CHAPTER 17: AIR QUALITY

A. INTRODUCTION

This chapter examines the potential for air quality impacts from the proposed actions. Ambient air quality is affected by numerous sources and activities that introduce air pollutants into the atmosphere. A comprehensive assessment of potential air quality impacts from the proposed actions was performed. The analyses described in the sections that follow were performed utilizing the general procedures recommended in the *CEQR Technical Manual*. These procedures are described in the Methodology Section. The remainder of this chapter is divided into "Existing Conditions", "Future without the Proposed Actions" and "Future with the Proposed Actions".

Air quality impacts can be either direct or indirect. Direct impacts stem from emissions generated by stationary sources associated with the proposed actions, such as emissions from fuel burned on site for heating, ventilation, and air conditioning ("HVAC") systems. Indirect effects include emissions from motor vehicles ("mobile sources") generated by the proposed actions and effects of existing stationary sources on the proposed actions.

As stated in the DEIS, DCP coordinated with the New York City Department of Environmental Protection (NYCDEP) with respect to refinements to the industrial source air quality analysis undertaken between the DEIS and the FEIS. The industrial source analysis in the FEIS has been revised to reflect information obtained through field investigations conducted by the NYCDEP. The field investigations confirmed facility operations and emissions for several permitted sources relevant to the modeling analysis. The air contaminants affected by these refinements to the analysis are tetrachloroethylene and sodium hydroxide. As a result, the refined air quality modeling analysis shows that there would be no significant adverse air quality impacts from nearby industrial sources. Therefore, the (E) designations related to industrial source air emissions identified in the DEIS are not required for any projected or potential development sites.

B. OVERVIEW

POLLUTANTS FOR ANALYSIS

Ambient air quality is affected by air pollutants produced by both motor vehicles and stationary sources. Emissions from motor vehicles are referred to as mobile source emissions, while emissions from fixed facilities are referred to as stationary source emissions. Typically, ambient concentrations of Carbon Monoxide ("CO") are predominantly influenced by mobile source emissions. Particulate matter ("PM"), volatile organic compounds ("VOCs") and nitrogen oxides (NO and NO_2, collectively referred to as "NO_x") are emitted from both mobile and stationary sources. Fine PM is also formed when emissions of NO_x, sulfur oxides ("SO_x"), ammonia, organic compounds, and other gases react or condense in the atmosphere. The formation of such secondary PM takes hours or days to occur and thus has no measurable effect on air quality in the immediate vicinity of the source. Emissions of SO_2 are associated mainly with stationary sources and sources using non-road diesel fuel, such as diesel trains, marine engines, and non-road vehicles such as construction engines; diesel-powered vehicles, primarily heavy-duty trucks and buses, also contribute somewhat to these emissions. However, diesel fuel regulations that recently took effect will reduce SO_2 emissions from mobile sources. Ozone is formed in the atmosphere by complex photochemical processes that include NO_x and VOCs, emitted mainly from industrial processes and mobile sources.

CARBON MONOXIDE

CO, a colorless and odorless gas, is produced in the urban environment primarily by the incomplete combustion of gasoline and other fossil fuels. In urban areas, approximately 80 to 90 percent of CO emissions are from motor vehicles. Since CO is a reactive gas that does not persist in the atmosphere, CO concentrations can vary greatly over relatively short distances. Elevated concentrations are usually limited to locations near crowded intersections, heavily traveled and congested roadways, parking lots, and garages. Consequently, CO concentrations must be predicted on a local, or microscale, basis.

The proposed actions would increase traffic volumes on streets within and surrounding rezoning area and could result in localized increases in CO levels. Therefore, a mobile source analysis was conducted at critical intersections in the study area to evaluate future CO concentrations with and without the proposed actions.

