3.17 AIR QUALITY

INTRODUCTION

Increases in mobile source emissions related to increases in project-induced traffic would not result in any exceedances of the National Ambient Air Quality Standards (NAAQS) or the DEP/DEC NYC interim guideline impact criteria at existing or future project-related sensitive receptors. Pollutant emissions related to the proposed development sites HVAC systems would not result in any violations of applicable NAAQS standards or exceed the DEP/DEC NYC interim guideline incremental impact criteria. Existing pollutant sources would not result in any air quality related impacts at the proposed development sites. Existing large-scale pollutant sources, in addition to industrial sources that would emit air toxics, would not result in any significant adverse impacts at any of the sensitive land uses that created by the proposed action.

As discussed in Chapter 2.0, "Project Description," the net increment the proposed action is expected to generate is approximately 3,416 dwelling units (DUs), 841,805 sf of commercial space, 95,500 sf of industrial space and 154,289 sf of community facility space on 31 projected development sites. In addition, DCP has identified 48 potential development sites in the rezoning area. If development does not occur on the projected development sites, the same overall amount of development could occur instead on some or all of the potential development sites. Although considered possible sites for future development, based on the soft site criteria described above, these sites are considered less likely to be developed over the ten-year analysis period. Site conditions, location, and market demand are among the factors contributing to the more limited likelihood for redevelopment of potential development sites.

Air quality issues associated with the proposed action relate to:

- Potential for increases and/or changes in vehicular travel associated with the action-generated development to result in significant mobile source air quality impacts;

- Potential for the emissions from the heating systems of the action-generated developments to significantly impact existing land uses and/or other action-generated developments;

- Potential of existing commercial, institutional or large-scale residential developments to impact action-generated residential/commercial uses on projected and potential development sites;

- Potential for action-generated residential/commercial uses on projected and potential development sites to be adversely affected by air toxic emissions generated by existing nearby industrial and commercial uses.

Air quality analyses were conducted, following the procedures outlined in the 2001 *CEQR Technical Manual*, to determine whether the proposed action would result in violations of ambient air quality standards or health-related guideline values. The methodologies and procedures utilized in these analyses along with corresponding results tables are described below.

Pollutants of Concern

Criteria Pollutants

The following air pollutants have been identified by the U.S. Environmental Protection Agency (USEPA) as being of concern nationwide: carbon monoxide (CO); nitrogen oxides (NO_x); photochemical oxidants; particulate matter; sulfur dioxide (SO_2); and lead (Pb). In New York City, ambient concentrations of CO, and photochemical oxidants are predominantly influenced by motor vehicle activity; NO_x are emitted from both mobile and stationary sources; emissions of SO_2 are associated mainly with stationary sources; and emissions of particulate matter are associated with stationary sources, and to a lesser extent, diesel-fueled mobile sources (heavy trucks and buses). Lead emissions, which historically were influenced principally by motor vehicle activity, have been substantially reduced due to the elimination of lead from gasoline.

Carbon Monoxide. Carbon monoxide is a colorless, odorless, and toxic gas that results primarily from the incomplete combustion of fossil fuels. Particularly sensitive to its affects are infants and elderly persons, as well as other individuals who may suffer from respiratory diseases. In New York, more than eighty percent of all CO emissions are the result of motor vehicle exhaust. Roadways that experience high vehicular volumes, low travel speeds and traffic congestion are usually associated with high CO concentrations. The implementation of the proposed project within the Lower Concourse rezoning area could exacerbate traffic conditions near existing streets, which are already heavily congested. In addition, significant incremental increases in traffic may also affect other streets where there is little existing traffic. As a result, CO is a pollutant of concern for this project.

Nitrogen Oxides and Photochemical Oxidants. Nitrogen dioxide (NO_2) is formed from the burning of fossil fuels and is considered a highly reactive gas that is also linked to the production of acid rain. NO_2 and photochemical oxidants such as ozone (O_3) are linked in that the production of NO_2 is a precursor to the formation of O_3. Because the chemical reactions that form O_3 occur slowly and ordinarily take place far downwind from the site of actual pollutant emission, the effects of the pollutants involved are usually analyzed on a regional level. The NY/NJ/CT-Long Island Metropolitan area (of which Bronx County is a part) is designated as a moderate non-attainment zone for the 8-hour ozone standard. Typically, an analysis of these pollutants is not warranted since the projected and potential developments would not significantly affect the amounts of these pollutants generated within the region. However, because nitrogen oxides could be emitted from heating systems associated with the proposed residential developments, on a microscale basis, NO_2 is a pollutant of concern.

Particulate Matter. Inhalable particulate matter is a respiratory irritant and is of most concern when classified as being less than 10 microns in diameter (PM_{10}). Particulate matter is primarily generated by stationary sources, such as industrial facilities and power plants however, the proposed project could also produce PM by the combustion of diesel fuel used in some buses and trucks as well as residential and commercial HVAC systems using oil as fuel. Particulate matter also develops from the mechanical breakdown of coarse particulate matter (e.g., from building demolition or roadway surface wear as well as other construction-related activities).

The USEPA has also promulgated standards for PM less than 2.5 microns in diameter ($PM_{2.5}$). While $PM_{2.5}$ and PM_{10} both emanate from similar sources, $PM_{2.5}$ or "fine particulates" are considered the most damaging to human health because they penetrate and remain in the deepest passages of the lungs. In addition to health effects, it has been shown that fine particles are the major cause of visibility impairment within major urban landscapes. At the present time, New York City is recognized as a non-attainment area for this pollutant. To assist in the prediction of potential impacts, the New York State Department of Environmental Conservation (NYSDEC) and New York City Department of Environmental Protection (NYCDEP) have developed recently updated interim guidelines (March 3, 2008) for the screening and assessment of potential project-related $PM_{2.5}$ emissions. The mobile source screening portion of the guidelines requires that if a proposed action would generate fewer heavy duty diesel vehicles (HDDV) per hour (or its equivalent in vehicular emissions) than listed below, the need for a detailed $PM_{2.5}$ analysis would be unlikely:

- 12 HDDV: for paved roads with < 5000 veh/day
- 19 HDDV: for collector type roads
- 23 HDDV: for principal and minor arterials
- 23 HDDV: for expressways and limited access roads

As the proposed project could generate HDDV's, $PM_{2.5}$ and PM_{10} are pollutants of particular concern.

Sulfur Oxides. Oxides of sulfur (SO_2) are respiratory irritants associated with the combustion of sulfur-containing fuels (such as heating oil and coal). SO_2 is a precursor to acid rain and to $PM_{2.5}$, both of which create damage to individual health and the environment. This pollutant is typically associated with large industrial operations but can also result from much smaller sources. In urban areas, especially in the winter, smaller stationary sources such as HVAC systems contribute to elevated SO_2 levels. However, all NYSDEC SO_2 monitoring sites have remained in compliance with the New York State/Federal annual mean standard for over 20 consecutive years. As the proposed heating systems of anticipated new mixed-use residential and commercial developments would potentially use oil as fuel, SO_2 is a pollutant of concern.

Lead. Lead emissions are associated principally with industrial sources and motor vehicles using gasoline containing lead additives. As the availability of leaded gasoline has decreased, motor vehicle-related lead emissions have decreased resulting in a significant decline of concentrations of lead. Although the USEPA has recently (as of October 2008) strengthened the national standards for lead, atmospheric lead concentrations in New York City are still well below the NAAQS. Lead concentrations are expected to continually decrease; and as a result lead is not a pollutant of concern for the proposed project.

Air Toxic Pollutants

In addition to criteria pollutants, small quantities of a wide range of the non-criteria air pollutants (known as air toxic pollutants), which could be emitted from nearby industrial and commercial facilities, are also of concern. These pollutants can be grouped into two categories: carcinogenic air pollutants, and non-carcinogenic air pollutants. These two groups include hundreds of pollutants, ranging from high to low toxicity. No federal standards have been promulgated for toxic air pollutants. However, the USEPA and NYSDEC have issued guidelines that establish acceptable ambient levels for these pollutants based on human exposure criteria.

In summary, the air pollutants identified as being of concern are considered as follows:

- CO is considered as the pollutant of concern for the mobile source analysis because of the additions and/or changes in local vehicular traffic that are anticipated as a result of the proposed action;

- NO_2, PM_{10}, and SO_2 are the pollutants of concern for the air quality analysis of emissions from the heating systems of project-related developments; and

- Air toxic emissions from existing industrial/manufacturing land uses are considered to determine the potential for significant impacts on projected and potential development sites.

Based on future traffic projections, the proposed action would not have a significant effect on the number of heavy duty and/or diesel fueled vehicles in the study area. As a result, $PM_{2.5}$ and PM_{10} were not considered for the mobile source analysis. A screening assessment based on the NYSDEP interim guidelines was performed and appears later in this chapter.

Air Quality Standards and Guidelines

Air Quality Standards

National and New York State ambient air quality standards (NAAQS) are pollutant concentrations for each of the criteria pollutants specified by the USEPA that have been developed primarily to protect human health. The secondary goal is to protect the nation's welfare and account for the effect of air pollution on soil, water, vegetation and other aspects of general welfare. Time frames, based on how these pollutants adversely affect health, have also been established for these pollutants. These standards, together with their health-related averaging periods, are presented in Table 3.17-1.

Significant Impact Thresholds

In addition to the Federal and State standards, under New York City's Environmental Quality Review (CEQR) guidelines, incremental impact criteria, known as *de minimis* criteria, have been established to measure the impact significance of estimated increments.

Table 3.17-1: National Ambient Air Quality Standards (NAAQS)

Pollutant	Standard Value		Standard Type
Carbon Monoxide (CO)			
8-hour Average[1]	9 ppm	(10 µg/m³)	Primary
1-hour Average[1]	35 ppm	(40 µg/m³)	Primary
Nitrogen Dioxide (NO_2)			
Annual Arithmetic Mean	.053 ppm	(100 µg/m³)	Primary & Secondary
Ozone (O_3)			
8-hour Average[5]	.075 ppm	(147 µg/m³)	Primary & Secondary
Lead (PB)			
Quarterly Average	0.15 µg/m³		Primary & Secondary
Particulate (PM_{10})			
Annual Arithmetic Mean	(Revoked)[2]		Primary & Secondary
24-hour Average[1]	(150 µg/m³)		Primary & Secondary
Particulate ($PM_{2.5}$)			
Annual Arithmetic Mean[3]	(15 µg/m³)		Primary & Secondary
24-hour Average[4]	(35 µg/m³)		Primary & Secondary
Sulfur Dioxide (SO_2)			
Annual Arithmetic Mean	.03 ppm	(80 µg/m³)	Primary
24-hour Average[1]	.14 ppm	(365 µg/m³)	Primary
3-hour Average[1]	.50 ppm	(1300 µg/m³)	Secondary

Notes:
1 - Not to be exceeded more than once per year
2 - As of December 17, 2006, the USEPA revoked the annual PM_{10} standard
3 - 3 year average of annual mean within an area must not exceed 15 µg/m³
4 - 3 year average of 98th percentile of 24-hour concentrations at each monitor within an area must not exceed 35 µg/m³
5 - Former NYS Standard for ozone of 0.08 ppm was not officially revised via regulatory process to coincide with the Federal standard of 0.12 ppm which is currently being applied by NYS to determine compliance status. Compliance with the Federal 8 hour standards is determined by using the average of the 4th highest daily value during the past three years - which cannot exceed 0.084 ppm or 0.075 ppm, effective May 27, 2008.
6 – As of June 15, 2005, the USEPA revoked the 1-hour ozone standard in all areas except the fourteen 8-hour ozone non-attainment Early Action Compact (EAC) Areas.

CO Thresholds

Significant CO increments are characterized as:

- An increase of 0.5 parts per million (ppm) or more for the 8-hour period, when baseline concentrations are above 8.0 ppm; or

- An increase of one-half the difference between the baseline and the standard concentration (9 ppm) for the 8-hour period when baseline concentrations are below 8 ppm.

Project-related impacts less than these values are not considered to be significant.

