Chapter 11: Air Quality

A. INTRODUCTION

This chapter assesses the potential impacts of proposed land use actions in support of a new Center East building (Proposed Project) on air quality. As described in Chapter 1, "Project Description," the Applicant is requesting a rezoning and other discretionary actions (the Proposed Actions) to facilitate the construction of the Proposed Project, an approximately 596,200 gross-square-foot (gsf) building on the site of its existing New York Blood Center building at 310 East 67th Street, Block 1441 Lot 40 (the "Development Site").

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 combustion for heating and hot water systems. Indirect impacts are caused by off-site emissions associated with a project such as emissions from nearby existing stationary sources (i.e., impacts from buildings within the Project Area) or by emissions from on-road vehicle trips (mobile sources) generated by the Proposed Project or other changes to future traffic conditions due to a project.

The Proposed Project is not expected to significantly alter traffic conditions. The maximum hourly incremental traffic volumes generated by the Proposed Project would not exceed the 2020 *City Environmental Quality Review* (*CEQR) Technical Manual* carbon monoxide (CO) screening threshold of 170 peak-hour vehicle trips at intersections in the traffic study area, nor would they exceed the particulate matter (PM) emission screening threshold discussed in Chapter 17, Sections 210 and 311, of the *CEQR Technical Manual*. Therefore, there is no potential for mobile source impacts from the Proposed Project, and a quantified assessment of mobile source emissions is not warranted.

The Proposed Project would include fossil fuel-burning heating and hot water systems. Therefore, a stationary source analysis was conducted to evaluate potential pollutant concentrations from the proposed heating and hot water systems.

A review of DEP and NYSDEC air permits was performed to determine whether there are any permitted industrial sources of emissions within the 400-foot study area referenced in the *CEQR Technical Manual*. No such industrial sources were identified.

A residential development defined as a large source as per the *CEQR Technical Manual* was identified within 1,000 feet of the Development Site. Therefore, an analysis of the potential air quality impacts of this emissions source on the Proposed Project is required, as described in the *CEQR Technical Manual*.

The Proposed Project would include space for research laboratories for the Applicant and its research partners. Therefore, an analysis was performed to examine the expected use of potentially hazardous materials and the procedures and systems that would be employed in the proposed laboratory to ensure the safety of staff and the surrounding community in the event of a chemical spill in one of the proposed laboratories to ensure the safety of staff and the surrounding community in the event of a chemical spill.

PRINCIPAL CONCLUSIONS

An analysis of air quality determined that the Proposed Actions would not result in significant adverse impacts related to mobile source or stationary source air quality. As discussed below, the maximum pollutant concentrations and concentration increments from mobile sources with the Proposed Actions are projected to be lower than the corresponding CEQR *de minimis* criteria, and therefore would not warrant further analysis.

In terms of industrial sources, no businesses were found to have a New York State Department of Environmental Conservation (NYSDEC) air permit or New York City Department of Environmental Protection (DEP) certificate of operation within the study area, and no other potential sources of concern were identified. Therefore, no potential significant adverse air quality impacts would occur on the Proposed Project from industrial sources.

The analysis of the existing large source of emissions determined there would be no significant adverse air quality impact on the Proposed Project.

Based on a detailed dispersion modeling analysis, no potential significant adverse air quality impacts would result from the Proposed Project's heating and hot water systems. An (E) Designation (E-612) would be applied to ensure that the Proposed Project would not result in any significant adverse air quality impacts from fossil fuel-fired heat and hot water systems emissions.

An analysis of the laboratory exhaust system for the Proposed Project 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.

B. POLLUTANTS FOR ANALYSIS

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 CO are predominantly influenced by mobile source emissions. 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 some sources utilizing non-road diesel such as large international marine 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. Ambient concentrations of CO, PM, NO_2, SO_2, ozone, and lead are regulated by the U.S. Environmental Protection Agency (EPA) under the Clean Air Act (CAA),[1] and are referred to as 'criteria pollutants'; emissions of precursors to criteria pollutants, including VOCs, NO_x, and SO_2, are also regulated by EPA.

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. CO concentrations can diminish rapidly over relatively short distances; elevated concentrations are usually limited to locations near crowded

[1] The Clean Air Act of 1970, as amended 1990 (42 U.S.C. §7401 et seq.).

intersections, heavily traveled and congested roadways, parking lots, and garages. Consequently, CO concentrations must be analyzed on a local (microscale) basis.

The Proposed Project is not expected to result in an increase in vehicle trips higher than the *CEQR Technical Manual* screening threshold of 170 trips at any intersection. Therefore, a mobile source analysis to evaluate future CO concentrations was not warranted.

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 criteria pollutant. Since NO_2 is mostly formed from the transformation of NO in the atmosphere, it has mostly been of concern farther downwind from large stationary point sources. (NO_x emissions from fuel combustion are mostly in the form of NO at the source.) Consequently, potential for impacts on local NO_2 concentrations from the fuel combustion for the proposed action's heating and hot water systems were evaluated.

