-001, September 2004 and Addendum December 2006.

within 400 feet of the project site that have the potential for emitting air pollutants. The survey was conducted on November 8, 2011. To completely cover the study area, all of the blocks bounded by York Avenue to the west, the FDR Drive to the east, East 72nd Street to the south, and East 75th Street to the north were surveyed to observe uses and to identify visible emissions.

A list of the identified businesses was then submitted to DEP's Bureau of Environmental Compliance (BEC) to obtain all the available certificates of operation for these locations and to determine whether manufacturing or industrial emissions occur. In addition, a search of federal and state-permitted facilities within the study area was conducted using the EPA's Envirofacts database.[13] No businesses were found to have a DEP certificate of operation within the surveyed area. Therefore, no potential impacts from industrial sources would occur with the proposed project, and no further analysis was warranted.

ADDITIONAL SOURCES

The *CEQR Technical Manual* requires an assessment of any actions that could result in the location of sensitive uses within 1,000 feet of a "large" emission source (examples of large emission sources provided in the *CEQR Technical Manual* include solid and medical waste incinerators, cogeneration plants, asphalt and concrete plants, or power plants). To assess the potential effects of these existing sources on the proposed project, a review of existing permitted facilities was conducted. Within the study area boundaries, sources permitted under DEC's Title V program and State Facility permit program were considered.

Two large sources were identified within the 1,000 foot study area: the Con Edison East 74th Street Steam Plant (Con Edison Steam Plant) and the New York Presbyterian Hospital (NYPH) central steam plant on East 68th Street. An analysis was performed using the EPA/AMS AERMOD dispersion model.[14] The AERMOD analysis was performed assuming the same options and assumptions as described previously for the analysis of the proposed project's emissions sources, except where indicated.

Emission Rates and Stack Parameters

Table 10-7 presents the emission rates and stack exhaust parameters used in the AERMOD analysis.

NO_2 concentrations were estimated using NO_2 to NO_x ratios of 0.8 for the maximum 1-hour concentration and 0.75 for the annual concentration, per EPA guidance.[15]

Receptor Locations

Discrete receptors (i.e., locations at which concentrations are calculated) were modeled along the facades of the proposed MSK ACC and CUNY-Hunter Building to represent operable window locations, intake vents, and otherwise accessible locations such as terraces. Rows of receptors were placed at spaced intervals on the proposed buildings at multiple elevations.

---

[13] http://oaspub.epa.gov/enviro/ef_home2.air

[14] EPA, AERMOD: Description Of Model Formulation, 454/R-03-004, September 2004; and

EPA, User's Guide for the AMS/EPA Regulatory Model AERMOD, 454/B-03-001, September 2004 and Addendum December 2006.

[15] EPA, Memorandum, "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard," March 1, 2011.

Table 10-7
Emission Rates and Stack Parameters

Parameter	Con Edison Steam Plant	NYPH Plant
Stack Height (ft) [1]	494	403
Stack Diameter (ft) [1]	16	8
Exhaust Velocity (ft/s)	111.6 [2]	44.1 [3]
Exhaust Temperature (F)	363 [2]	450 [3]
$PM_{2.5}$ Emission Rate (g/s)	13.67 [4]	0.48 [5]
PM_{10} Emission Rate (g/s)	17.1 [4]	0.59 [4]
NO_x Emission Rate (g/s)	110.1 [4]	7.77 [6]
SO_2 Emission Rate (g/s)	141.95 [4]	0.142 [4]

Sources:

(1) Title V permit for the source.
(2) Con Edison, 2001, *East River Repowering Project, New York, NY: Cumulative Impact Air Quality Analysis Under the New York City Environmental Review Technical Manual*.
(3) Based on 2008 Stack test report for NYPH sources.
(4) Emission rates are based on the calculated emission rate using AP-42 emission factors and maximum heat input.
(5) Emission rate based on the sum of the emission rate for the boilers based on stack testing, and the calculated emission rate for the combustion turbine and duct burner based on AP-42 emission factors and maximum heat input.
(6) Emission rate based on permitted NO_x emission limit.

Background Concentrations

To estimate the maximum expected pollutant concentration at a given receptor, the predicted impact must be added to a background value that accounts for existing pollutant concentrations from other sources that are not directly accounted for in the model. Consistent with the form of the standard, for the 1-hour NO_2 averaging period, the 3-year average of the annual 98th percentile daily maximum 1-hour average concentration was used. $PM_{2.5}$ impacts are assessed on an incremental basis and compared with the $PM_{2.5}$ interim guidance criteria. Therefore, a background concentration for $PM_{2.5}$ is not included.