Non-Criteria Air Toxics Pollutant Thresholds

In order to evaluate short-term and annual impacts of non-carcinogenic toxic air pollutants, NYSDEC has established short-term guideline concentrations (SGCs) and annual guideline concentrations (AGCs) for exposure limits. These are maximum allowable one-hour and annual guideline concentrations, respectively, that are considered acceptable concentrations below which there should be no adverse effects on the health of the general public.

When cumulative impacts of multiple air toxics from multiple sources could pose a potential health risk to proposed development, a cumulative impact analysis for industrial sources would be performed. Potential cumulative impacts are determined based on the USEPA's Hazard Index Approach for non-carcinogenic compounds and using the USEPA's Unit Risk Factors for carcinogenic compounds. These methods are based on equations that use the USEPA health risk information (established for individual compounds with known health effects) to determine the level of health risk posed by an expected ambient concentration of that compound at a potentially sensitive receptor. The derived values of health risk are additive and can be used to determine the total risk posed by multiple air contaminants. For carcinogens, the public health risk would be based on calculations of the incremental risk associated with each toxic pollutant. These incremental values would then be summed to arrive at the total risk. If the total risk is predicted to be less than or equal to one in one million (1×10^{-6}), the carcinogenic risk is considered negligible. For non-carcinogens, the public health risk would be based on estimates for inhalation of non-carcinogenic pollutants (i.e., the Hazard Index). Once the hazard index of each compound is established, they are summed together. If the total hazard index is less than or equal to one, then the non-carcinogenic risk is considered negligible.

The following equations are used to calculate incremental risk for carcinogenic pollutants and the hazard index for non-carcinogenic pollutants:

- Incremental Risk = C x URF

Where:
C = annual average ambient air concentration of the compound in μg/m^3
URF = compound-specific inhalation unit risk factor in (μg/m^3)-1

- Hazard Index = C/RfC

Where:
C = annual average ambient air concentration of compound in μg/m^3
RfC = compound-specific inhalation reference concentration in μg/m^3

3.17.1 EXISTING POLLUTANT LEVELS AND REGULATORY SETTING

Monitored Data

Representative monitored ambient air quality data for the area are shown in Table 3.17-2. These data were compiled by NYSDEC for the year 2007, the latest calendar years for which data are currently available. Monitored levels for pollutants that are considered for this analysis (i.e., SO_2, NO_2, and PM_{10}) do not exceed National and State ambient air quality standards. Monitored values indicate that current $PM_{2.5}$ annual levels exceed the NAAQS.

Table 3.17-2: Representative Monitored Ambient Air Quality Data

Pollutant	Monitor	Averaging Time	Value	NAAQS
CO	Botanical Gardens (Bronx) (Background Site Monitor)	8-hour	2.0 ppm	9 ppm
		1-hour	3.1 ppm	35 ppm
NO_2	Botanical Gardens (Bronx)	Annual	.024 ppm	0.053 ppm (100 μg/m^3)
Ozone	IS 52 (Bronx)	8-hour	0.077	0.080 ppm (157 μg/m^3)
		1-hour	0.107	0.12 ppm
PM_{10}	IS 52 (Bronx)	Annual (revoked)	-	50 μg/m^3
		24-hour	48 μg/m^3	150 μg/m^3
$PM_{2.5}$	Morrisania (Bronx)	Annual	**15.7 μg/m^3**	15 μg/m^3
		24-hour	**38.0 μg/m^3**	35 μg/m^3
SO_2	IS 52 (Bronx)	3-hour	.057 ppm	0.50 ppm (1300 μg/m^3)
		24-hour	.037 ppm	0.14 ppm (365 μg/m^3)
		Annual	.008 ppm	0.03 ppm (80 μg/m^3)

Source: NYSDEC 2007 Data.
Note: *Values are the highest pollutant levels recorded during the latest available calendar years.* ***Bold values indicate violation of NAAQS.***

Regulatory Setting

Attainment Status/State Implementation Plan (SIP). The Clean Air Act (CAA), as amended in 1990, defines non-attainment areas as geographic regions that have not meet one or more of the NAAQS. When an area within a state is designated as non-attainment by the USEPA, the state is required to develop and implement a State Implementation Plan (SIP), which would describes how it will meet the NAAQS under deadlines established by the CAA. New York City has been designated as non-attainment area for ozone and $PM_{2.5}$ but as an attainment area for CO. Violations of the CO standard have not been recorded at the NYSDEC monitoring sites for several years. As part of its ongoing effort to maintain its attainment designation for CO, New York State has committed to the implementation of area-wide and site-specific control measures to continue to reduce CO levels.

On February 13, 2004, New York State formally recommended that the USEPA designate New York City (NYC) as non-attainment for $PM_{2.5}$; the USEPA made their final non-attainment designation for $PM_{2.5}$ on December 17, 2004. On September 8, 2005, the USEPA proposed specific requirements that state and local governments have to meet as they implement the national ambient air quality standards for $PM_{2.5}$. On September 21, 2006, the USEPA tightened the 24-hour fine particle standard from 65 micrograms per cubic meter ($\mu g/m^3$) to 35 $\mu g/m^3$, but retained the current annual fine particle standard at 15 $\mu g/m^3$. In addition, effective September 17, 2006, the USEPA has revoked the current annual PM_{10} standard based on a lack of evidence that links health problems to long-term exposure to coarse particle pollution. The USEPA will finalize the $PM_{2.5}$ designation no later than Dec. 18, 2008. In the event there is insufficient information to promulgate the designations by December 18, 2008, the date of final designations may be extended up to one year, but no later than December 18, 2009. State and local governments have three years from the date of the USEPA designation to develop implementation plans to meet the NAAQS.

Ozone SIP revisions have been submitted to the USEPA over the past several years. A November 1992 NYSDEC submission to the USEPA provided SIP revisions which addressed the minimum air quality control requirements that were established by the CAA. In November 1993, a revision was submitted which documented how a 15% reduction in ozone precursors would be achieved by the end of 1996. Subsequent SIP revisions took into consideration the need to incorporate alternative procedures in order to reach an ozone attainment status by 2007. Phase I of this plan calls for a 9% rate of progress for the period 1997 through 1999. Phase II calls for future per annum rates of progress for the years 2002, 2005 and 2007 to be at 3%. On April 15, 2004, the USEPA officially designated the New York City portion of the NY/NJ/CT-Long Island area as moderate non-attainment for the new 8-hour ozone standard (effective June 15, 2004). The USEPA revoked the 1-hour standard on June 15, 2005, so that New York State can focus attention an attaining the stricter 8-hour standard. However, the very specific control measures for the 1-hour standard included in the SIP will be required to stay in place until the 8-hour standard is attained. A new SIP for ozone was to be adopted by the state no later than June 15, 2007, with a target attainment deadline of June 15, 2010. However, on June 20, 2007, the USEPA proposed to strengthen the national ambient air quality standards for ground-level ozone. The proposed revisions reflect new scientific evidence about ozone and its effects on people and public welfare. The USEPA was to issue final standards by March 12, 2008 with the following estimated implementation schedule:

- By June 2009: States make recommendations for areas to be designated attainment and nonattainment.
- By June 2010: the USEPA makes final designations of attainment and nonattainment areas. Those designations would become effective 60 days after publication in the Federal Register.
- 2013: State Implementation Plans, outlining how states will reduce pollution to meet the standards, are due to the USEPA (three years after designations).
- 2013 to 2030: States are required to meet the standard, with deadlines depending on the severity of the problem.

3.17.2 MOBILE SOURCE ANALYSIS

Carbon Monoxide

Selection of Intersection Analysis Sites

A microscale modeling analysis was conducted to estimate CO levels at the most heavily congested intersections (i.e., analysis sites) in the study area. The following scenarios were analyzed: existing conditions and future conditions (2018), with and without the proposed action. In order to select analysis sites, data related to traffic volumes, levels of service and vehicular speeds at the major signalized intersections were evaluated with and without the proposed action. The intersections were selected as they are most likely to be affected by the Proposed Action. Selection of analysis sites was based on screening procedures described in the 2001 *CEQR Technical Manual.* The procedure utilizes total traffic volumes at intersections, operating levels of service, changes associated with speeds, and project-generated trips from the traffic analysis to make a final determination on the analysis sites, which will be studied in detail. Intersections selected for analysis are shown in Table 3.17-3 and on Figure 3.17-1.

Table 3.17-3: Microscale Intersection Analysis Sites

Site Number	Intersection
1	149th Street & Exterior Street
2	149th Street & Grand Concourse
3	138th Street & Exterior Street
4	138th Street & Morris Avenue/3rd Avenue

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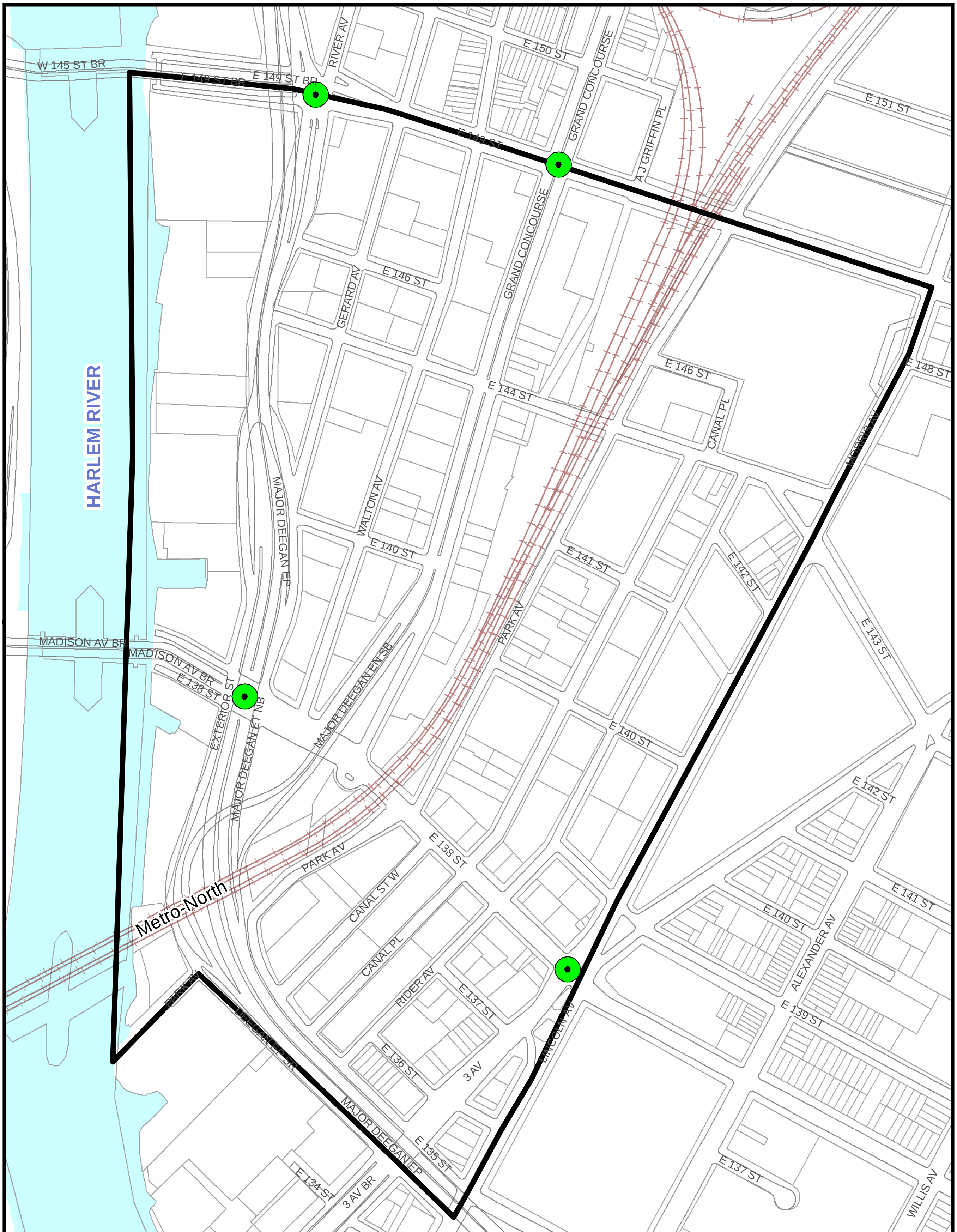

Legend

Air Quality Intersections

Proposed Rezoning Area

200 0 200 400 600 Feet

N

Source: STV Incorporated

Figure 3.17-1: Air Quality Intersections

Lower Concourse Rezoning and Related Actions EIS

NYC Department of City Planning

Receptors

The exact locations at which pollutant concentrations are estimated are known as "receptors." Following guidelines established by the USEPA, receptors are typically located where the maximum concentration is likely to occur and where the general public is likely to have access. For this analysis, receptors were distributed along sidewalks near the intersection selected for analysis and surrounding each analysis site.