With the promulgation of the 1-hour average standard for NO_2, local sources such as vehicular emissions may be of greater concern. However, any increase in NO_2 associated with the Proposed Project would be relatively small, as demonstrated below for CO and PM, due to the very small increases in the number of vehicles. This increase would not be expected to significantly affect levels of NO_2 experienced near roadways; therefore, no analysis of NO_2 from mobile sources was performed.

LEAD

Current airborne lead emissions are principally associated with industrial sources. Lead in gasoline has been banned under the CAA and would not be emitted from any other component facilitated by the Proposed Project. Therefore, an analysis of this pollutant 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 VOCs; 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) or from precursor gases reacting in the atmosphere to form secondary PM.

Gasoline-powered and diesel-powered vehicles, especially heavy-duty trucks and buses operating on diesel fuel, are a significant source of respirable PM, most of which is $PM_{2.5}$; PM concentrations may, consequently, be locally elevated near roadways. The Proposed Project would not result in any significant increases in truck traffic near the Development Site or in the region, nor other potentially significant increase 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 not warranted.

An assessment of PM emissions from the Proposed Project's heat and hot water systems was conducted, following the *CEQR Technical Manual* and EPA guidance.

SULFUR DIOXIDE

SO_2 emissions are primarily associated with the combustion of sulfur-containing fuels (oil and coal). 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/or non-road sources was not warranted.

Based on the design information for the Proposed Project, natural gas heating and hot water systems would be utilized. The sulfur content of natural gas is negligible; therefore, no analysis was undertaken to estimate the future levels of SO_2 with the Proposed Project.

NONCRITERIA POLLUTANTS

In addition to the criteria pollutants discussed above, noncriteria pollutants may be of concern. Noncriteria pollutants are emitted by a wide range of man-made and naturally occurring sources. These pollutants are sometimes referred to as hazardous air pollutants (HAP), and when emitted from mobile sources, as Mobile Source Air Toxics (MSATs). Emissions of noncriteria pollutants from industries are regulated by EPA.

A review was performed to examine the potential for impacts from existing industrial emissions on the Proposed Project. In addition, an assessment of noncriteria pollutant emissions from the Proposed Project's wet laboratories was conducted, following the *CEQR Technical Manual* guidance.

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[2] 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 standards are generally either the same as the secondary standards or more restrictive. The NAAQS are presented in **Table 11-1**. 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 particles, settleable particles, non-methane hydrocarbons, 24-hour and annual SO_2, and ozone which correspond to federal standards that have since been revoked or replaced, and for the noncriteria pollutants beryllium, fluoride, and hydrogen sulfide.

[2] EPA. *National Ambient Air Quality Standards*. 40 CFR part 50.

Table 11-1
National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary		Secondary	
	ppm	µg/m³	ppm	µg/m³
Carbon Monoxide (CO)				
	9(1)	10,000	None	
	35(1)	40,000		
Lead				
Rolling 3-Month Average	NA	0.15	NA	0.15
Nitrogen Dioxide (NO_2)				
1-Hour Average(2)	0.100	188	None	
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average(3,4)	0.070	140	0.070	140
Respirable Particulate Matter (PM_{10})				
24-Hour Average(1)	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Annual Mean(5)	NA	12	NA	15
24-Hour Average(6)	NA	35	NA	35
Sulfur Dioxide (SO_2)				
1-Hour Average(7)	0.075	196	NA	NA
Maximum 3-Hour Average(1)	NA	NA	0.50	1,300

Notes:
ppm – parts per million (unit of measure for gases only)
µg/m³ – micrograms per cubic meter (unit of measure for gases and particles, including lead)
N/A – not applicable
All annual periods refer to calendar year.
Standards are defined in ppm. Approximately equivalent concentrations in µg/m³ are presented.
(1) Not to be exceeded more than once a year.
(2) 3-year average of the annual 98th percentile daily maximum 1-hr average concentration.
(3) 3-year average of the annual fourth highest daily maximum 8-hr average concentration.
(4) EPA has lowered the NAAQS down from 0.075 ppm, effective December 2015.
(5) 3-year average of annual mean.
(6) Not to be exceeded by the annual 98th percentile when averaged over 3 years.
(7) 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

Effective December 2015, EPA reduced the 2008 ozone NAAQS, lowering the primary and secondary NAAQS from the current 0.075 ppm to 0.070. EPA issued final area designations for the revised standard on April 30, 2018.

Federal ambient air quality standards do not exist for noncriteria pollutants; however, NYSDEC has issued standards for certain noncriteria compounds, including beryllium, gaseous fluorides, and hydrogen sulfide. NYSDEC has also developed guideline concentrations for numerous noncriteria pollutants. The NYSDEC Division of Air Resources (DAR) guidance document DAR-1[3] contains a compilation of annual and short-term (1-hour) guideline concentrations for these compounds. The NYSDEC guidance thresholds represent ambient levels that are considered safe for public exposure. EPA has also developed guidelines for assessing exposure to noncriteria

[3] NYSDEC. *DAR-1: Guidelines for the Evaluation and Control of Ambient Air Contaminants Under Part 212*. August 2016.

pollutants. These exposure guidelines are used in health risk assessments to determine the potential effects to the public.