$PM_{2.5}$ impacts are assessed on an incremental basis and compared with the $PM_{2.5}$ interim guidance criteria. Therefore, a background concentration for $PM_{2.5}$ is not included.

E. EXISTING CONDITIONS

The most recent concentrations of all criteria pollutants at DEC air quality monitoring stations nearest to the proposed project are presented in **Table 10-8**. As shown, the recently monitored levels did not exceed the NAAQS. It should be noted that these values are somewhat different from the background concentrations used in the mobile source analyses. For most pollutants, the concentrations presented in **Table 10-8** are based on measurements obtained in 2011, the most recent year for which data are available; the background concentrations are obtained from several years of monitoring data and represent a conservative estimate of the highest background concentrations for future conditions.

Table 10-8
Representative Monitored Ambient Air Quality Data

Pollutant	Location	Units	Averaging Period	Concentration	NAAQS
CO	Queens College 2, Queens	ppm	8-hour	1.4	9
			1-hour	1.9	35
SO_2	Botanical Garden, Bronx[1]	µg/m^3	3-hour	102.6	1,300
			1-hour	133.5	196
PM_{10}	P.S. 19, Manhattan	µg/m^3	24-hour	40	150
$PM_{2.5}$	P.S. 19, Manhattan[2]	µg/m^3	Annual	11.9	15
			24-hour	27	35
NO_2	Queens College 2, Queens[3]	µg/m^3	Annual	40.7	100
			1-hour	126.9	188
Lead	Morrisania, Bronx[4]	µg/m^3	3-month	0.008	0.15
Ozone	CCNY, Manhattan[5]	ppm	8-hour	0.072	0.075

Notes:
(1) The 1-hour value is based on a three-year average (2009-2011) of the 99th percentile of daily maximum 1-hour average concentrations. EPA replaced the 24-hr and the annual standards with the 1-hour standard.
(2) Annual value is based on a three-year average (2009-2011) of annual concentrations. The 24-hour value is based on the 3-year average of the 98th percentile of 24-hour average concentrations.
(3) The 1-hour value is based on a three-year average (2009-2011) of the 98th percentile of daily maximum 1-hour average concentrations.
(4) Based on the highest quarterly average concentration measured in 2011.
(5) Based on the 3-year average (2009-2011) of the 4th highest daily maximum 8-hour average concentrations.
Source: DEC, New York State Ambient Air Quality Data.

MODELED CO CONCENTRATIONS FOR EXISTING TRAFFIC CONDITIONS

As noted previously, receptors were placed at multiple sidewalk locations next to the intersections selected for the analysis. **Table 10-9** shows the maximum modeled existing (2012) CO 8-hour average concentration. (No 1-hour values are shown since predicted values are much lower than the 1-hour standard of 35 ppm.) At all receptor sites, the maximum predicted 8-hour average concentrations are well below the national standard of 9 ppm.

Table 10-9
Modeled Existing 8-Hour Average CO Concentrations (2012)

Receptor Site	Location	Time Period	8-Hour Concentration (ppm)
1	York Avenue and E. 74th Street	MD	2.7

Notes:
8-hour standard (NAAQS) is 9 ppm.
Concentration includes a background concentration of 2.0 ppm.

F. THE FUTURE WITHOUT THE PROPOSED PROJECT

MOBILE SOURCES

INTERSECTION ANALYSIS

CO concentrations in the No Build condition were determined for future 2019 conditions using the methodology previously described. **Table 10-10** shows future maximum predicted 8-hour average CO concentrations, including background concentrations, at the analysis intersections in the No Build condition. The values shown are the highest predicted concentrations for the receptor locations for any of the time periods analyzed.

Table 10-10
Maximum Predicted Future (2019) 8-Hour Average Carbon Monoxide No Build Concentrations

Receptor Site	Location	Time Period	8-Hour Concentration (ppm)
1	York Avenue and E. 74th Street	MD	2.4
Notes: 8-hour standard (NAAQS) is 9 ppm. Concentration includes a background concentration of 2.0 ppm.			