Traffic Data

Traffic inputs for the air quality analysis were derived from traffic counts and other information developed as part of the traffic study analysis. Traffic periods considered in the analysis were the same periods selected for the traffic analysis. They consisted of the AM, MD and PM weekday peak as well as the PM weekend peak. These are the periods when the maximum changes in pollutant concentrations are expected based on overall traffic volumes and anticipated changes in traffic patterns due to the proposed action. Future proposed action traffic data utilized in the mobile source air-quality analyses were based on unmitigated traffic conditions. This represents a conservative approach since traffic mitigation is usually employed to improve traffic flow at an intersection (i.e., by decreasing traffic delays or improving the Level of Service). Improvements in an intersections LOS will typically result in improvements to traffic-related air quality conditions at that intersection.

The *2000 Highway Capacity Manual* and HCS 2000 software were used to develop the traffic data necessary for the air quality analysis. The vehicle classification was determined through field data collection. Existing vehicle speeds were obtained from field measurements for the area, and adjusted to estimate future free flow speeds.

Vehicle Classification Data

Vehicle classification percentages required to determine composite emission factors were based on traffic survey data for the following categories: light duty gasoline vehicles (LDGVs), sport utility vehicles (SUVs), medallion taxis, light-duty trucks, heavy-duty trucks, and buses. Where appropriate, the six collected vehicle classification categories were expanded into eight categories. The eight expanded categories were based on NYSDEC's downstate registration data contained in the MOBILE CO emissions model for each appropriate analysis year. Light duty gasoline trucks were divided into two sub-groups (LDGT12, and LDGT34). Heavy-duty trucks were divided into heavy duty gas vehicles (HDGVs) and heavy-duty diesel vehicles (HDDVs). All buses, regardless of fuel source, were analyzed as heavy-duty diesel vehicles (HDDVs).

Vehicular Emissions

CO emission factors were estimated using the USEPA MOBILE6 mobile emission factor algorithm model released by the USEPA on January 29, 2002. This version includes the effects of the new vehicle standards, and includes vehicle turnover. MOBILE6.2 (the most current version), which includes emission factors for particulate matter, was released May 2004 and is used in this analysis.

The following assumptions were applied in using MOBILE6.2:

- NYSDEC input files with engine operating start and distribution parameters and vehicle miles traveled (VMT) for Bronx County were used to estimate baseline conditions;
- 2006 New York State registration and diesel sales fraction data;
- 100 percent hot-stabilized LDGV emission factors were used for medallion taxis
- All inbound project-generated trips were assumed to consist of 100% hot start trips. All outbound project-generated trips were assumed to consist of 100% cold start trips
- SUVs were assumed to be LDGTs that have the same engine operating parameters as automobiles;
- A 24-hour average temperature distribution was used.

Dispersion Analysis

Mobile source dispersion models are the basic analytical tools used to estimate pollutant concentrations from the emissions generated by motor vehicles as expected under given conditions of traffic, roadway geometry, and meteorology. CAL3QHC Version 2 is a line-source dispersion model that predicts pollutant concentrations near congested intersection and heavily traveled roadways. CAL3QHC input variables include free flow and calculated idle emission factors, roadway geometries, traffic volumes, site characteristics, background pollutant concentrations, signal timing, and meteorological conditions. CAL3QHC predicts inert pollutant concentrations, averaged over a one-hour period near roadways. This model was used to predict concentrations at affected study-area intersections.

CAL3QHC predicts peak one-hour pollutant concentrations using assumed meteorology and peak-period traffic conditions. Different emission rates occur when vehicles are stopped (idling), accelerating, decelerating, and moving at different average speeds. CAL3QHC simplifies these different emission rates into the following two components:

- Emissions when vehicles are stopped (idling) during the red phase of a signalized intersection.
- Emissions when vehicles are in motion during the green phase of a signalized intersection.

The analyses followed the USEPA's Intersection Modeling Guidelines (USEPA-454/R-92-005) for CO modeling methodology and receptor placement. All major roadway segments (links) within approximately 1,000 feet from each analysis site (i.e., congested intersection) were considered. A mixing height of 1,000 meters and a surface roughness factor of 321 centimeters were included in all calculations.

A conservative analysis, which assumes that peak period vehicular emissions, traffic volumes, and intersection operating parameters occur every hour of each analysis year, was conducted. The use of peak hour baseline and project-generated traffic conditions would also result in conservative predictions of pollutant levels and project impacts.

Background Values

To properly represent the total impact of the proposed action in the analysis, it is necessary to consider representative background levels for each of the analyzed pollutants. The background level is the component of the total concentration not accounted for through the microscale modeling analysis. Applicable background concentrations were added to the modeling results to obtain total pollutant concentrations at each receptor site for each analysis year. Background concentrations were based either on monitored values collected by NYSDEC or values obtained from NYCDEP. The CO background values were provided by NYCDEP using the latest NYSDEC procedures based on the most recent ambient monitoring data and future decreases in vehicular emissions. $PM_{2.5}$, NO_2 and SO_2 background values were also obtained from NYCDEP. These values were added to the modeling results as appropriate to obtain total pollutant concentrations at each receptor site for each analysis year. The background values used in the air quality analyses are provided in Table 3.17-4.

Table 3.17-4: Background Concentrations

Pollutant	Averaging Time	Value
CO	8-hour	2.0 ppm
NO_2	Annual	60 µg/m³
PM_{10}	24-hour	91 µg/m³
	3-hour	233 µg/m³
SO_2	24-hour	136 µg/m³
	Annual	34 µg/m³

* *CO values are representative of 2007 data. NO_2 and SO_2 values are based on data collected for the years 2001 – 2005. PM_{10} values are based on data collected for the years 2002–2004. The monitoring station for NO_2 and SO_2 and PM_{10} was located at IS 52 in the Bronx.*

Existing Conditions

The results of the mobile source air quality modeling analysis under existing (2008) conditions are provided in Table 3.17-5. The values shown are the maximum CO concentrations estimated near each analysis site under the time frames that correspond to the NAAQS.

Table 3.17-5: Existing Conditions – Maximum Predicted 8-Hour CO Levels (2008)

Site #	***Analysis Site***	***8-hr CO Level (ppm)***			
		AM	**MD**	**PM**	**SAT**
1	149th Street & Exterior Street	4.2	3.1	4.0	3.6
2	149th Street & Grand Concourse	3.2	3.7	3.3	3.0
3	138th Street & Exterior Street	4.7	4.3	4.7	4.3
4	138th Street & Morris Avenue / 3rd Avenue	2.8	2.8	2.8	2.7

Notes:
1 All values include appropriate background concentration; 8-hour CO background concentration is 2.0 ppm.
2. Time Periods: AM peak period (7:00-9:00 AM); Midday peak period (12:00-2:00 PM); PM peak period (4:00-6:00 PM); SAT – PM weekend peak period (2:00-3:00 PM)

The results are summarized as follows:

- Carbon monoxide levels do not exceed the 8-hour CO standard of 9 ppm. The highest estimated concentration (4.7 ppm) occurs near the intersection of East 138th Street and Exterior Street (Analysis Site #3) under the AM peak period.

Future Without the Proposed Action

A summary of the results of the mobile source air quality modeling analysis for the future without the proposed action in 2018 are provided in Table 3.17-6. The values shown are the maximum CO concentrations estimated near each analysis site under the time frames that correspond to the NAAQS.

Table 3.17-6: 2018 Future Without the Proposed Action Maximum Predicted 8-Hour CO Levels

Site #	***Analysis Site***	***8-hr CO Level (ppm)***			
		AM	**MD**	**PM**	**SAT**
1	149th Street & Exterior Street	3.4	3.1	3.3	2.8
2	149th Street & Grand Concourse	3.0	2.8	3.0	2.7
3	138th Street & Exterior Street	4.2	3.5	4.2	3.8
4	138th Street & Morris Avenue / 3rd Avenue	2.7	2.6	2.8	2.6

Notes:
1 All values include appropriate background concentration; 8-hour CO background concentration is 2.0 ppm.
2. Time Periods: AM peak period (7:00-9:00 AM); Midday peak period (12:00-2:00 PM); PM peak period (4:00-6:00 PM); SAT – PM weekend peak period (2:00-3:00 PM)

The results are:

- CO levels would not exceed the 8-hour standard of 9 ppm at any of the analysis sites. The highest estimated concentration (4.2 ppm) would occur near the intersection of East 138th Street and Exterior Street (Analysis Site #3) under the AM peak period.

These results assume that the future year CO emission rates would be affected by decreases in future year emission factors due to increasing stringent emission control requirements and increases in traffic volumes due to anticipated increases in travel demand.

Future With the Proposed Action

A summary of the results of the mobile source air quality modeling analysis for the Future with the Proposed Action in 2018 is provided in Table 3.17-7. The values shown are the maximum CO concentrations increments estimated near each analysis site with the proposed action.

Table 3.17-7: 2018 Future With the Proposed Action Maximum Predicted 8-Hour CO Levels

Site #	*Analysis Site*	*8-hr CO Level (ppm)*			
		AM	**MD**	**PM**	**SAT**
1	149th Street & Exterior Street	3.5	3.2	3.5	2.9
2	149th Street & Grand Concourse	3.0	2.8	3.1	2.8
3	138th Street & Exterior Street	4.3	3.8	4.2	3.8
4	138th Street & Morris Avenue / 3rd Avenue	2.6	2.6	2.8	2.6

Notes:
1 *All values include appropriate background concentration; 8-hour CO background concentration is 2.0 ppm.*
2. *Time Periods: AM peak period (7:00-9:00 AM); Midday peak period (12:00-2:00 PM); PM peak period (4:00-6:00 PM); SAT – PM weekend peak period (2:00-3:00 PM)*

The results of this analysis are summarized as follows:

- CO levels would not exceed the 8-hour standard of 9 ppm at any of the analysis sites. The highest estimated 8-hour concentration (4.3 ppm) would occur near the intersection of East 138th Street and Exterior Street (Analysis Site #3) under the AM peak period.

The highest project-generated CO increment would occur at the intersection of East 138th Street and Exterior Street during the MD peak period (increase of 0.3 ppm). Therefore, the NYCDEP CO *de minimis* value of 0.5 ppm would not be exceeded at this site or any other analysis site, indicating that the proposed action does not have the potential to cause CO impacts that are considered to be significant.

Parking Facilities Analysis

Pollutant concentrations could be affected near new parking facilities that could be built as part of the Proposed Action. To estimate the potential impacts from the emissions of these facilities, the largest proposed parking facility that were located near intersections which would accommodate the most project-generated traffic were selected for detailed analysis. The largest facility would be a 410-space parking garage located at projected development Site #1 along Exterior Street between 149th Street and 146th Street.

Because the garage would be used almost exclusively by gasoline-powered automobiles and not diesel-fueled trucks, CO was the only pollutant considered for this analysis. PM_{10} and $PM_{2.5}$ concentrations would not be materially affected by emissions from these facilities.