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 plans, New York 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. The second CO maintenance plan for the region was approved by EPA on May 30, 2014.

Manhattan had been designated as a moderate NAA for PM_{10}; on July 29, 2015, EPA clarified that the designation only applied to the revoked annual standard.

The five New York City counties and Nassau, Suffolk, Rockland, Westchester, and Orange Counties, which had been designated as a $PM_{2.5}$ NAA (New York Portion of the New York–Northern New Jersey–Long Island, NY–NJ–CT NAA), were redesignated as in attainment for that standard effective April 18, 2014 and are now under a maintenance plan. EPA lowered the annual average primary standard to 12 $\mu g/m^3$ effective March 2013. EPA designated the area as in attainment for the 12 $\mu g/m^3$ NAAQS effective April 15, 2015.

Effective June 15, 2004, EPA designated Nassau, Rockland, Suffolk, Westchester, and the five New York City counties as a "moderate" NAA for the 1997 8-hour average ozone standard. In March 2008 EPA strengthened the 8-hour ozone standards, but certain requirements remain in areas that were either nonattainment or maintenance areas for the 1997 ozone standard ("anti-backsliding"). EPA designated these same areas as a "marginal" NAA for the 2008 ozone NAAQS, effective July 20, 2012. On April 11, 2016, EPA reclassified the area as a "moderate" NAA. NYSDEC determined that the NYMA was not projected to meet the July 20, 2018 attainment deadline and therefore requested that EPA reclassify the NYMA to "serious" nonattainment. EPA reclassified the NYMA from "moderate" to "serious" NAA, effective September 23, 2019, which imposes a new attainment deadline of July 20, 2021 (based on 2018–2020 monitored data). On April 30, 2018, EPA designated the same area as a moderate NAA for the revised 2015 ozone standard. SIP revisions are due by August 3, 2021.

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" of the 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.

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. In December 2017, EPA designated most of the State of New York, including New York City, as in attainment for this standard.

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.[4] 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 11-1**) would be deemed to have the potential for a 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 NAAs, *de minimis* 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 the potential for a significant adverse impact, even in cases where violations of the NAAQS are not predicted.

CO DE MINIMIS CRITERIA

The *CEQR Technical Manual* defines *de minimis* criteria to assess the significance of the increase in mobile-source related CO concentrations that would result from proposed projects or actions. 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.

$PM_{2.5}$ DE MINIMIS CRITERIA

For projects subject to CEQR, the *de minimis* criteria currently employed to determine the potential for significant adverse $PM_{2.5}$ impacts under CEQR are as follows:

- Predicted increase of more than half the difference between the background concentration and the 24-hour standard;
- Annual average $PM_{2.5}$ concentration increments that 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 that 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 above *de minimis* criteria will be considered to have the potential for a significant adverse impact.

[4] New York City. *CEQR Technical Manual*. Chapter 1, Section 222. 2020; and New York State Environmental Quality Review Regulations. 6 NYCRR § 617.7

D. METHODOLOGY FOR PREDICTING POLLUTANT CONCENTRATIONS

HEATING AND HOT WATER SYSTEMS

AERMOD ANALYSIS

An analysis of the Proposed Project's heating and hot water systems was performed using the American meteorological Society (AMS)/EPA Regulatory Model (AERMOD) dispersion model.[5] 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 and source types. 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 and understanding of turbulence and dispersion, and includes handling of the plume interaction with terrain. AERMOD is EPA's preferred regulatory stationary source model.

AERMOD calculates pollutant concentrations from simulated sources (e.g., exhaust stacks) based on hourly meteorological data and surface characteristics, 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 analysis of potential impacts from exhaust stacks assumed stack tip downwash, urban dispersion and surface roughness length, and elimination of calms.

AERMOD incorporates the Plume Rise Model Enhancements (PRIME) downwash algorithm, which is designed to predict concentrations 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). AERMOD also uses the Building Profile Input Program for PRIME (BPIPPRM) to provide a detailed analysis of downwash influences on a direction-specific basis. BPIPPRM determines 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.

The analysis was prepared both with and without downwash in order to assess the worst-case impacts at elevated locations close to the height of the source, which would occur without downwash, as well as the worst-case impacts at lower elevations and ground level, which would occur with downwash, consistent with the *CEQR Technical Manual* guidance.