As shown in **Table 10-10**, 2019 No Build values are predicted to be well below the 8-hour CO standard of 9 ppm, and lower than predicted existing average concentrations (shown in **Table 10-9**). The predicted decrease in CO concentrations would result from the increasing proportion of newer vehicles with more effective pollution controls as well as the continuing benefits of the New York State I&M Program.

PM_{10} concentrations for the No Build condition were also determined using the methodology previously described. **Table 10-11** presents the future maximum predicted PM_{10} 24-hour concentrations, including background concentrations, at the analyzed intersections in 2019 No Build condition. The values shown are the highest predicted concentrations for the receptor locations. Note that $PM_{2.5}$ concentrations for the No Build condition are not presented, since impacts are assessed on an incremental basis.

Table 10-11
No Build Condition Maximum Predicted 24-Hour Average PM_{10} Concentrations ($\mu g/m^3$)

Receptor Site	Location	Concentration
1	York Avenue and E. 74th Street	60.8
Notes: NAAQS—24-hour average 150 $\mu g/m^3$. Concentration includes a background concentration of 44 .0 $\mu g/m^3$.		

STATIONARY SOURCES

In the future without the proposed project, stationary source emissions would be similar to existing conditions.

G. PROBABLE IMPACTS OF THE PROPOSED PROJECT

The following sections describe the results of the analyses performed to assess the potential impacts on the surrounding community from emissions associated with the proposed project. In addition, existing industrial facilities were assessed for potential adverse impacts on the proposed project.

MOBILE SOURCES

INTERSECTION ANALYSIS

CO concentrations for future conditions in the 2019 analysis year were predicted using the methodology previously described. **Table 10-12** shows the future maximum predicted 8-hour average CO concentrations at the intersection studied. (No 1-hour values are shown, since no exceedances of the NAAQS would occur and the *de minimis* criteria are only applicable to 8-hour concentrations; therefore, the 8-hour values are the most critical for impact assessment.) The values shown are the highest predicted concentrations. The results indicate that the proposed project would not result in any violations of the 8-hour CO standard. In addition, the incremental increases in 8-hour average CO concentrations are very small, and consequently would not result in a violation of the CEQR *de minimis* CO criteria. Therefore, the proposed project mobile source CO emissions would not result in a significant adverse impact on air quality.

Table 10-12
Maximum Predicted 2019
CO Concentrations

Receptor Site	Location	Time Period	8-Hour Concentration (ppm)		De minimis
			No Action	Build	
1	York Avenue and E. 74th Street	MD	2.4	2.5	5.7

Notes:
8-hour standard is 9 ppm.
Concentration includes a background concentration of 2.0 ppm.

PM_{10} concentrations for the Build condition were also determined using the methodology previously described. **Table 10-13** presents the future maximum predicted PM_{10} 24-hour concentrations, including background concentrations, at the analyzed intersections in 2019 Build condition. The values shown are the highest predicted concentrations for the receptor locations.

Table 10-13
No Build Condition Maximum Predicted 24-Hour Average
PM_{10} Concentrations ($\mu g/m^3$)

Receptor Site	Location	Concentration	
		No Action	Build
1	York Avenue and E. 74th Street	60.8	63.4

Notes:
NAAQS—24-hour average 150 $\mu g/m^3$.
Concentration includes a background concentration of 44.0 $\mu g/m^3$.

Using the methodology previously described, maximum predicted 24-hour and annual average $PM_{2.5}$ concentration increments were calculated so that they could be compared to the interim

guidance criteria that would determine the potential significance of any impacts from the proposed project. Based on this analysis, the maximum predicted localized 24-hour average and neighborhood-scale annual average incremental $PM_{2.5}$ concentrations are presented in **Tables 10-14 and 10-15**, respectively. Note that $PM_{2.5}$ concentrations in the No Build condition are not presented, since impacts are assessed on an incremental basis.

Table 10-14
2019 Maximum Predicted 24-Hour Average
$PM_{2.5}$ Concentration

Location	Increment (µg/m^3)
York Avenue and E. 74th Street	1.11
Note: $PM_{2.5}$ interim guidance criteria—24-hour average, 2 µg/m^3 (5 µg/m^3 not-to-exceed value).	

Table 10-15
2019 Maximum Predicted Annual Average
$PM_{2.5}$ Concentration

Location	Increment (µg/m^3)
York Avenue and E. 74th Street	0.08
Note: $PM_{2.5}$ interim guidance criteria—annual (neighborhood scale), 0.1 µg/m^3.	