Concentrations of CO near the facility were estimated following the *CEQR Technical Manual* guidelines for a mechanically ventilated, enclosed garage. Pollutant concentrations were estimated at receptors (representative of a near sidewalk location and a far location along the pedestrian path of the 145th Street Bridge) located at 5 and 39 feet from the exhaust vents, with the assumed height of the vent a minimum of 10 feet above street level. An additional elevated receptor located above the vent on the near side of the street, was studied to determine potential impacts on residents at the development sites. The study analyzed one exhaust vent for the parking garage and the vent location was assumed to be located on the 149th Street side of the parking garage. These are conservative assumptions since 1) more than one vent would dilute pollutant emissions at a specific location; and 2) contributions from emissions generated by intersection traffic at 149th Street and Exterior Street under peak hour Build conditions could be added to these estimated concentrations to estimate the cumulative impacts of the garage and the corresponding street contribution.

This analysis was conducted for the 2018 analysis year, when this facility is anticipated to be in operation and for the PM peak period, when estimated garage emissions would be greatest because all of the exiting vehicles would be operating in the higher-polluting, cold-start mode.

The resulting maximum total 8-hour CO concentration (i.e., including background levels and street traffic contributions) predicted for any of the receptor sites are not estimated to cause or exacerbate the NAAQS of 9.0 ppm.

Table 3.17-8: Results of Garage Analysis (2018)*

Garage Site #	Near Receptor - South Side of 149th Street 8-hr CO Impact (ppm)	Elevated Window Receptor– South Side of 149th Street 8-hr CO Impact (ppm)	Far Receptor - North Side of 149th Street on 145th Street Bridge 8-hr CO Impact (ppm)
1	3.3	2.9	3.1

* *Results include contribution from on street traffic.*

Particulate Matter

Project traffic data indicate the proposed project would induce a small number of heavy duty vehicles (less than eight per intersection during any of the peak hours). The current NYCDEP/NYSDEC protocol for analyzing the effects of $PM_{2.5}$ establishes a threshold below which mobile source impacts from particulate matter is highly unlikely. This protocol establishes an emission threshold equivalent to 23 heavy duty diesel vehicles (based on 2008 Mobile 6.2 emissions). As a result, the established threshold was estimated to be 5.164 gram/mile for the proposed project. These emissions were then compared to the expected 2018 $PM_{2.5}$ emissions burden of the proposed project as a result of both HDDV traffic and other contributions from gas powered autos. If the expected emission rate of the proposed project is less than the applicable threshold, then the likelihood of an impact from $PM_{2.5}$ is not considered to be significant and no further analysis would be required.

In the future 2018 build year, the intersection that would result in the highest $PM_{2.5}$ emissions would be located at 138th Street and Exterior Street. The future emissions from the combination of HDDV's and autos were calculated to be 3.598 gram/mile. As a result, the emissions burden of the project would not surpass the NYCDEP/NYSDEC screening threshold and the proposed project is not expected to cause any adverse traffic-related $PM_{2.5}$ impacts.

Yankee Game Day - Mobile Source Analysis

Carbon Monoxide

Selection of Intersection Analysis Sites

A microscale modeling analysis was conducted to estimate CO levels at heavily congested intersections (i.e., analysis sites) in the study area which would be most affected by Yankee Game Day (YGD) traffic. The following scenarios were analyzed: existing conditions and future conditions (2018), with and without the proposed action. Intersections selected for analysis are shown in Table 3.17-9. These intersections were chosen based on their proximity to the East 145th Street Bridge and East 149th Street corridor. Based on this proximity, these sites could potentially be affected by the greatest volume of YGD traffic.

Table 3.17-9: YGD Microscale Intersection Analysis Sites

Site Number	Intersection
1	149th Street & Exterior Street
2	149th Street & Grand Concourse

Existing Conditions

The results of the mobile source air quality modeling analysis under YGD existing (2008) conditions are provided in Table 3.17-10. The values shown are the maximum CO concentrations estimated near each analysis site under the time frames that correspond to the NAAQS.

Table 3.17-10: YGD Existing Conditions – Maximum Predicted 8-Hour CO Levels (2008)

Site #	Analysis Site	PM 8-hr CO Level (ppm)	SAT 8-hr CO Level (ppm)
1	149th Street & Exterior Street	4.0	3.7
2	149th Street & Grand Concourse	3.3	3.2

Notes:
1 All values include appropriate background concentration; 8-hour CO background concentration is 2.0 ppm.
2. Time Periods: AM peak period (7:00-9:00 AM); Midday peak period (12:00-2:00 PM); PM peak period (4:00-6:00 PM); SAT – PM weekend peak period (2:00-3:00 PM)

The results are summarized as follows:

- Carbon monoxide levels do not exceed the 8-hour CO standard of 9 ppm. The highest estimated concentration (4.0 ppm) occurs near the intersection of East 149th Street and Exterior Street (Analysis Site #1) under the PM peak period.

Future Without the Proposed Action

A summary of the results of the mobile source air quality modeling analysis for the future without the proposed action in 2018 are provided in Table 3.17-11. The values shown are the maximum CO concentrations estimated near each analysis site under the time frames that correspond to the NAAQS.

Table 3.17-11: 2018 YGD Future Without the Proposed Action Maximum Predicted 8-Hour CO Levels (2018)

Site #	Analysis Site	PM 8-hr CO Level (ppm)	SAT 8-hr CO Level (ppm)
1	149th Street & Exterior Street	3.6	3.3
2	149th Street & Grand Concourse	3.0	2.9

Notes:
1 All values include appropriate background concentration; 8-hour CO background concentration is 2.0 ppm.
2. Time Periods: AM peak period (7:00-9:00 AM); Midday peak period (12:00-2:00 PM); PM peak period (4:00-6:00 PM); SAT – PM weekend peak period (2:00-3:00 PM)

The results are:

- CO levels would not exceed the 8-hour standard at any of the analysis sites. The highest estimated concentration (3.6 ppm) would occur near the intersection of East 149th Street and Exterior Street (Analysis Site #1) under the PM peak period.

These results assume that the future year CO emission rates would be affected by decreases in future year emission factors due to increasing stringent emission control requirements and increases in traffic volumes due to anticipated increases in travel demand.

Future With the Proposed Action

A summary of the results of the mobile source air quality modeling analysis for the Future with the Proposed Action in 2018 is provided in Table 3.17-12. The values shown are the maximum CO concentrations increments estimated near each analysis site with the proposed action.

Table 3.17-12: 2018 YGD Future With the Proposed Action Maximum Predicted 8-Hour CO Levels

Site #	Analysis Site	PM 8-hr CO Level (ppm)	SAT 8-hr CO Level (ppm)
1	149th Street & Exterior Street	3.7	3.3
2	149th Street & Grand Concourse	3.0	2.9

Notes:
1 All values include appropriate background concentration; 8-hour CO background concentration is 2.0 ppm.
2. Time Periods: AM peak period (7:00-9:00 AM); Midday peak period (12:00-2:00 PM); PM peak period (4:00-6:00 PM); SAT – PM weekend peak period (2:00-3:00 PM)

The results of this analysis are summarized as follows:

- CO levels would not exceed the 8-hour standard at any of the analysis sites. The highest estimated 8-hour concentration (3.7 ppm) would occur near the intersection of East 149th Street and Exterior Street (Analysis Site #1) under the PM peak period.

The highest project-generated CO increment would occur at the intersection of East 149th Street and Exterior Street during the PM peak period (increase of 0.1 ppm). The NYCDEP CO *de minimis* values would not be exceeded at this site or any other analysis site, indicating that the proposed action does not have the potential to cause significant adverse CO impacts.

Conclusion

For the proposed action, the YGD scenario would not result in significant increases of CO emissions over the non-YGD scenario. At 149th Street and Exterior Street (Site 1), there is an increase of 0.2 ppm during the PM peak period and 0.4 ppm during the SAT midday peak period. At 149th Street and Grand Concourse (Site 2), there is a decrease of 0.1 ppm during the PM peak period and an increase of 0.1 ppm during the SAT midday peak period.

When comparing the results of the future with and without the action analyses, the YGD offered a slightly smaller increment increase (0.1 ppm) versus the non-YGD increment (0.2 ppm).

As noted above, the CO levels would not exceed the 8-hour standard of 9 ppm nor would the increment between with and without the proposed action exceed the NYCDEP CO *de* minimis value of 0.5 ppm for any of the analysis sites under either the non-YGD or YGD. As a result, mobile source air quality impacts are not anticipated under both the YGD and non-YGD scenarios.

3.17.3 ANALYSIS OF HEATING SYSTEM EMISSIONS

Introduction

The proposed action, under the RWCDS, would affect 31 projected and 48 potential development sites, and include new buildings and building conversions, and assemblages.

The proposed action would alter land uses in the study area and allow residential units in an area where the existing zoning permits only commercial and industrial activity. Air quality, which is a general term used to describe pollutant levels in the atmosphere, would be affected by these changes. The air quality impacts associated with stationary sources addressed in this analysis are:

- The potential for emissions from the HVAC systems of the proposed development sites to significantly impact existing land uses;

- The potential for emissions from the HVAC systems of projected and potential development sites to significantly impact other development sites (project-on-project impacts);

- The potential combined impacts from HVAC emissions of proposed developments that are located in close enough proximity to one another (clusters) to significantly impact existing land uses and other proposed developments;

- The potential for significant air quality impacts from the emissions of "major" existing emission sources (i.e., HVAC systems with 20 or more million Btu/hr heat input) on the proposed residential developments located in areas that are being rezoned to allow new residential uses; and

- Air quality analyses were conducted, following the procedures outlined in the New York City Environmental Quality Review (*CEQR) Technical Manual*, to determine whether the proposed action would result in violations of ambient air quality standards or exceedances of health-related guideline values. The methodologies and procedures utilized in these analyses are described below.

Emissions from the HVAC systems of the projected and potential developments may affect air quality levels at nearby existing land uses as well as the other proposed developments. The impacts of these emissions would be a function of fuel type, stack height, building size (gross floor area), and location of each emission source relative to a nearby sensitive receptor site. Data to conduct this analysis were obtained as follows:

- The size (gross floor area and height) and location (block and lot number) for each projected and potential development site under the proposed action were provided by the DCP; and
- The size and location of each existing building were determined using the New York City Open Accessible Space Information System Cooperative (OASIS) database.

Screening Level Analysis of Non-Adjacent Developments

<u>Building-on-Building Impact Analysis</u>

An analysis was conducted, using *CEQR Technical Manual* screening procedures, to determine whether the HVAC emissions of any of the projected and potential development sites that are not located adjacent to another development would have the potential to significantly impact air quality levels at any of the other nearby projected and potential development sites (i.e., project-on-project impacts).

Each projected and potential development site was evaluated and all nearby projected or potential developments of similar or greater height were considered as potential sensitive receptor sites. If the distance from a projected and/or potential development to the nearest development of similar or greater height was less than the threshold distance provided in the *CEQR Technical Manual nomograph*, there is a potential for significant air quality impacts, and a detailed dispersion modeling analysis was conducted. Otherwise, the source passes the screening analysis, and no further analysis is required.

The maximum floor area of each of the projected and/or potential development site was used as input for the screening analysis. It was assumed that HVAC system of each development site would utilize a single stack with the height 3 feet above roof height (as per *CEQR Technical Manual* guidance). If a source did not pass this screening procedure, detailed atmospheric dispersion analyses using the USEPA's AERMOD model were conducted.

Impacts on Existing Land Uses

A screening level analysis was also conducted, using the same *CEQR Technical Manual* procedures, to determine the potential impacts of the HVAC emissions of any of the projected and potential development sites on existing sensitive land uses.

A survey of existing land uses within 400 feet of the rezoning area was conducted using the New York City OASIS mapping network system to identify residential land uses and other sensitive receptor sites. The survey showed that there are a numerous existing buildings within and near the rezoning area, mostly commercial and industrial establishments, and a few residential buildings. The following are sensitive sites (i.e., residences, schools, parks, etc.) that were considered in the screening-level analysis of the HVAC emissions of the projected and potential development sites:

- Block 2349, which includes Lower Concourse Park;
- Nine blocks (2298, 2309, 2311, 2314, 2317, 2324, 2325, 2338, and 2352) that currently contain multi-family residential buildings;
- Blocks 2343, 2346, and 2350, which contain Hostos College,
- Block 2335, which contains Lincoln Hospital,
- Block 2344, which contains Health Opportunities High School, and
- Block 2325, which contains New York City Housing Authority's Paterson Houses.