Potential 1-hour average NO_2 concentrations, added to representative background concentrations in the area, were compared with the NAAQS. Potential 24-hour and annual average incremental concentrations of $PM_{2.5}$ were compared with the $PM_{2.5}$ *de minimis* criteria defined in the *CEQR Technical Manual*. For the analysis of the 1-hour average NO_2 concentration from the building's heating and hot water systems, AERMOD's Plume Volume Molar Ratio Method (PVMRM) module was used to analyze chemical transformation within the model. PVMRM incorporates hourly background ozone concentrations to estimate NO_x transformation within the source plume. The model applied ozone concentrations measured in 2015–2019 at the nearest available NYSDEC ozone monitoring station—the IS 52 monitoring station in the Bronx. An initial NO_2 to

[5] EPA. *AERMOD Implementation Guide*. 454/B-16-013. December 2016.
EPA. AERMOD Model Formulation and Evaluation. 454/R-17-001. May 2017. and
EPA. User's Guide for the AMS/EPA Regulatory Model (AERMOD). 454/B-16-011. December 2016.

NO_x ratio of 10 percent at the source exhaust stack was assumed for the heating and hot water systems emission sources, which is considered representative.

Five years of surface meteorological data collected at LaGuardia Airport (2015–2019) and concurrent upper air data collected at Brookhaven, New York were used in the analysis.

EMISSION RATES AND STACK PARAMETERS

The Proposed Project would utilize natural gas-fired heating and hot water systems. Six natural gas-fired condensing boilers, each rated at 6 million British Thermal Units per Hour (Btu/hr) would be used to provide space heating for the building. Up to five boilers would be used at any time, with one spare boiler. Domestic hot water service would be provided by three natural gas-fired hot water heaters.

Annual emission rates for heating and hot water systems were calculated based on fuel consumption estimates, using energy intensity estimate referenced in the *CEQR Technical Manual* assuming a commercial building type, the size of the building (596,200 gsf), and applying emission factors for natural gas-fired boilers.[6] $PM_{2.5}$ emissions included both the filterable and condensable components. The short-term emission rates (24-hour and shorter) were calculated using the peak capacity for the boilers and hot water heaters, based on design information. The exhausts from the heating and hot water systems were assumed to be vented through a single stack located three feet above the roof of the building at a height of approximately 317 feet above grade, which is a conservative approach.

Assumptions for stack diameter and exhaust temperature for the proposed systems were obtained from a survey of boiler exhaust data provided by the DEP[7]. To calculate exhaust velocity, the fuel consumption of the proposed heating and hot water system equipment was multiplied by EPA's fuel factor for natural gas,[8] providing the exhaust flow rate at standard temperature; the flow rate was then corrected for the exhaust temperature, and exhaust velocity was calculated based on the stack diameter.

The emission rates and exhaust stack parameters used in the modeling analysis are presented in **Table 11-2**.

[6] EPA. *Compilation of Air Pollutant Emission Factors AP-42*. 5th Ed., V. I, Ch. 1.4. September, 1998.

[7] DEP. *Boiler Database*. August 11, 2017.

[8] EPA. *Standards of Performance for New Stationary Sources.* 40 CFR Chapter I Subchapter C Part 60. Appendix A-7, Table 19-2. 2013.

Table 11-2
Proposed Project's Heating and Hot Water Systems
Exhaust Stack Parameters and Emission Rates

Stack Parameter	Value
Stack Height (feet)	317
Stack Diameter (feet)	5(1)
Exhaust Velocity (feet/second)	2.14(1)
Exhaust Temperature (degrees Fahrenheit)	307.8(1)
Emission Rate (grams/second)	
NO_2 (1-hour average)	0.144
NO_2 (Annual average)	0.0144
$PM_{2.5}$ (24-hour average)	0.0295
$PM_{2.5}$ (Annual average)	0.00295

Note:
(1) Stack parameter assumptions were obtained from a survey of boiler exhaust data provided by DEP.

BACKGROUND CONCENTRATIONS

To estimate the maximum expected pollutant concentration at a given location (receptor), the predicted impacts 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 (see **Table 11-3**). To develop background levels, concentrations measured at the most representative NYSDEC ambient monitoring station over the latest available three-year period (2017–2019).

Total 1-hour NO_2 concentrations were refined following the EPA Tier 3 approach. The methodology used to determine the total 1-hour NO_2 concentrations from the facility was based on adding the monitored background to modeled concentrations. The hourly modeled concentrations from the boilers were first added to the seasonal hourly background monitored concentrations; then the highest combined daily 1-hour NO_2 concentration was determined at each location and the 98th percentile daily 1-hour maximum concentration for each modeled year was calculated within the AERMOD model; finally the 98th percentile concentrations were averaged over the latest five years.

$PM_{2.5}$ impacts were assessed on an incremental basis and compared with the $PM_{2.5}$ *de minimis* criteria. The $PM_{2.5}$ 24-hour average background concentration based on the 98th percentile concentration, averaged over the years 2017–2019 was used to establish the *de minimis* value of 8.4 ug/m^3.

Table 11-3
Maximum Background Pollutant Concentrations

Pollutant	Average Period	Location	Concentration (µg/m^3)	NAAQS (µg/m^3)
NO_2	1-hour	IS 52, Bronx	110.6	188
	Annual		32.8	100
$PM_{2.5}$	24-hour	JHS 126, Brooklyn	18.3	35
	Annual		7.6	12
PM_{10}	24-hour	Division Street	39.3	150

Source: New York State Air Quality Report Ambient Air Monitoring System, NYSDEC, 2017–2019.