The results show that the annual and daily (24-hour) $PM_{2.5}$ increments are predicted to be below the interim guidance criteria. Therefore, there would be no potential for significant adverse impacts on air quality from vehicle trips generated by the proposed project.

PARKING GARAGE

Based on the methodology previously described, the maximum predicted 8-hour average CO concentrations from the proposed parking facility were analyzed at the following locations, assuming a vent location on the façade of the proposed building: a near side sidewalk receptor on the same side of the street as the parking facility; a far side sidewalk receptor on the opposite side of the street from the parking facility; and a receptor placed on the façade of the building above the parking garage vent.

The total CO concentrations include both background CO levels and contributions from traffic on adjacent roadways for the far side receptor only. The maximum predicted 8-hour average CO concentration of all the receptors modeled is 2.3 ppm on the building façade. This value includes a predicted concentration of 0.3 ppm from the parking garage vent, and includes a background level of 2.0 ppm. At other locations the maximum predicted CO concentration is lower. The maximum predicted concentration is substantially below the applicable standard of 9 ppm. Therefore, the proposed parking garage would not result in any significant adverse air quality impacts.

STATIONARY SOURCES

BOILER, EMERGENCY GENERATOR AND COGENERATION SYSTEMS

An AERMOD modeling analysis was performed to determine potential impacts from the exhaust stacks for the boiler and cogeneration systems associated with the proposed project, as

well short-term impacts due to emergency generators. Maximum predicted concentrations were added to the design ambient background concentration and compared to the NAAQS.

The results of this analysis are presented in **Table 10-16** for NO_2, PM_{10} and SO_2. Impacts from the proposed project are less than their respective NAAQS; therefore, the proposed project would not result in any significant adverse air quality impacts.

Table 10-16
Future (2019) Maximum Modeled Pollutant Concentration (in µg/m^3)

Pollutant	Averaging Period	Maximum Modeled Impact	Background	Total Concentration	NAAQS
NO_2	1-hour	49.25	126.9	173.85	188
	Annual	0.64	54.5	55.14	100
SO_2	1-hour	2.65	133.56	136.21	196
	3-hour	1.66	162.4	164.06	1,300
PM_{10}	24-hour	3.53	44	47.53	150

Maximum concentrations of $PM_{2.5}$ from the proposed project were also estimated. Impacts were compared to the City's interim guidance criteria for $PM_{2.5}$. The maximum predicted 24-hour and localized annual average incremental $PM_{2.5}$ concentrations are presented in **Table 10-17**.

Table 10-17
Future (2019) Maximum Predicted $PM_{2.5}$ Concentrations (in µg/m^3)

Pollutant	Averaging Period	Maximum Concentration	Interim Guidance Threshold
$PM_{2.5}$	24-hour	3.53	5/2[(1)]
	Annual (discrete)	0.256	0.3
	Annual (neighborhood scale)	0.010	0.1

Note:
[(1)] 24-hour $PM_{2.5}$ interim guidance criterion, > 2 µg/m^3 (5 µg/m^3 not-to-exceed value), depending on the magnitude, frequency, duration, location, and size of the area of the predicted concentrations.

As shown in **Table 10-17**, the maximum 24-hour incremental impacts at any discrete receptor location would be less than the applicable interim guidance criterion of 5 µg/m^3. On an annual basis, the maximum projected $PM_{2.5}$ increments would be less than the applicable interim guidance criterion of 0.3 µg/m^3 for local impacts and 0.1 for neighborhood scale impacts.

The air quality analysis also evaluated impacts with the 24-hour average interim guidance criterion of 2 µg/m^3 for discrete receptor locations. The assessment examined the magnitude, duration, frequency, and extent of the increments at locations where exposure above the 2 µg/m^3 threshold averaged over a 24-hour period could occur. The receptor location with the maximum continual 24-hour exposure was predicted on the residential building at 530 East 73rd Street, at an elevation of approximately 488 feet above sea level. At this location, the maximum 24-hour $PM_{2.5}$ incremental concentration from the proposed project was predicted to be 3.53 µg/m^3, at a maximum annual frequency of once per year, and at an average frequency of less than once per year, over five years. On the same floor, there were locations with incremental concentrations exceeding 2 µg/m^3 along the northern façade of the building. At these receptors, 24-hour incremental concentrations from the proposed project were predicted to exceed 2 µg/m^3 at a maximum frequency ranging from one to five times per year, with an average frequency of less than two times per year. Overall, the magnitude, extent, and frequency of concentrations above 2.0 µg/m^3 are very low.