The *CEQR Technical Manual* provides a nomographic procedure, based on the square footage and height of each building (provided that buildings are at least 30 feet apart), that was used to determine the threshold distance between each projected and/or potential non-adjacent development heated by oil or natural gas and a nearby building of similar or greater height. If more than one taller building is located near a shorter building, the potential impacts from the HVAC emissions of the shorter building on the closest taller building were considered.

The following procedures were conducted:

- Figures 3Q-5, 3Q-7 and 3Q-9 of the *CEQR Technical Appendix* were used to determine potential for significant SO_2 (i.e., the critical pollutant for fuel oil) and NO_2 (i.e., the critical pollutant for natural gas) impacts.

- The estimated maximum size of each building was plotted on the nomograph against the distance to a potentially affected nearby taller building.

- The threshold distance at which a potentially significant impact is likely to occur was estimated and compared to the actual distance between the shorter building and the nearest taller building.

- If the distance between buildings was greater than the threshold distance indicated on the nomograph, no potentially significant impact is anticipated, and no detailed analysis was conducted.

- If the distance was less than the threshold distance indicated on the nomograph, a potentially significant impact is possible, and a detailed dispersion modeling analysis was conducted.

Screening level analyses were conducted using fuel oil (#2 and #4) and natural gas, with the critical pollutant for fuel oil being SO_2 and the critical pollutant for natural being NO_2.

<u>Results</u>

Non-Adjacent Building-on-Building Impacts. The results of the screening level analyses as well as the critical distance parameters used in these analyses, which are presented in Tables 3.17-13 and 3.17-14, are as follows:

- The development sites that passed the screening level analysis (Table 3.17-13) using fuel oil are Projected Development Sites 4, 5, 6, 7, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 24, 26, 28, 31, and Potential Development Sites 34, 35, 36, 38, 40, 41, 43, 44, 46, 49, 52, 54, 59, 63, 64, 65, 70, and 78.

- The development sites that did not pass the screening level analysis (Table 3.17-14) using fuel oil are Projected Development Sites 5, 6, 9, 12, 18, 21 and Potential Development Sites 41, 46, 47, 48, 53, 59, 68, 70, and 76.

Table 3.17-13: Projected and Potential Non-Adjacent Development Sites That Passed Screening Level Analysis

Site ID	Size (sq. feet)	RWCDS Building Height (feet)	*CEQR* Threshold Distance for Fuel Oil (feet)	Measured Distance to the Nearest Site (feet)	Source and Receptor Sites	*CEQR* Screening Results for Fuel Oil
Projected on Projected Developments						
Site 4	218,172	125	108	400	4 on 8	Pass
Site 5	116,510	120	76	115	5 on 2	Pass
Site 6	275,868	120	119	71	6 on 8	Pass
Site 7	141,765	120	88	191	7 on 8	Pass
Site 11	47,808	70	55	98	11 on 13	Pass
Site 12	98,834	72	85	338	12 on 16	Pass
Site 13	72,382	120	62	180	13 on 14	Pass
Site 15	128,582	120	82	123	15 on 14	Pass
Site 16	191,400	120	105	354	16 on 18	Pass
Site 17	56,250	70	60	235	17 on 30	Pass
Site 18	168,200	125	90	383	18 on 19	Pass
Site 19	62,500	125	62	94	19 on 21	Pass
Site 21	57,500	125	55	92	21 on 20	Pass
Site 24	18,000	15	50	139	24 on 25	Pass
Site 26	74,483	60	75	286	26 on 17	Pass
Site 28	60,250	50	61	232	28 on 29	Pass
Site 31	101,890	80	85	165	31 on 20	Pass
Projected on Potential Developments						
Site 4	218,172	125	108	215	4 on 44	Pass
Site 5	116,510	120	76	85	5 on 41	Pass
Site 9	320,695	120	130	168	9 on 41	Pass
Site 11	47.808	70	55	60	11 on 46	Pass
Site 12	98,834	72	85	198	12 on 33	Pass
Site 13	72,382	120	65	180	13 on 49	Pass
Site 14	65,160	120	62	116	14 on 43	Pass
Site 15	128,582	120	80	107	15 on 46	Pass
Site 17	56,250	70	60	82	17 on 71	Pass
Site 18	168,200	125	90	204	18 on 55	Pass
Site 19	62,500	125	62	66	19 on 54	Pass
Site 21	57,500	125	55	118	21 on 54	Pass
Site 26	74,483	60	75	76	26 on 67	Pass

Table 3.17-13: Projected and Potential Non-Adjacent Development Sites That Passed Screening Level Analysis (continued)

Site ID	Size (sq. feet)	RWCDS Building Height (feet)	*CEQR* Threshold Distance for Fuel Oil (feet)	Measured Distance to the Nearest Site (feet)	Source and Receptor Sites	*CEQR* Screening Results for Fuel Oil
Potential on Projected Developments						
Site 36	100,000	125	75	108	36 on 3	Pass
Site 38	268,272	120	114	136	38 on 5	Pass
Site 46	422,438	120	148	167	46 on 16	Pass
Site 52	85,800	120	70	205	52 on 18	Pass
Site 59	68,080	80	69	70	59 on 21	Pass
Site 63	11,700	45	30	115	63 on 23	Pass
Potential on Potential Developments						
Site 34	153,376	125	88	145	34 on 33	Pass
Site 35	250,024	260	110	300	35 on 32	Pass
Site 40	88,877	120	70	305	40 on 35	Pass
Site 41	83,520	120	65	172	41 on 39	Pass
Site 43	53,086	120	54	115	43 on 50	Pass
Site 44	54,004	70	54	63	44 on 46	Pass
Site 46	422,458	120	148	159	46 on 51	Pass
Site 49	42,062	120	47	111	49 on 46	Pass
Site 52	85,800	120	67	190	52 on 53	Pass
Site 54	50,000	125	53	98	54 on 55	Pass
Site 64	34,394	80	48	116	64 on 60	Pass
Site 65	38,079	80	50	71	65 on 64	Pass
Site 76	96,959	80	83	164	76 on 54	Pass

Table 3.17-14 Projected and Potential Non-Adjacent Development Sites That Did Not Pass Screening Level Analysis

Site ID	Size (sq. feet)	RWCDS Height (feet)	CEQR Threshold Distance for Fuel Oil (feet)	Measured Distance to the Nearest Site (feet)	Source and Receptor Sites	CEQR Screening Results for Fuel Oil
Projected on Projected Developments						
Site 6	275,868	120	119	66	6 on 5	did not pass
Site 9	320,695	120	130	60	9 on 8	did not pass
Projected on Potential Developments						
Site 5	116,510	120	76	64	5 on 40	did not pass
Site 12	98,834	72	85	61	12 on 46	did not pass
Site 18	168,200	125	90	93	18 on 53	did not pass
Site 21	57,500	125	55	54	21 on 55	did not pass
Potential on Projected Developments						
Site 41	83,250	120	65	55	41 on 6	did not pass
Site 70	189,500	125	102	56	70 on 18	did not pass
Potential on Potential Developments						
Site 46	422,458	120	148	110	46 on 50	did not pass
Site 47	75,262	120	64	64	47 on 45	did not pass
Site 48	223,920	120	115	115	48 on 42	did not pass
Site 53	106,105	125	75	64	53 on 54	did not pass
Site 59	68,060	80	70	68	59 on 60	did not pass
Site 68	51,750	70	57	56	68 on 71	did not pass
Site 70	189,500	125	102	47	70 on 55	did not pass
Site 76	96,959	80	83	75	76 on 78	did not pass

Impacts on Existing Land Uses. The following are the results of the screening level analyses that are based on *CEQR Technical Manual* screening procedures:

- No further analysis is required for those projected and/or potential development sites where all adjacent proposed building heights would be taller than that proposed for the development site.

- Projected Development Site 26 (60 feet tall) is located near the taller 14-story Lincoln Hospital on Block 2335, and HVAC emissions of the projected building may impact the taller building. However, the distance between these buildings exceeds the estimated screening threshold distances and no further analysis is required.

- Potential Development Sites 72, 75, and 76 (all 80 feet tall) are located near the existing taller (14-story) Paterson Houses Complex on Block 2325, and HVAC emissions of these buildings may impact the taller buildings. However, the distance between any of the potential development sites and the nearest housing complex building exceeds the estimated screening threshold distances, and no further analysis is required.

- Projected Development Sites 26 (60 feet tall) and 27 (40 feet tall) are located near a taller (25-story) existing residential building on Block 2338, and HVAC emissions of these buildings may impact the taller buildings. However, the distance between each of the projected buildings and the existing building exceeds the estimated screening threshold distances and no further analysis is required.

- Potential Development Sites 71 and 72 (both 80 feet tall) are located near a taller (13-story) existing residential building on Block 2324, and HVAC emissions of these buildings may impact the taller buildings. However, the distance between each of the potential buildings and the existing building exceeds the estimated screening threshold distances, and no further analysis is required.

- Potential Development Sites 63 (45 feet tall) and 64 (80 feet tall) are located near a taller (20-story) existing residential building on Block 2311, and HVAC emissions of these buildings may impact the taller building. However, the distances between each of the potential buildings and the existing building exceeds the estimated screening threshold distances, and no further analysis is required.

The result of the screening-level analysis is that no significant air quality impacts from the emissions of the HVAC systems of the projected and potential development sites that are not adjacent to each other or part of a cluster on the surrounding existing land uses are predicted to occur.

Detailed Analysis

Detailed dispersion analyses, using the USEPA AERMOD model, were conducted for:

- Non-adjacent development sites that did not pass the screening-level analysis; and
- Development sites that are adjacent to other development sites.

Non-Adjacent Development Sites That Did Not Pass the Screening Level Analysis. Detailed dispersion modeling analyses were conducted for the sites that did not pass the CEQR screening analysis. These are Projected Development Sites 5, 6, 9, 12, 18, and Potential Development Sites 41, 46, 47, 48, 53, 59, 68, 70, and 76.

Methodology

Adjacent Development Sites

The rezoning area includes 26 development sites that are immediately adjacent to one another with the same or shorter proposed building height that requires analysis (see Tables 3.17-16 and 3.17-17). Because *CEQR Technical Manual* screening procedures are not applicable to buildings than less than 30 feet apart, the potential impacts of the HVAC emissions from these buildings were estimated using detailed dispersion analyses, described in the "Detailed Dispersion Analysis" section below.

Pollutants Considered

The maximum 24-hr SO_2 and the annual NO_2 impacts represent the critical pollutants and time period for determining potential project impacts. As such, SO_2 analyses were conducted for fuel oil and NO_2 analyses were conducted for natural gas.

As SO_2 emission rates are basically the same for Number 4 fuel oil and Number 2 fuel, analyses were conducted for Number 2 fuel oil and the results apply to Number 4 fuel oil as well.

Dispersion Model

AERMOD is a steady-state plume model is applicable in rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources). It can be used to calculate pollutant concentrations from one or more points (e.g., exhaust stacks) based on hourly meteorological data, and has the capability of calculating pollutant concentrations in a cavity region and at locations when the plume from the exhaust stack is affected by the aerodynamic wakes and eddies (downwash) produced by nearby structures.

Regulatory default options of the AERMOD model were used. Following CEQR guidelines, analyses were conducted assuming stack tip downwash, urban dispersion and surface roughness length, with and without building downwash, and the elimination of calms. The AERMOD downwash algorithm was utilized to estimate the potential affects of the multiple building structures on the plume dispersion. The total of seventy nine (79) development sites was included in this analysis.

Emission Rates

Emission rates were estimated as follows:

- A fuel consumption rate for each site was estimated using fuel factors presented in the *CEQR Technical Manual,* Appendix 7.

- These fuel factors, which are 0.36 gallons per square feet for Number 4 fuel oil and 0.38 for Number 2 fuel oil and 52.8 cubic feet per square feet for natural gas for the New York City, were multiplied by the square footage of each site to estimate the total number of gallons (or cubic feet) of fuel consumed by that building annually.