RECEPTOR PLACEMENT

Discrete receptors were modeled along existing and proposed-building façades to represent potentially sensitive locations such as operable windows and intake vents. Rows of receptors at spaced intervals on the modeled buildings were analyzed at multiple elevations. A broad ground-level grid was also included to identify potential concentrations at publically accessible locations in the surrounding area.

ADDITIONAL SOURCES

The *CEQR Technical Manual* requires an analysis of projects that may result in a significant adverse impact due to certain types of new uses located near a "large" or "major" emissions source. Major sources are defined as those located at facilities that have a Title V or Prevention of Significant Deterioration air permit, while large sources are defined as those located at facilities that require a State Facility Permit. To assess the potential effects of these existing sources on the Proposed Project, a review of existing permitted facilities was conducted. Sources of information reviewed included EPA's Envirofacts database, the NYSDEC Title V and State Facility Permit websites, the New York City Department of Buildings website, and DEP permit data.

One facility with a State Facility Permit was identified: the Regency Towers building at 245 East 63rd Street. Pollutant concentrations were estimated from this source to evaluate potential impacts on the Proposed Project. The AERMOD dispersion model was used in the analysis, with the same meteorological data and background concentrations used for the heating and hot water system analysis. Also, as described in the methodology for the analysis of the Proposed Project's heating systems, 1-hour NO_2 concentrations were determined using the EPA Tier 3 approach.

The facility consists of three boilers capable of firing natural gas or No. 2 fuel oil. To be conservative, the analysis was performed assuming No. 2 oil is used, since this fuel has higher pollutant emissions. The facility emissions were estimated using the information developed for the air permit, and applying the EPA's Compilations of Air Pollutant Emission Factors (AP-42)[9] emission factors for boilers. **Table 11-4** presents the emission rates and stack parameters used in the AERMOD analysis for the analyzed facility.

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

Table 11-4
Stack Parameters and Emission Rates from Regency Towers

Parameter	Value
Stack Height (ft)[(1)]	356
Stack Diameter (ft)[(1)]	2.0
Exhaust Flow Rate (acfm)[(2,3)]	8,336
Exhaust Temperature (°F)[(4)]	307.8
Fuel Type	No. 2 Fuel Oil
NO_x Emission Rate (g/s)	0.54
SO_2 Emission Rate (g/s)	0.0058
PM_{10} Emission Rate (g/s)	0.065
$PM_{2.5}$ Emission Rate (g/s)	0.058

Notes:
(1) Based on NYSDEC State Facility Permit.
(2) acfm = actual cubic feet per minute.
(3) The stack exhaust flow rate was estimated based on the type of fuel and heat input rate.
(4) Stack exhaust temperature obtained from *DEP Boiler Permit Survey*.

INDUSTRIAL SOURCE ANALYSIS

The Rezoning Area is zoned C1-9 which is used for commercial districts which are residential in character. Based on the zoning and land use characteristics of the study area, it is unlikely that any industrial sources of emissions exist that would require analysis. However, a review of DEP and NYSDEC air permits was performed to determine whether there are any permitted industrial sources of emissions within the 400-foot study area. Land use maps were reviewed to identify potential sources of emissions from manufacturing/industrial operations. A search of federal- and state-permitted facilities within the study area was conducted. DEP's online permit search database was also used to identify any permitted industrial uses in the study area.[10]

No businesses were found to have a NYSDEC air permit or DEP certificate of operation within the study area, and no other potential sources of concern were identified. Therefore, no potential significant adverse air quality impacts would occur on the Proposed Project from industrial sources.

CHEMICAL SPILL ANALYSIS

The Proposed Project would provide space for research laboratories for the Applicant and its research partners. Emissions from the proposed fume hood exhaust system were evaluated, in the event of an accidental chemical spill in one of the laboratories. 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 each chemical examined. It is assumed that the types and quantities of materials that are to be used for the Proposed Project.

The following section details the expected usage of potentially hazardous materials, as well as the ventilation system(s) 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 laboratories. Two quantitative analyses employing mathematical modeling were performed to

[10] DEP. *NYC DEP CATS Information.* https://a826-web01.nyc.gov/dep.boilerinformationext.

determine potential impacts (1) at operable windows and air intakes in nearby buildings and at nearby places of public access; and (2) at the proposed building itself due to recirculation into air intake systems, windows, and open air terraces.

LABORATORY FUME HOOD EXHAUSTS

All laboratories in which hazardous chemicals are used would be equipped with fume hoods. Fume hoods are workstation enclosures that are maintained under negative pressure and continuously vented to the outside when work is taking place. Their function is to protect 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 building, or through windows to the outside.