NITROGEN OXIDES, VOC, AND OZONE

NO_x are of principal concern because of their role, together with VOCs, as precursors in the formation of ozone. Ozone is formed through a series of reactions that take place in the atmosphere in the presence of sunlight. Because the reactions are slow, and occur as the pollutants are carried downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. The effects of NO_x and VOC emissions from all sources are therefore generally examined on a regional basis. The contribution of any action or project to regional emissions of these pollutants would include any added stationary or mobile source emissions. The change in regional mobile source emissions of these pollutants would be related to the total vehicle miles traveled added or subtracted on various roadway types throughout the New York metropolitan area, which is designated as a moderate non-attainment area for ozone by the United States Environmental Protection Agency ("EPA").

The proposed actions would not have a significant effect on the overall volume of vehicular travel in the metropolitan area; therefore, no measurable impact on regional NO_x emissions or on ozone levels would result. An analysis of project-related emissions of these pollutants from mobile sources is therefore not warranted.

There is a standard for average annual NO_2 concentrations, which is normally examined only for fossil fuel energy sources. An analysis of the potential NO_2 impacts from the proposed actions' stationary sources of emissions was performed.

LEAD

Airborne lead emissions are principally associated with industrial sources and motor vehicles that use gasoline containing lead additives. Most U.S. vehicles produced since 1975, and all produced after 1980, are designed to use unleaded fuel. As these newer vehicles have replaced the older ones, motor vehicle-related lead emissions have decreased. As a result, ambient concentrations of lead have declined significantly. Nationally, the average measured atmospheric lead level in 1985 was only about one-quarter the level in 1975.

In 1985, the EPA announced new rules that drastically reduced the amount of lead permitted in leaded gasoline. The maximum allowable lead level in leaded gasoline was reduced from the previous limit of 1.1 to 0.5 grams per gallon effective July 1, 1985, and to 0.1 grams per gallon effective January 1, 1986.

Monitoring results indicate that this action has been effective in significantly reducing atmospheric lead concentrations. Effective January 1, 1996, the Clean Air Act banned the sale of the small amount of leaded fuel that was still available in some parts of the country for use in on-road vehicles, concluding the 25-year effort to phase out lead in gasoline. Even at locations in the New York City area where traffic volumes are very high, atmospheric lead concentrations are far below the national standard of 1.5 micrograms per cubic meter (the current three-month average is 0.02 ug/m^3).

No significant sources of lead are associated with the proposed actions, and, therefore, an analysis of this pollutant from stationary or mobile sources is not warranted.

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

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

As described below, PM is regulated in two size categories: particles with an aerodynamic diameter of less than or equal to 2.5 micrometers, or $PM_{2.5}$, and particles with an aerodynamic diameter of less than or equal to 10 micrometers, or PM_{10}, which includes the smaller $PM_{2.5}$. $PM_{2.5}$ has the ability to reach the lower regions of the respiratory tract, delivering with it other compounds adsorbed to the surfaces of the particles, and is also extremely persistent in the atmosphere. $PM_{2.5}$ is directly emitted from combustion material that has volatilized and then condensed to form primary PM (often soon after the release from an exhaust) or from precursor gases reacting in the atmosphere to form secondary PM.

There is also a New York standard for total suspended particulate matter ("TSP"), which represents both coarse and fine particles. However, the New York State Department of Environmental Conservation ("NYSDEC") no longer conducts monitoring for this pollutant.

As part of the proposed actions, fuel oil would be burned in the proposed HVAC systems. Therefore, an analysis was performed to estimate the future levels of PM with the proposed actions.

SULFUR DIOXIDE

SO_2 emissions are primarily associated with the combustion of sulfur-containing fuels: oil and coal. Due to the federal restrictions on the sulfur content in diesel fuel for on-road vehicles, no significant quantities are emitted from vehicular sources. Monitored SO_2 concentrations in New York City are below the national standards. Vehicular sources of SO_2 are not significant, and, therefore, an analysis of this pollutant from mobile sources is not warranted.