- It was assumed that all fuel is consumed in a 100 day (2,400 hour) heating season.

- Average annual peak period pollutant emission rates were estimated, as recommended in the *CEQR Technical Manual*, by dividing the total amount of pollution estimated to be emitted in a year by 8760 hours.

Emission factors for pollutants of concern were obtained from the USEPA's "Compilation of Air Pollutant Emission Factors" (AP-42) for fuel oil with sulfur content of 0.2 percent and natural gas.

Stack Parameters

Stack heights, building sizes (square footages and heights), fuel consumption rates, and estimated pollutant emission rates used in these analyses are provided in the Technical Appendix. It was assumed that emissions from each development site would be released through a single stack located at the edge of the roof closest to the nearest taller building. The minimum distance between sites was estimated from lot line to lot line.

The following stack parameters, which were developed using the NYCDEP "CA Permit" database and the rated heat input (in MMBtus per hour) of the heating systems, were used:

- Boilers from 1 to 5 MMBtu/hr = 0.5 foot diameter

- Boilers from 5.1 to 10 MMBtu/hr = 1.0 foot diameter

- Boilers from 10.1 to 15 MMBtu/hr = 2.0 foot diameter

- Boilers greater than 15.1 MMBtu/hr = 4.0 foot diameter

All stack exit temperatures were assumed to be 300°F (423°K).

Meteorological Data

Analyses were conducted using five consecutive years of meteorological data (2002-2006). Surface data were obtained from La Guardia Airport and upper air data were obtained from Brookhaven station, New York. These meteorological data provide hour-by-hour wind speeds and directions, stability states, and temperature inversion elevations over the 5-year period. Data were developed using the USEPA AERMET processor. The land use around the site was classified using defined categories to determine surface parameters used by the AERMET program.

Receptor Locations

Source-receptor configurations (stack diameters, plume rise and dispersion, and stack proximity to the receptors) were considered in selecting receptor sites. In order to determine receptor locations where the maximum impacts would occur when stack is closed to the receptors, the test was conducted where receptors were placed on the façade of impacted development site directly under the plume centerline at the stack height and then above and below stack height in 0.1 meter increments. It was determined that the highest impacts occur at the height that is 0.3 meter higher then the stack height.

For the analysis of existing land uses, receptors were placed on the nearby existing buildings at the levels of the stacks of the proposed development sites (i.e., where the highest impacts are likely to occur). If a stack on a proposed development site was taller than an existing building, receptors were placed at the level of the top floor of the existing building.

The receptor network was also included regularly spaced ground-level receptors at the proposed Lower Concourse Park.

Background Values

Background concentrations (i.e., pollutant levels from other sources in the study area) for the pollutants of concern were obtained from monitoring data collected by the NYSDEC in 2006, the latest year of compiled data. Background data for SO_2 and NOx from Bronx monitoring station IS52 were used. The second highest 24-hr SO_2 background concentration of 134 $\mu g/m^3$ was added to the 1st highest AERMOD-predicted SO_2 impact and resulting total 24-hr SO2 concentration was compared with appropriate 24-hr SO_2 NAAQS of 365 $\mu g/m^3$. Annual background NOx concentration of 56 $\mu g/m^3$ from the same monitoring station was used as well.

Results

Non-Adjacent Development Sites - Building-on-Building Impact Analysis

The results of this analysis for SO_2 are shown in Table 3.17-15. As shown, no exceedances of the 24 SO_2 NAAQS are predicted as a result of non-adjacent building-on-building impact analysis using fuel oil. No exceedances of the annual NOx NAAQS are also predicted as a result of non-adjacent building-on-building impact analysis using natural gas.

Therefore, no exceedances of the NAAQS for all applicable pollutants are predicted as a result of the non-adjacent building-on-building impact analysis.

Table 3.17-15: Non-Adjacent Development Sites - Building-on-Building 24-hr SO_2 Analysis Results

Site No.	Total Floor Area (sq. feet)	Stack Height (feet)	Source and Receptor Sites	Measured Distance to Nearest Taller Building (feet)	24-hr SO_2 Emission Rate (gm/sec)	Total Estimated 24-hr SO_2 Conc. (μg/m³)	24-hr SO_2 NAAQS (μg/m³)
Site 5	116,510	120	5 on 40	64	0.037	160	365
Site 6	275,868	120	6 on 5	66	0.087	217	
Site 9	320,695	120	9 on 8	60	0.101	210	
Site 12	98,834	120	12 on 46	61	0.031	171	
Site 18	168,200	125	18 on 53	93	0.053	149	
Site 21	57,500	125	21 on 55	54	0.018	148	
Site 41	63,520	120	41 on 6	55	0.026	157	
Site 46	422,458	120	46 on 50	110	0.133	182	
Site 47	72,262	120	47 on 45	110	0.024	150	
Site 48	223,920	120	48 on 42	115	0.070	149	
Site 53	106,105	125	53 on 54	64	0.033	176	
Site 59	68,080	80	59 on 60	68	0.021	150	
Site 68	51,750	70	68 on 71	56	0.016	159	
Site 70	189,500	125	70 on 55	47	0.060	269	
Site 76	96,959	80	76 on 78	75	0.031	151	

1. Distances between development sites are measured from lot line to lot line
2. Include 24-SO_2 background concentration of 134 μg/m³
3. NAAQS = National Ambient Air Quality Standards

Adjacent Development Sites

The New York City Building Code (Building Code) requires that a rooftop stack should be at least 10 feet away from a taller building (highest obstacle). As such, the HVAC stack on each projected and potential development site located adjacent to another projected or potential development site were initially placed 10 feet from the lot line to account for conditions that may occur should an adjacent taller building be built and potential impacts were estimated. If exceedances of the NAAQS were predicted, set-back distances were increased in one foot increments until the threshold distance at which the development site would pass analysis was found.

All adjacent development sites passed the detailed analysis with a 10 foot distance between the HVAC exhaust stack and the nearest taller building if natural gas were used for the analysis. A conservative analysis to determine the annual NO_2 impact for natural gas was conducted for two development sites with the largest floor area (Projected Development Site 2 with 320,000 sf and Potential Development Site 42 with 558,281 sf) that also have the highest NO_2 emission rates. It was assumed that 20 percent of NOx emissions would be in form of NO_2 at the receptor sites located close to the stacks. The highest estimated NO_2 impact is 21 $\mu g/m^3$, with a maximum estimated total annual NO_2 concentration (that includes a background concentration of 56 $\mu g/m^3$) of 77 $\mu g/m^3$ resulting in no significant adverse annual NO_2 impact when using natural gas. Therefore, all other development sites which have smaller floor areas, are assumed to pass using natural gas.

The results of analyses for these development sites using fuel oil #2 and # 4 are as follows:

- **Table 3.17-16** shows the results of analyses that were conducted for adjacent development sites that did not exceed NAAQS for SO_2 using fuel oil #2 and #4. No additional restrictions on stack locations beyond the Building Code mandated minimum distance (i.e., 10 feet) would be required for these development sites.

- **Table 3.17-17** shows the results of analyses that were conducted for the adjacent development sites that did not pass the analysis and the stack setback distances required to comply with air quality standards. As such, "E" designations would be required on these development sites to ensure that there would be no significant air quality impacts on adjacent sites. Since these development sites did not exceed the applicable air quality standard using natural gas, "E" designation would be required that would specify either that natural gas be used or the distance that the stack on the building roof must be from the edge of an adjacent development site.

The results of these analyses are that with the use of "E" designations to ensure adequate distance between HVAC exhaust point and nearby taller buildings or the use of natural gas, the potential impacts from the heating systems of the projected and potential development sites under the proposed action would not cause violations of the NAAQS and would therefore have no significant adverse air quality impacts.

Required Set-Back Distances

To preclude the potential for significant adverse air quality impacts, the "E" designations shown in Table 3.17-18 would be required on the Projected and Potential development sites. These "E" designations would specify the required stack set-back distance for fuel oil or the exclusive use of natural gas.

Table 3.17-16: Potential and Projected Development Sites That Did Not Exceed NAAQS for SO_2 Using Fuel Oil

Site No.	Total Floor Area (sq. feet)	Stack Height (feet)	Source and Receptor Sites	24-hr SO_2 Emission Rates (gm/sec)	Total Estimated 24-hr SO_2 Conc. (μg/m³)	24-hr SO_2 NAAQS (μg/m³)
Site 10	13,400	50	10 on 9	0.004	238	365
Site 22	3,347	40	22 on 56	0.001	147	
Site 22	3,347	40	22 on 57	0.001	147	
Site 23	10,800	60	23 on 60	0.003	221	
Site 25	17,907	40	25 on 65	0.006	282	
Site 27	9,804	40	27 on 26	0.003	178	
Site 30	30,963	80	30 on 71	0.010	337	
Site 30	30,963	80	30 on 72	0.010	350	
Site 51	26,352	120	51 on 15	0.008	300	
Site 51	26,352	120	51 on 16	0.008	300	
Site 56	7172	40	56 on 21	0.002	186	
Site 56	7172	40	56 on 22	0.002	186	
Site 58	8,525	55	58 on 57	0.003	230	
Site 58	8,525	55	58 on 59	0.003	235	
Site 61	7,500	40	61 on 62	0.002	176	
Site 61	7,500	40	61 on 23	0.002	176	
Site 63	11,700	45	63 on 64	0.004	240	
Site 67	24,800	60	67 on 68	0.008	310	
Site 69	31,250	60	69 on 17	0.010	354	
Site 77	31,281	55	77 on 19	0.010	336	
Site 77	31,281	55	77 on 78	0.010	340	

Table 3.17-17: Projected and Potential Development Sites That Would Require Stack Set-Back Distances Beyond the Building Code Minimum

Site No.	Total Floor Area (sq. feet)	Stack Height (feet)	Source and Receptor Sites	Stack Distances from Nearest Taller Building (feet)	24-hr SO_2 Emission Rates (gm/sec)	Total Estimated 24-hr SO_2 Conc. (µg/m^3)	24-hr SO_2 NAAQS (µg/m^3)
Site 2	320,000	260	2 on 1	45	0.101	321	365
			2 on 35	37		339	
Site 4	218,172	125	4 on 32	35	0.069	356	
			4 on 33	30	0.069	357	
Site 5	116,510	120	5 on 37	27	0.037	350	
Site 6	275,868	120	6 on 40	35	0.087	328	
Site 7	141,765	120	7 on 41	25	0.045	331	
Site 11	47,808	70	11 on 44	18	0.015	300	
Site 12	98,834	72	12 on 45	25	0.031	344	
Site 13	72,382	120	13 on 42	20	0.023	361	
			13 on 43	20		346	
Site 14	65,160	120	14 on 48	20	0.021	359	
			14 on 49	15		358	
Site 15	128,582	120	15 on 50	28	0.040	350	
			15 on 51	25		322	
Site 16	191,400	120	16 on 51	30	0.060	318	
			16 on 52	35		340	
Site 19	62,500	125	19 on 20	20	0.020	301	
Site 20	54,870	125	20 on 19	15	0.017	274	
Site 26	74,483	60	26 on 66	20	0.023	327	
Site 28	54,870	125	28 on 17	20	0.019	278	
Site 29	104,000	65	29 on 73	25	0.033	341	
Site 31	101,890	80	31 on 76	20	0.032	327	
Site 34	153,376	125	34 on 3	28	0.048	325	
Site 35	260,024	260	35 on 32	34	0.079	360	
Site 37	393,070	120	37 on 5	40	0.124	353	
Site 38	268,272	120	38 on 39	35	0.084	325	
Site 39	47,045	120	39 on 38	20	0.015	300	
Site 40	88,877	120	40 on 6	25	0.028	333	
Site 41	83,520	120	41 on 7	25	0.026	337	

Table 3.17-17: Projected and Potential Development Sites That Would Require Stack Set-Back Distances Beyond the Building Code Minimum (continued)