CHEMICAL SPILL ANALYSIS

Recirculation Analysis

The recirculation analysis indicates that the minimum potential dilution factor between the fan exhausts and the nearest air intake below the rooftop is approximately 1,000 (i.e., pollutant concentrations at the nearest intake to the exhaust fan would be approximately 1,000 times less than the concentration at the fan exhaust). Thus, for example, a chloroform spill in a fume hood as described above would produce a maximum concentration at the nearest intake location of about 0.0018 ppm.

The results of the recirculation analysis are presented in **Table 10-18**. The results indicate that a spill in a fume hood as described above would produce a maximum concentration at the nearest intake location well below the corresponding STELs or ceiling values set by OSHA and/or NIOSH for each of the chemicals analyzed. Consequently, it can be concluded that no significant impact would be expected due to recirculation of fume hood emissions back into the proposed CUNY-Hunter Building's air intakes in the event of a chemical spill.

Table 10-18
Fume Hood Recirculation Analysis
Maximum Predicted Concentrations (ppm)

Chemical	STEL/OSHA Ceiling	15-Minute Average
Acetonitrile	40	0.0077
Chloroform	2.0	0.0051
Formaldehyde	0.1	0.0019
Note: * 15-Minute Average emission rate		

Dispersion Analysis

The results of the analysis of potential emissions from the fume hood exhaust system are shown below in **Table 10-19**. The maximum concentrations at elevated receptors downwind of the fume hood exhausts were estimated using the methodology previously described, and were determined to be below the STEL levels.

Table 10-19
Maximum Predicted Concentrations (ppm)

Chemical	STEL/OSHA Ceiling	15-Minute Average
Acetonitrile	40	0.363
Chloroform	2.0	0.241
Formaldehyde	0.1	0.089
Note: * 15-Minute Average emission rate		

Conclusion

Potential emissions from a chemical spill within the proposed CUNY-Hunter Building's laboratory exhaust system were evaluated. Maximum concentrations were determined based on dispersion modeling at downwind receptors, rather than due to recirculation impacts of the fume exhaust on receptors on the CUNY-Hunter Building. The results of the laboratory chemical spill analysis demonstrate that no significant adverse impacts from the exhaust system of the

laboratories to be located in the new CUNY-Hunter Building, or on other nearby buildings in the surrounding community, would be expected with the project.

ADDITIONAL SOURCES

An analysis was performed for the two large sources that were identified within the 1,000 foot study area—the Con Edison Steam Plant on East 74th Street and the NYPH steam plant on East 68th Street.

AERMOD Analysis

The maximum modeled pollutant concentrations from the NYPH and Con Edison steam plants, along with the relevant background concentrations, the total potential concentrations and the applicable NAAQS, are presented in **Table 10-20**. The maximum predicted $PM_{2.5}$ concentrations from the steam plants at the proposed project locations would be lower than the City's interim guidance criteria thresholds, and other total pollutant concentrations (when added to the applicable background) would be well below their respective NAAQS.

Table 10-20
Maximum Modeled Pollutant Concentrations from NYPH and Con Edison Steam Plants on the Proposed Project (in $\mu g/m^3$)

Pollutant	Averaging Period	Modeled Concentration	Background Concentration	Total Concentration	NAAQS
NO_2[(1)]	1-hour	56.63	126.9	183.53	188
	Annual	3.35	54.50	57.85	100
SO_2	1-hour	37.97	133.56	171.53	196
	3-hour	37.84	162.4	200.24	1,300
PM_{10}	24-hour	2.37	44	46.37	150
$PM_{2.5}$	24-hour	1.92	-	-	2/5 (SIL)[(2)]
	Annual	0.237	-	-	0.3 (SIL)

Note:

(1) NO_2 concentrations were estimated using NO_2 /NO_x ratio of 0.8 for NO_2 1-hour and 0.75 for NO_2 annual as per EPA guidance.

(2) 24-hour $PM_{2.5}$ interim guidance criterion, > 2 $\mu g/m^3$ (5 $\mu g/m^3$ not-to-exceed value), depending on the magnitude, frequency, duration, location, and size of the area of the predicted concentrations.

Overall, no significant adverse air quality impact on the proposed project would occur as a result of the operation of nearby large emission sources. ✷