As part of the proposed actions, fuel oil would be burned in the proposed HVAC systems. Therefore, an analysis was performed to estimate the future levels of SO_2 with the proposed actions.

AIR TOXICS

In addition to the criteria pollutants discussed above, non-criteria air pollutants, also called air toxics, are also regulated. Air toxics are those pollutants that are known or suspected to cause serious health effects in small doses. Air toxics are emitted by a wide range of man-made and naturally occurring sources. Emissions of air toxics from industries are regulated by the EPA. Federal ambient air quality standards do not exist for non-criteria compounds. However, the NYSDEC has issued standards for certain non-criteria compounds, including beryllium, gaseous fluorides, and hydrogen sulfide. NYSDEC has also developed ambient guideline concentrations for numerous air toxic non-criteria compounds. The NYSDEC guidance document DAR-1 (September 2007) contains a compilation of annual and short term (1-hour) guideline concentrations for these compounds. The NYSDEC guidance thresholds represent ambient levels that are considered safe for public exposure.

EPA has developed guidelines for assessing exposure to air toxics. These exposure guidelines are used in health risk assessments to determine the potential effects to the public.

There are areas within the proposed rezoning area that are currently zoned for manufacturing and would continue to be zoned for such under the proposed actions. Therefore, an analysis was performed to examine the potential for impacts due to industrial emissions as a result of the proposed actions.

AIR QUALITY REGULATIONS, STANDARDS, AND BENCHMARKS

NATIONAL AND STATE AIR QUALITY STANDARDS

As required by the Clean Air Act ("CAA"), primary and secondary National and State Ambient Air Quality Standards ("NAAQS") have been established for six major air pollutants: CO, NO_2, ozone, respirable PM (both $PM_{2.5}$ and PM_{10}), SO_2, and lead. The primary standards represent levels that are intended to protect the public health, allowing an adequate margin of safety. The secondary standards are intended to protect the nation's welfare, and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the environment. For NO_2, ozone, lead, and PM, the primary and secondary standards are the same; there is no secondary standard for CO. EPA promulgated additional NAAQS that became effective September 16, 1997: a new 8-hour standard for ozone, which replaced the 1-hour standard, and new 24-hour and annual standards for $PM_{2.5}$. The standards for these pollutants are presented in Table 17-1. These standards have also been adopted as the ambient air quality standards for New York State. In addition, New York State has established ambient air quality standards for total suspended particulate, non-methane hydrocarbons, beryllium, gaseous fluorides, and hydrogen sulfide. On September 21, 2006, EPA revised the NAAQS for PM, effective December 18, 2006. The revision included lowering the level of the 24-hour $PM_{2.5}$ standard from 65 micrograms per cubic meter ($\mu g/m^3$) to 35 $\mu g/m^3$, and retaining the level of the annual fine standard at 15 $\mu g/m^3$. The PM_{10} 24-hour average standard was retained and the annual average PM_{10} standard was revoked.

NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLANS (SIP)

The CAA, as amended in 1990, defines non-attainment areas ("NAA") as geographic regions that have been designated as not meeting one or more of the NAAQS. When an area is designated as non-attainment by EPA, the state is required to develop and implement a State Implementation Plan ("SIP"),

which delineates how a state plans to achieve air quality that meets the NAAQS under the deadlines established by the CAA.

In 2002, EPA re-designated New York City as being in attainment for CO. The CAA requires that a maintenance plan ensure continued compliance with the CO NAAQS for former non-attainment areas. New York City is also committed to implementing site-specific control measures throughout the city to reduce CO levels, should unanticipated localized growth result in elevated CO levels during the maintenance period.