Site No.	Total Floor Area (sq. feet)	Stack Height (feet)	Source and Receptor Sites	Stack Distances from Nearest Taller Building (feet)	24-hr SO_2 Emission Rates (gm/sec)	Total Estimated 24-hr SO_2 Conc. (μg/m^3)	24-hr SO_2 NAAQS (μg/m^3)
Site 42	558,288	120	42 on 13	50	0.176	356	365
			42 on 43	50		356	
Site 43	53,086	120	43 on 13	15	0.017	315	
Site 44	54,004	70	44 on 11	18	0.017	337	
			44 on 12	15		334	
Site 46	422,438	120	46 on 47	45	0.133	333	
Site 47	75,262	120	47 on 46	22	0.024	331	
Site 48	223,920	120	48 on 14	30	0.070	315	
Site 49	42,062	120	49 on 14	15	0.013	336	
Site 50	44,402	120	50 on 15	15	0.014	312	
			50 on 49	50		350	
Site 52	85,800	120	52 on 16	25	0.027	323	
Site 66	56,690	60	66 on 26	15	0.018	300	
Site 71	171,644	80	71 on 30	28	0.054	328	
			71 on 72	32		350	
Site 72	49,574	80	72 on 30	15	0.016	328	
			72 on 71	15		328	
Site 73	53,000	65	73 on 29	13	0.017	348	
Site 75	210,524	80	75 on 31	30	0.066	360	
			75 on 76	30		357	
Site 76	96,959	80	76 on 31	28	0.031	326	
			76 on 75	28		330	
Site 78	49,321	80	78 on 19	15	0.016	333	
			78 on 20	15		335	
Site 79	56,190	60	79 on 53	14	0.018	360	

Notes:
- *Total estimated 24-hr SO_2 concentrations include a background value of 134 μg/m^3*
- *24-hr SO_2 NAAQS = 365 μg/m^3*

Table 3.17-18: Minimum Stack Set-Back Requirements in Excess of Building Code when Using Fuel Oil

Site Number	Block Number	Lot Number(s)	Set-Back Requirement
Projected Development Sites			
2	2349	100	45 feet from Development Site 1; 37 feet from Development Site 35
4	2349	15	35 feet from Development Site 32; 30 feet from Development Site 33
5	2351	22	27 feet from Development Site 37
6	2351	1, 12, 20	35 feet from Development Site 40
7	2350	11, 16	25 feet from Development Site 41
11	2344	75	18 feet from Development Site 44
12	2344	60	25 feet from Development Site 45
13	2345	5	20 feet from Development Site 42; 20 feet from Development Site 43
14	2341	37, 40	20 feet from Development Site 48; 15 feet from Development Site 49
15	2341	28	28 feet from Development Site 50; 25 feet from Development Site 51
16	2341	10	30 feet from Development Site 51; 35 feet from Development Site 52
19	2333	6, 10	20 feet from Development Site 20
20	2333	1	15 feet from Development Site 19
26	2335	58	20 feet from Development Site 66
28	2340	204	20 feet from Development Site 17
29	2340	186	25 feet from Development Site 73
31	2333	31	20 feet from Development Site 76
Potential Development Sites			
34	2323	43	28 feet from Development Site 3
35	2349	46, 47	34 feet from Development Site 32
37	2351	25, 35	40 feet from Development Site 5
38	2350	34	35 feet from Development Site 39
39	2350	63	20 feet from Development Site 38
40	2351	3	25 feet from Development Site 6
41	2350	5	25 feet from Development Site 7
42	2345	10, 12, 14, 18, 22, 26	50 feet from Development Site 13; 50 feet from Development Site 43
43	2345	1, 49	15 feet from Development Site 13
44	2344	83	18 feet from Development Site 11; 15 feet from Development Site 12
46	2344	11, 17, 27	45 feet from Development Site 47
47	2344	1	22 feet from Development Site 46
48	2341	42	30 feet from Development Site 14
49	2341	34	15 feet from Development Site 14
50	2341	31	15 feet from Development Site 15; 50 feet from Development Site 49
52	2341	6	25 feet from Development Site 16
66	2335	6	15 feet from Development Site 26
71	2334	43, 45, 59	28 feet from Development Site 30; 32 feet from Development Site 72
72	2334	38, 39, 40, 41, 66	15 feet from Development Site 30; 15 feet from Development Site 71

Table 3.17-18: Minimum Stack Set-Back Requirements in Excess of Building Code when Using Fuel Oil (continued)

Site Number	Block Number	Lot Number(s)	Set-Back Requirement
73	2340	195	13 feet from Development Site 29
75	2333	50, 54	30 feet from Development Site 31; 30 feet from Development Site 76
76	2333	33	28 feet from Development Site 31; 28 feet from Development Site 75
78	2333	17	15 feet from Development Site 19; 15 feet from Development Site 20
79	2340	11	14 feet from Development Site 53

Cluster Analysis

The proposed action would result in projected and potential development sites with the same building heights (or approximately the same heights) that are located in close proximity to one another. Therefore, in addition to estimating the potential impacts of the HVAC emissions of these development sites individually, emissions from these development sites were also considered as "clusters" of emission sources.

As the potential impacts of these development sites clusters could not be evaluated using *CEQR Technical Manual* screening procedures, the impacts of the HVAC systems emissions of these clusters were estimated using the detailed analyses. This analysis was performed in the same manner described for the non-adjacent development sites, except that this analysis was conducted using a single representative stack located in the approximate geographic center of each cluster as the emission source. Analysis evaluated impacts of the 24-SO_2 and annual NO_2 emissions.

The following three clusters of HVAC emissions were identified:

- Cluster # 1: Projected Development Site 5 (Block 2351, Lot 22), Site 6 (Block 2351, Lot 1, 12, 20), and Site 7 (Block 2350, Lot 11, 16); and, Potential Development Site 37 (Block 2351, Lot 25, 35), Site 38 (Block 2350, Lot 34), and Site 41 (Block 2350, Los 5, 10, 12, 14, 16, 22, and 26) with total floor area of 1,279,005 square feet and representative stack height of 120 ft.

- Cluster # 2: Projected Development Site 15 (Block 2341, Lot 28) and Site 16 (Block 2341, Lot 10); and Potential Development Site 51 (Block 2341, Lot 31) and Site 52 (Block 2341, Lot 6) with total floor area of 432,144 square feet and representative stack height of 120 ft, and

- Cluster # 3: Projected Development Site 13 (Block 2345, Lot 5) and Site 14 (Block 2345, Lot 5); and Potential Development Site 43 (Block 2345, Lot 1, 49) and Site 49

(Block 2341, Lot 34) with total floor area of 232,690 square feet and representative stack height of 120 ft.

Building-on-Building Impact Analysis

The potential impact of the emissions of these clusters on other nearby development sites was evaluated. The result of this analysis is that the maximum 24-hr SO_2 and annual NO_2 impacts of combined emissions from these clusters (using fuel oil or natural gas in the HVAC systems of all buildings) would not cause an exceedance of a NAAQS. The result of this analysis, therefore, is that no exceedances of the NAAQS for all applicable pollutants are predicted as a result of all clusters impacts.

Potential Impacts on Existing Land Uses

Detailed dispersion analyses were conducted using the USEPA AERMOD model and procedures described above to estimate potential impacts of the projected and potential development sites and cluster emissions combined on existing residential uses within 400 feet of the rezoning area. All project-induced emission sources were included in the evaluation in one modeling run.

The existing sensitive land uses that were considered in this analysis were those described in the screening-level analysis impacts above. Some of the existing buildings are taller than the projected and/or potential development sites. Therefore, receptors on the existing buildings were placed at heights where the highest impacts are likely to occur.

Because the maximum 24-hr SO_2 impact is the critical pollutant and time period for determining potential project impacts, 24-hr SO_2 concentrations were considered for this analysis. The highest 24-hour SO_2 concentration at any of the selected receptor sites considered was estimated to be below the 24-hour SO_2 standard of 365 $\mu g/m^3$. This concentration was found at an elevated receptor within the Paterson Houses Complex. As such, the cumulative air quality impacts of the HVAC emissions of development sites on existing residential land uses are not significant. The HVAC emissions of the proposed action, therefore, do not have the potential to significantly impact existing nearby land uses.

Impacts from "Major" Existing Emission Sources

Following *CEQR Technical Manual* guidelines, a survey of land uses and building heights was conducted to determine whether there are any existing "major" sources of boiler emissions (i.e., emissions from boiler facilities with heat inputs 20 million Btu per hour or greater) located within 1,000 feet of the proposed residential development sites. As a result of this survey, four major HVAC emission sources were identified. These are the 14-story Lincoln Hospital building, the 14-story Paterson Houses complex, and two other residential buildings in blocks 2298 and 2311 of 19 and 20-stories, respectively. Detailed dispersion analyses were conducted, using the AERMOD model and procedures described above, to determine whether the emissions from these emission sources have the potential to significantly impact the proposed developments. The building sizes, heat inputs, stack parameters, and estimated emission rates for these "major" sources are provided in the Technical Appendix.

The result of this analysis is that the maximum estimated 24-hour SO_2 concentration, which was found at the Potential Development Site 66 receptors near Lincoln Hospital Building, is below the 24-hour SO_2 standard of 365 $\mu g/m^3$. Therefore, no exceedances of the NAAQS are predicted as a result of the "major' existing emission source impacts.

An additional examination was conducted to determine if there is any "large" combustion emission source (e.g., power plant, co-generation facility, etc) located within 1,000 feet of any of the proposed development sites. The result of this survey is that no large boiler emission sources are located within 1,000 feet of the proposed developments and, therefore, no further analysis is required.

Results

With "E" designations, the potential impacts from projected and potential development sites heating systems would not exceed the applicable NAAQS and would have no potential significant adverse environmental impacts on air quality.

3.17.4 HEALTH RISK ASSESSMENT OF TOXIC AIR EMISSIONS FROM EXISTING INDUSTRIAL SOURCES

Introduction

The proposed action would allow development of residential uses within existing manufacturing and industrial zones. As such, emissions of toxic pollutants from the operation of existing industrial emission sources might affect proposed residential uses.

An analysis was therefore conducted to determine whether the impacts of these emissions would be significant. Data necessary to perform this analysis, which include facility type, source identification and location, pollutant emission rates, and exhaust stack parameters, were obtained from regulatory agencies (e.g., from existing air permits). All existing industrial facilities located within 400 feet of the rezoning area that are permitted to exhaust toxic pollutants were considered in this analysis.

Data Sources

Information regarding emissions of toxic air pollutants from existing industrial sources was obtained from New York State and New York City databases using the following procedure:

- The boundaries of the rezoning area were used to identify the extent of the study area for determining air quality impacts associated with the Proposed Action.

All permitted industrial toxic air pollutant emission sources located within 400-feet radius of each proposed development site were included in this analysis.

- New York State Department of Environmental Conservation (NYSDEC's) DAR-1 software, which includes a database with information on all facilities in the state that have an air quality permit (as of 1996), was searched to identify facilities located within the area that had received the current state air quality permits.

- The New York City Open Accessible Space Information System Cooperative (OASIS) data base, which is an interactive mapping and data analysis application, was used to identify existing industrial uses located within the analysis area;

- A search was performed to identify NYSDEC Title V permits and permits listed in the USEPA Envirofacts database.

- Air permits for active (currently permitted) industrial facilities within the analysis area that are included in the New York City Department of Environmental Protection (NYCDEP) Clean Air Tracking System database were acquired and reviewed to obtain pollutant emission rates and stack parameters. The data on these permits, which include source locations, stack parameters, pollutant emission rates, etc., are considered to be the most current and served as the primary basis of data for this analysis. This information was compiled into DAR-1 software format for use in the following analyses.

Health Risk Assessment Methodology

Toxic air pollutants can be grouped into two categories: carcinogenic air pollutants, and non-carcinogenic air pollutants. These include hundreds of pollutants, ranging from high to low toxicity. While no federal standards have been promulgated for toxic air pollutants, the USEPA and NYSDEC have issued guidelines that establish acceptable ambient levels for these pollutants based on human exposure criteria.