Since design information is not available on the fume hood exhaust system, a set of conservative assumptions was used. While the fume hood exhausts would likely be combined and vented to the building roof through a single stack, the worst-case analysis assumed a single fume hood vented separately to the roof. The fume hood exhaust stack height was assumed to be three feet above the building roof. An exhaust fan sufficient to maintain a minimum exit velocity of 1,500 feet per minute through a six-inch stack discharge was also assumed. These assumptions are not based on the actual mechanical design but are designed to yield conservative estimates in order to evaluate the potential for significant adverse air quality impacts.

CHEMICALS FOR ANALYSIS

An inventory of chemicals which may be present in a typical laboratory in the proposed facility was examined. From the chemical inventory, 11 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 (with a vapor pressure of less than 10 mm Hg) were excluded as well since they would largely not be released in a spill.

The hazardous chemicals selected are presented in **Table 11-5**. The vapor pressure shown for each chemical is a measure of its volatility—its tendency to evaporate, or to form vapors, which is a critical parameter in determining potential impacts from chemical spills. Exposure standards are safety- and health-based standards indicative of the chemical's toxicity—substances with higher toxicity have lower exposure standards. These include OSHA's permissible exposure limit (PEL), National Institute for Occupational Safety and Health (NIOSH) and/or OSHA's STEL, ceiling, and immediately dangerous to life or health (IDLH) values.

Table 11-5
Expected Hazardous Materials in the Proposed Laboratories

Chemical [CAS #]	Vapor Pressure mm Hg	PEL PPM	STEL PPM	IDLH PPM	Ceiling PPM
Acetic Acid, Glacial [64-19-7]	11	10	--	--	10
Acetonitrile [75-05-8]	73	40	--	500	40
Acrolein [107-02-8]	210	0.1	0.3	2	--
Benzene* [71-43-2]	75	1	--	500	--
Carbon Tetrachloride [56-23-5]	91	10	2	200	--
Dichloromethane [75-09-2]	350	25	125	2,300	--
Glutaraldehyde [111-30-8]	17	--	--	--	0.2
Hydrochloric Acid [7647-01-1]	14.62	5	--	50	5
Hydrogen Peroxide [7722-84-1]	25	1	--	75	1
Nitric Acid* [7697-37-2]	48	2	--	25	--
Triethylamine* [121-44-8]	54	25	--	200	--

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.
* No STEL or Ceiling values published. The listed OSHA Permissible Exposure Limit will be applied (time weighted average for up to a 10-hour workday during a 40-hour workweek.)
Where a hyphen (-) appears there is no recommended corresponding guideline value.

ESTIMATES OF WORST-CASE EMISSION RATES

The dispersion of hazardous chemicals from a chemical spill within one of the proposed laboratories was analyzed to assess the potential for exposure of the general public and staff within 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[11]. 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 11-6**, a subset of the most potentially hazardous chemicals, shown in **Table 11-6**, 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 the highest vapor pressures compiled for **Table 11-6**, the chemical selected also has the lowest STEL. Since the chemical selected for detailed analysis is most likely to have the highest emissions rates and the lowest exposure standards, if the analysis of this chemical resulted in no significant impacts, it would indicate that the other chemicals listed in **Table 11-6** would also not present any significant potential impacts.

The analysis conservatively assumes that a full container of the chemical would be spilled in a fume hood. For a spill area of approximately 1.1 square meters, the emission rates were determined

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

using the evaporation rates. For modeling purposes, the emission rates shown in **Table 11-6** 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 exhaust height of the fan would be at an elevation of 3 feet above the building roof.

Table 11-6
Chemicals Selected for Worst-Case Spill Analysis

Chemical	Spill Quantity (liters)	Evaporation Rate (gram/meter^2/sec)	Emission Rate[(1)] (gram/sec)
Acetic Acid, Glacial	0.05	0.054	0.060
Acetonitrile	0.33	0.26	0.29
Acrolein	0.5[(2)]	0.94	0.47
Benzene	0.42	0.36	0.41
Carbon Tetrachloride	0.52	0.82	0.91
Dichloromethane	1.73	2.30	2.56
Glutaraldehyde	0.11	0.12	0.13
Hydrochloric Acid	0.05	0.05	0.06
Hydrogen Peroxide	0.07	0.09	0.10
Nitric Acid	0.18	0.27	0.30
Triethylamine	0.11	0.24	0.27

Notes:
(1) Average emission rate.
(2) Since than the calculated spill quantity exceeds the container volume used in the laboratory, the container volume was used instead.

RECIRCULATION MODELING

The potential for recirculation of the fume hood emissions back into the proposed laboratory building air intakes was assessed using the Wilson method.[12] 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, and introducing 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

The AERMOD dispersion model was used in the analysis, with the same set of meteorological data and the same background concentration values as was done for the HVAC analysis.

Concentrations were evaluated at nearby buildings and publicly accessible areas. This included locations along the façades and roof of the buildings, operable windows, intake vents, and

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

otherwise accessible locations. Multiple elevations were analyzed at spaced intervals on the buildings.

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.