Table 17-1
National Ambient Air Quality Standards

Pollutant	Primary		Secondary	
	ppm	µg/m^3	ppm	µg/m^3
Carbon Monoxide (CO)				
Maximum 8-Hour Concentration[1]	9	10,000	None	
Maximum 1-Hour Concentration[1]	35	40,000		
Lead				
Maximum Arithmetic Mean Averaged Over 3 Consecutive Months	NA	1.5	NA	1.5
Nitrogen Dioxide (NO_2)				
Annual Arithmetic Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average[2,3]	0.075	157	0.075	157
Respirable Particulate Matter (PM_{10})				
24-Hour Concentration[1]	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Average of Three Annual Arithmetic Means	NA	15	NA	15
24-Hour Concentration[4,5]	NA	35	NA	35
Sulfur Dioxide (SO_2)				
Annual Arithmetic Mean	0.03	80	NA	NA
Maximum 24-Hour Concentration[1]	0.14	365	NA	NA
Maximum 3-Hour Concentration[1]	NA	NA	0.50	1,300

Notes:
ppm – parts per million
µg/m^3 – micrograms per cubic meter
NA – not applicable
Concentrations of all gaseous pollutants are defined in ppm — approximately equivalent concentrations in µg/m^3 are presented.
[1] Not to be exceeded more than once a year.
[2] Three-year average of the annual fourth highest daily maximum 8-hr average concentration.
[3] EPA has changed the primary ozone standard to a level of 0.075 ppm. The form of the secondary standard has been changed as well.
[4] Not to be exceeded by the 98th percentile averaged over 3 years.
[5] EPA has reduced these standards down from 65 µg/m^3, effective December 18, 2006.
Sources: 40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards.

Manhattan has been designated as a moderate NAA for PM_{10}. On December 17, 2004, EPA took final action designating the five New York City counties, Nassau, Suffolk, Rockland, Westchester, and Orange counties as a $PM_{2.5}$ non-attainment area under the CAA due to exceedance of the annual average standard. New York State is required to develop a SIP by early 2008, which will be designed to meet the annual average standard by 2010. As described above, EPA has revised the 24-hour average $PM_{2.5}$ standard. Attainment designations for the revised 24-hour $PM_{2.5}$ standard should be effective by April 2010, and State and local governments in areas that are designated as non-attainment are required to develop SIPs by April 2013 which should be designed to attain the revised 24-hour $PM_{2.5}$ standards by April 2015, although this may be extended in some cases up to April 2020 (these milestones may occur at earlier dates).

Nassau, Rockland, Suffolk, Westchester, Lower Orange County Metropolitan Area ("LOCMA"), and the five New York City counties had been designated as a severe non-attainment area for ozone 1-hour standard. In November 1998, New York State submitted its *Phase II Alternative Attainment Demonstration for Ozone*, which was finalized and approved by EPA effective March 6, 2002, addressing attainment of the 1-hour ozone NAAQS by 2007. These SIP revisions included additional emission reductions that EPA requested to demonstrate attainment of the standard, and an update of the SIP estimates using the latest versions of the mobile source emissions model, MOBILE6.2, and the nonroad emissions model, NONROAD—which have been updated to reflect current knowledge of engine emissions and the latest mobile and nonroad engine emissions regulations.

On April 15, 2004, EPA designated these same counties as moderate non-attainment for the new 8-hour ozone standard which became effective as of June 15, 2004 (LOCMA was moved to the Poughkeepsie moderate non-attainment area for 8-hour ozone). EPA revoked the 1-hour standard on June 15, 2005; however, the specific control measures for the 1-hour standard included in the SIP are required to stay in place until the 8-hour standard is attained. The discretionary emissions reductions in the SIP would also remain but could be revised or dropped based on modeling. The State is currently formulating a new SIP for ozone, which is expected to be adopted in the near future. The SIP will have a target attainment deadline of June 15, 2010.

In March 2008 EPA strengthened the 8 –hour ozone standards. EPA expects designations to take effect no later than March 2010 unless there is insufficient information to make these designation decisions. In that case, EPA will issue designations no later than March 2011. SIPs would be due three years after the final designations are made.