In order to evaluate short-term and annual impacts of non-carcinogenic toxic air pollutants, the NYSDEC has established short-term guideline concentrations (SGCs) and annual guideline concentrations (AGCs) for exposure limits. These are maximum allowable 1-hour and annual guideline concentrations, respectively, that are considered acceptable concentrations below which there should be no adverse effects on the health of the general public.

Based on SGCs and AGCs, the USEPA has developed methodologies that can be used to estimate the potential impacts of air toxic pollutants from multiple emission sources. The "Hazard Index Approach" can be used to estimate the potential impacts of non-carcinogenic pollutants. If the sum of the combined ratios of estimated pollutant concentrations divided by the respective SGCs or AGCs value for each of the toxic pollutants is found to be less than 1, no significant air quality impact is predicted to occur.

For carcinogenic pollutants, unit risk factors based on the toxicity of each pollutant are used. the USEPA does not consider an overall incremental cancer risk from a proposed action of less the one-in-one million to be significant. Using these factors, the potential cancer risk associated with each carcinogenic pollutant, as well as the total cancer risk of the releases of all of the carcinogenic toxic pollutants combined, can be estimated. If the total incremental cancer risk of all of the carcinogenic toxic pollutants combined is less than one-on-one million, no significant air quality impacts are predicted to occur due to these pollutant releases.

These methods are based on equations that use the USEPA health risk information (established for individual compounds with known health effects) to determine the level of health risk posed by an increased ambient concentration of that compound at a potentially sensitive receptor. The derived health risk values are additive and can be used to determine the total risk posed by the release of multiple air contaminants.

<u>Non-Carcinogens</u>

Public health risk estimates for inhalation of non-carcinogenic compounds are based on the following calculation:

Hazard Index = C/AGCs

Where:

C = annual average ambient air concentration of compound in $\mu g/m^3$

AGCs = NYSDEC annual guideline concentration is an equivalent to reference dose concentrations RfC, established by the USEPA, in $\mu g/m^3$.

Once the hazard index of each compound is established, they are summed together. If the total hazard index is less than or equal to one, then the non-carcinogenic risk is considered to be insignificant.

<u>Carcinogens</u>

Public health risk estimates for inhalation of carcinogenic compounds are based on the following calculation:

Incremental Risk = C x URF

Where:

C = annual average ambient air concentration of the compound in $\mu g/m^3$

URF = compound-specific inhalation unit risk factor in $(\mu g/m^3)^{-1}$

Once the incremental risk of each compound is established, they are summed together. If the total risk is less than or equal to one in one million (1.0 E-06), the carcinogenic risk is considered to be insignificant.

Dispersion Analyses

Dispersion analyses were conducted using the USEPA's Hazard Index Approach for non-carcinogenic pollutants and the USEPA's Unit Risk Factors for carcinogenic pollutants to determine the potential of the toxic emissions released from the permitted emission sources to adversely affect the new residential areas. NYCDEC DAR-1 database and modeling software (modified version of the SCREEN model and enhanced version of the USEPA's ISCLT2 model) was employed to estimate maximum cumulative short-term (1-hour) and annual impacts for each air toxic pollutant and determine whether facilities have the potential to exceed short-term or annual guidelines values (i.e., SGCs or AGCs). The refined analysis with ISCLT2 model was used to estimate total each pollutant and total hazard index and incremental cancer risk associated with carcinogenic pollutants.

Emission sources for the dispersion analysis were located using geographical information system (GIS) software and the Universal Transverse Mercator coordinate system with appropriate projection information (Datum NAD83, UTM Zone 18).

The dispersion analysis was performed by modeling the emissions of all identified toxic air pollutants from the existing industrial facilities in one modeling run. The estimated ambient concentrations of each air toxic pollutant were then compared with the guideline concentrations established by the NYSDEC and the USEPA and contained in the DAR-1 database.

Two type of the analyses were conducted – an analysis of non-carcinogenic pollutants (where the results were compared to the total Hazard Index of 1.0), and analysis of the carcinogenic pollutants (where results were compared to the USEPA threshold level of one per million).

Industrial Source Emissions Analysis

Twenty-three (23) current industrial source permits for the facilities located within 400-foot of the rezoning area were identified from NYCDEP Clean Air Tracking System database. Emission data and stack parameters were obtained for these facilities either directly from the data or, if these data were not included in the database, directly from the permit applications for these facilities.

Based on a review of these data the following facilities were eliminated from further consideration, as follows:

- Permits for the Lincoln Medical and Mental Health Center, at 234 East 149th Street (Permits PB051405, PA024898, PA195873) are for emergency generators and a "rotoclave," which sterilizes medical equipment. Emissions from these emission sources were not considered because:

- Emergency generators only operate during emergency conditions and for short durations during equipment testing periods, and the health impacts of these emissions would therefore be minimal; and

- Even though, according to the permit application, the rotoclave produces carcinogens (e.g., such as acrolein, formaldehyde), these emissions, as stated in the permit application, cannot be quantified and are released as fugitive emissions within the hospital itself and not through exhaust stacks.

- Permit PA038693 is for an emission source at the same medical facility. However, no emission and stack parameters information is provided in either the DEP database or the facility's permit application.

- Permits for facilities that are located on the same block and lot as projected development sites were not considered because these facilities would demolished in the future with the proposed action,. These permits are as follows:

  - Permits (PA035098, PA035198, PA000699, PB008702, PA038786, and PA006596) are for S&S Industries Inc, Gerard 385 Company, Sport Screen, Inc that are currently located on Block 2349, Lot 90 -- on Projected Development Site 8.

  - Permits (PA380162, PA380362, PA380462, PA380662, and PA029296) are for the Grand Silver Company Co, that is currently located on Block 2333, Lot 31 -- on Projected Development Site 31.

  - Permit (PB413803) is for the Dover Garage Inc, that is currently located in Block 2322, Lot 28 -- on Projected Development Site 18.

  - Permits (PB012907 and PA028490) are for the Center of Woodworking and Rattan & Mica furniture, that are currently located in Block 2318, Lot 5 -- on Projected Development Site 25.

Emissions included in the remaining permits for currently operating facilities were considered in this air toxics analysis. These include emissions associated with the following permits: PA066988, PA066788, PA067088, and PB078501. Also included in this analysis are the emissions associated with Permit PA027374 (the Buffalo Packing Corporation), which is located on Potential Development Site 54 (Block 2340, Lot 56), which may or may not be replaced as part of the proposed action. These permits identify five emission sources of 10 non-carcinogenic pollutants and one (1) source of carcinogenic pollutants (acetaldehyde).

Results of the Cancer Risk and Hazard Index Evaluation

Non-Carcinogens

Table 3.17-19, entitled, "Analysis of the Non-Carcinogenic Toxic Pollutants under the Proposed Action," lists the identified facilities that emit non-carcinogenic pollutants together with the type and location of each facility and its permit number, emission point(s), contaminant name, and CAS registry number. Also provided are the respective pollutant guidelines values, estimated pollutant concentrations (short-term and long-term), and hazard indexes. As shown on this table, the maximum estimated concentrations for each non-carcinogenic toxic contaminant are below the NYSDEC short-term guideline concentrations (SGC) and annual guideline concentrations (AGC). In addition, the total hazard index caused by the non-carcinogenic pollutants emitted from all of sources combined is estimated to be 1.52×10^{-2} under the proposed action. This value is below the level (1.0) that is considered by the USEPA to be significant.

Carcinogens

Table 3.17-20, entitled, "Analysis of the Carcinogenic Toxic Pollutants under the Proposed Action," lists the identified facilities that emit carcinogenic pollutants together with the type and location of each facility and its permit number, emission point(s), contaminant name, and CAS registry number. Also provided are the estimated annual concentrations, unit risk factors, and incremental cancer risks. As shown on this table, the maximum total estimated incremental cancer risk caused by carcinogenic pollutants emitted from all of sources combined is estimated to be 2.03×10^{-2} per million under the the proposed action. This value is below the level one per million that is considered by the USEPA to be significant.

Summary of Results

The result of this analysis is that no exceedance of both the NYSDEC SGC or AGC acceptable limits and the USEPA's incremental risk threshold limit is predicted under the proposed action.

Table 3.17-19: Analysis of the Non-Carcinogenic Toxic Pollutants under the Proposed Action

Facility Name	Facility Address	Type of Business	NYCDEP Permit No.	Emission Point	CAS Registry No.	Compound	Permitted Emission Rates		Est. Short-Term Conc.	NYSDEC SGC	Est. Annual Av. Conc.	NYSDEC AGC	Hazard Index
							lb/hr	lb/year	μg/m³	μg/m³	μg/m³	μg/m³	
AMERTEX	231 Rider Avenue		PA066988	X58G0002	00630-08-0	CO	0.040	64.0	42.32	14,000	0.0000	0	0.000E+00
		Laundry			07446-09-5	SO_2	0.001	1.6	1.0579	910	0.0011	80	0.131E-04
		Drying			NY075-00-0	PM_{10}	0.003	4.8	3.1739	380	0.0031	50	0.630E-04
		Machine			10102-44-0	NO_2	0.470	752	0	0	0.4930	100	0.493E-02
AMERTEX	231 Rider Avenue		PA066788	X58G0001	00630-08-0	CO	6.4	6.4	6771.0	14,000	0.0000	0	0.00E+00
		Laundry			07446-09-5	SO_2	0.001	1.6	1.0579	910	0.0011	80	0.131E-04
		Drying			NY075-00-0	PM_{10}	0.001	1.6	1.0579	380	0.0010	50	0.210E-04
		Machine			10102-44-0	NO_2	0.04	64	0	0	0.0420	100	0.420E-03
AMERTEX	231 Rider Avenue	Laundry Drying	PA067088	X58G0003	07732-18-5	WATER MIST	0.500	80.0	528.98	0	0.0000	0	0.000E+00
Buffalo packing c0.	223 East 138 Street	Coking & Flavoring of Meats	PA027374	X13V0001	NY075-00-0	PM_{10}	0.015	32.0	13.8043	380	3.00000	50	0.111E-03 x

Table 3.17-19: Analysis of the Non-Carcinogenic Toxic Pollutants under the Proposed Action (continued)

Facility Name	Facility Address	Type of Business	NYCDEP Permit No.	Emission Point	CAS Registry No.	Compound	Permitted Emission Rates		Est. Short-Term Conc.	NYSDEC SGC	Est. Annual Av. Conc.	NYSDEC AGC	Hazard Index
							lb/hr	lb/year	μg/m³	μg/m³	μg/m³	μg/m³	
RIMI Corporate Facilities Refurbishing Ltd.	365 Canal Place	Spray Booth	PB078501	Y79760001	NY075-00-0	PM_{10}	0.03	48	3.1739	380	0.0306	50	0.609E-03
					01330-20-7	Xylene	0.82	1312	867.54	4,300	0.8480	100	0.832E-02
					00108-10-1	MIBK	0.89	1424	941.59	31,000	0.9200	3,000	0.301E-03
					00110-12-3	MIK	0.16	256	169.2755	0	0.1650	560	0.290E-03
					00078-93-3	MEK	0.55	880	581.88	59,000	0.5690	5,000	0.112E-03
					00067-63-0	Isopropyl Alcohol	0.225	360	238.0436	98,000	0.2230	7,000	0.326E-04

MEK = Methyl Ethyl Ketone
MIK = Methyl Isoamyl Ketone
MIBK = Methyl IsobutylKetone
DIIF = Diisooctyl Phthalate

Table 3.17-20: Analysis of the Carcinogenic Toxic Pollutants under the Proposed Action

NYCDEP Permit No.	Emission Point	CAS Registry No.	Compound	Permitted Emission Rates		NYSDEC AGC	Estimated Annual Av. Conc.	Unit Risk Factor	Incremental Cancer Risk
				lb/hr	lb/year	μg/m³	μg/m³	$(\mu g/m^3)^{-1}$	per million
PA027374	X13V0001	00075-07-0	ACETALDEHYDE	0.005	10.0	0.45	0.0091	2.20E-06	0.0203