CGMP FACILITY

The proposed building would include certified clean room facilities that would be approved under Current Good Manufacturing Practice (cGMP) guidelines for use in the small-scale production of cellular therapies, trial vaccines, and other materials used in connection with clinical trials. These facilities would replace similar clean room facilities in the Blood Center's existing building, which are used for the production of cellular therapies and other biological products. These clean room facilities are found at many life sciences laboratories both in the City and around the country. They would not require hazardous chemicals different in type or amount than what would otherwise be used in the building if there was no clean room facility and, therefore would not result in any additional significant adverse air quality impacts. Furthermore, the certified clean room facility would be exempt from regulation under the National Emissions Standards for Hazardous Air Pollutants (NESHAPS) for pharmaceutical products (40 CFR 63 Subpart GGG) since it would not be a major source of hazardous air pollutant (HAP) emissions (defined as 10 tons per year or more of an individual HAP, or 25 tons per year or more of any combination of HAPs). It would also be exempt from having to obtain an air permit or registration from NYSDEC since NYSDEC exempts processes that would not be used for the commercial production of pharmaceutical products, except in a de minimis manner. NYBC would be required to maintain records of such research and development activities, including the quantities of materials used, and estimated emissions of air contaminants necessary to demonstrate that emissions do not exceed established permitting thresholds under New York State and EPA regulations.

E. EXISTING CONDITIONS

The most recent concentrations of all criteria pollutants at NYSDEC air quality monitoring stations nearest to the Project Area are presented in **Table 11-7**. 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 analyses. For most pollutants the concentrations presented in **Table 11-7** are based on measurements obtained in 2019, 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. There were no monitored violations of NAAQS at these monitoring sites in 2019.

Table 11-7
Representative Monitored Ambient Air Quality Data

Pollutant	Location	Units	Averaging Period	Concentration	NAAQS
CO	IS 52	ppm	1-hour	1.68	35
			8-hour	1.1	9
SO_2	IS 52[(1)]	µg/m^3	1-hour	14.6	196
PM_{10}	Division Street	µg/m^3	24-hour	43	150
$PM_{2.5}$	JHS 45[(2,3)]	µg/m^3	Annual	7.5	12
			24-hour	18.3	35
NO_2	IS 52[(2,4)]	µg/m^3	Annual	31.7	100
			1-hour	110.6	188
Lead	IS 52[(5)]	µg/m^3	3-month	0.0041	0.15
Ozone	IS 52[(6)]	ppm	8-hour	0.069	0.075

Notes:
[(1)] The 1-hour value is based on a three-year average (2017–2019) of the 99th percentile of daily maximum 1-hour average concentrations.
[(2)] Annual value is based on a three-year average (2017–2019) of annual concentrations.
[(3)] The 24-hour value is based on the three-year average of the 98th percentile of 24-hour average concentrations.
[(4)] The 1-hour value is based on a three-year average (2017–2019) of the 98th percentile of daily maximum 1-hour average concentrations.
[(5)] Based on the highest quarterly average concentration measured during 2017 to 2019.
[(6)] Based on the three-year average (2017–2019) of the 4th highest daily maximum 8-hour average concentrations.
Source: NYSDEC, New York State Ambient Air Quality Data.

F. THE FUTURE WITHOUT THE PROPOSED PROJECT

Absent the Proposed Actions, the Applicant would construct a new building as-of-right containing laboratory space as well as other UG-4 community facility uses, which would be smaller in size than the Proposed Project. Accordingly, in the No Action condition, emissions in the area from heating and hot water systems would be less than the Proposed Project.

G. THE FUTURE WITH THE PROPOSED PROJECT

HEAT AND HOT WATER SYSTEMS

The results of the AERMOD analysis for the Proposed Project's heating and hot water systems are presented in **Table 11-8**. As shown in the table, no exceedance of the NO_2 NAAQS were predicted, and incremental concentrations of $PM_{2.5}$ were predicted to be less than the CEQR *de minimis* criteria. Therefore, no significant adverse air quality impacts from the Proposed Project's heating and hot water systems are predicted.

Table 11-8
Proposed Project's Heating and Hot Water Systems
Maximum Modeled Pollutant Concentrations (µg/m^3)

Pollutant	Averaging Period	Maximum Modeled Impact	Background	Total Concentration	NAAQS / *De Minimis* Criteria
NO_2	1-hour	171(1)	N/A	171	188(2)
	Annual	0.15(3)	37.9	38	100(2)
$PM_{2.5}$	24-hour	8.1	N/A	8.1	8.4(4)
	Annual	0.04	N/A	0.04	0.3(5)

Notes:
N/A – Not Applicable
(1) Reported concentration is the maximum total 98th percentile concentration at any receptor using seasonal-hourly background concentrations.
(2) NAAQS.
(3) Annual NO_2 concentrations from heating and hot water sources were estimated using a NO_2 to NO_x ratio of 0.75, based on EPA modeling guidance.
(4) $PM_{2.5}$ *de minimis* criteria—24-hour average, not to exceed more than half the difference between the background concentration and the 24-hour standard of 35 µg/m^3.
(5) $PM_{2.5}$ *de minimis* criteria—annual (discrete receptor).

To ensure that there are no potential significant adverse air quality impacts, certain restrictions would be required as part of the Proposed Actions through an Air Quality (E) Designation (E-612). These restrictions were assumed in the analysis results presented in **Table 11-8**, and would avoid the potential for significant air quality impacts from stationary sources based on the conservative assumptions used in the analysis. The restrictions are outlined below.

BLOCK 1441, LOT 40

Any new development on the above-referenced property must ensure that only natural gas be used for fossil fuel-fired heating and hot water systems fitted with low NO_x (30 ppm) burners, and ensure that the heating and hot water systems stack are located at least 317.4 feet above grade, and at least 40 feet away from the lot line facing Second Avenue, to avoid any potential significant air quality impacts.

ADDITIONAL SOURCES

Potential stationary source impacts on the Development Site from the existing large source were determined using the AERMOD model. The maximum estimated concentrations of NO_2, SO_2, and PM_{10} from the modeling analysis were added to the background concentrations to estimate total air quality concentrations on the Proposed Project, while $PM_{2.5}$ concentrations were compared with the $PM_{2.5}$ *de minimis* criteria. Total 1-hour NO_2 concentrations were determined following the refined EPA Tier 3 approach described earlier for the heating and hot water system analysis. The results of the AERMOD analysis are presented in **Table 11-9**.

Table 11-9
Maximum Modeled Pollutant Concentrations (µg/m³)
from Regency Towers on the Proposed Project

Pollutant	Averaging Period	Maximum Modeled Impact	Background	Total Concentration	NAAQS / *De Minimis* Criteria
NO_2	Annual (1)	0.30	37.9	38.2	100
	1-hour (2)	101	N/A	101	188
SO_2	1-hour	0.10	14.6	14.7	196
PM_{10}	24-hour	0.40	39.3	39.7	150
$PM_{2.5}$	24-hour	0.36	N/A	0.36	8.4 (3)
	Annual	0.04	N/A	0.04	0.3 (4)

Notes:
(1) Annual NO_2 concentrations were estimated using a NO_2/NO_x ratio of 0.75, based on EPA modeling guidance.
(2) Reported concentration is the maximum total 98th percentile concentration at any receptor using seasonal-hourly background concentrations.
(3) $PM_{2.5}$ *de minimis* criteria—24-hour average, not to exceed more than half the difference between the background concentration and the 24-hour standard of 35 µg/m³.
(4) $PM_{2.5}$ *de minimis* criteria—annual (discrete receptor), 0.3 µg/m³.

As shown in **Table 11-9**, the predicted pollutant concentrations for all of the pollutant averaging periods are below their respective standards. Therefore, no significant adverse air quality impacts on the Proposed Project from the large emission source at Regency Towers are predicted.

CHEMICAL SPILL ANALYSIS

RECIRCULATION IN LABORATORY BUILDING INTAKES

The recirculation analysis indicates that the minimum potential dilution factor between the fan exhausts and the nearest sensitive receptor is over 269 (i.e., pollutant concentrations at the nearest intake to the exhaust fan would be 269 times less than the concentration at the fan exhaust). The results of the recirculation analysis are presented in **Table 11-10**.

Table 11-10
Fume Hood Recirculation Analysis
Maximum Predicted Concentrations (ppm)

Chemical	STEL/OSHA Ceiling	15-Minute Average
Acetic Acid, Glacial	10	0.001
Acetonitrile	40	0.521
Acrolein	0.3	0.022
Benzene	1	0.007
Carbon Tetrachloride	2	0.008
Dichloromethane	125	0.040
Glutaraldehyde	0.2	0.002
Hydrochloric Acid	5	0.002
Hydrogen Peroxide	1	0.004
Nitric Acid	2	0.006
Triethylamine	25	0.009

Note: * 15-Minute Average emission rate.

The results indicate that a spill in a fume hood as described above would produce a maximum concentration at the nearest intake location 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 building's air intakes in the event of a chemical spill.

DISPERSION IN SURROUNDING AREA

The results of the analysis of potential emissions from the fume hood exhaust system in the surrounding area are shown in **Table 11-11**. As shown in the table, the maximum predicted concentrations at elevated receptors downwind of the fume hood exhausts were determined to be below the STEL/OSHA levels. The results of the dispersion analysis demonstrate that would be no significant adverse impacts from the exhaust system of the Proposed Project or the surrounding community.

Table 11-11
Maximum Predicted Concentrations (ppm)

Chemical	STEL/OSHA Ceiling	15-Minute Average
Acetic Acid, Glacial	10	0.03
Acetonitrile	40	0.22
Acrolein	0.3	0.26
Benzene	1	0.16
Carbon Tetrachloride	2	0.19
Dichloromethane	125	0.95
Glutaraldehyde	0.2	0.04
Hydrochloric Acid	5	0.05
Hydrogen Peroxide	1	0.09
Nitric Acid	2	0.15
Triethylamine	25	0.21
Note: * 15-Minute Average emission rate.		

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