DETERMINING THE SIGNIFICANCE OF AIR QUALITY IMPACTS

Any action predicted to increase the concentration of a criteria air pollutant to a level that would exceed the concentrations defined by the NAAQS (see Table 17-1) would be deemed to have a potential significant adverse impact. In addition, to maintain concentrations lower than the NAAQS in attainment areas, or to ensure that concentrations will not be significantly increased in non-attainment areas, threshold levels have been defined for certain pollutants as discussed below under deminimis criteria. In addition, there are also thresholds for non-criteria pollutants as discussed below.

DE MINIMIS CRITERIA REGARDING CO IMPACTS

New York City has developed *de minimis* criteria to assess the significance of the incremental increase in CO concentrations that would result from proposed projects or actions, as set forth in the *CEQR Technical Manual*. These criteria set the minimum change in CO concentration that defines a significant

environmental impact. Significant increases of CO concentrations in New York City are defined as: (1) an increase of 0.5 ppm or more in the maximum 8-hour average CO concentration at a location where the predicted No Build 8-hour concentration is equal to or between 8 and 9 ppm; or (2) an increase of more than half the difference between baseline (i.e., No Build) concentrations and the 8-hour standard, when No Build concentrations are below 8.0 ppm.

NON-CRITERIA POLLUTANT THRESHOLDS

Non-criteria, or toxic, air pollutants include a multitude of pollutants of ranging toxicity. No federal ambient air quality standards have been promulgated for toxic air pollutants. However, the EPA and the NYSDEC have issued guidelines that establish acceptable ambient levels for these pollutants based on human exposure.

The NYSDEC DAR-1 guidance document presents guideline concentrations in micrograms per cubic meter for the one-hour and annual average time periods for various air toxic compounds. These values are provided in Table 17-2 for the compounds affecting receptors located at projected and potential development sites. The compounds listed are those emitted by existing sources of air toxics in the project area (i.e., within 400 feet of the project boundaries).

In order to evaluate impacts of non-carcinogenic toxic air emissions, EPA developed a methodology called the "Hazard Index Approach." The acute hazard index is based on short-term exposure, while the chronic non-carcinogenic hazard index is based on annual exposure limits. If the combined ratio of pollutant concentration divided by its annual exposure threshold for each of the toxic pollutants is found to be less than 1, no significant air quality impacts are predicted to occur due to these pollutant releases.

In addition, the EPA has developed unit risk factors for carcinogenic pollutants as provided on its Integrated Risk Information System (IRIS) website. The EPA considers an overall incremental cancer risk from a proposed action of less than 1-in-1 million to be insignificant. 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 1- in-1 million, no significant air quality impacts are predicted to occur due to these pollutant releases.

C. METHODOLOGY FOR PREDICTING POLLUTANT CONCENTRATIONS

MOBILE SOURCES

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

The mobile source analyses for the proposed actions employ models approved by EPA that have been widely used for evaluating air quality impacts of projects in New York City, other parts of New York State, and throughout the country. The modeling approach includes a series of conservative assumptions

relating to meteorology, traffic, and background concentration levels resulting in a conservatively high estimate of expected pollutant concentrations that could result from the proposed actions.

Table 17-2
Industrial Source Analysis: Relevant NYSDEC
Air Guideline Concentrations

Pollutant	CAS Number	SGC ($\mu g/m^3$)	AGC (ug/m^3)
Acetone	00067-64-1	180,000	28,000
Ammonia	07664-41-7	2,400	100
Ammonium Hydroxide	01336-21-6	2,400	100
Antimony	07440-36-0	N/A	1.2
Butoxyethenol 2-	00111-76-2	14,000	13,000
Butoxyethyl Acetate	00112-07-2	N/A	310
Butyl Acetate	00123-86-4	95,000	17,000
Butyl Alcohol N-	00071-36-3	N/A	1,500
Carbon Monoxide	00630-08-0	14,000	N/A
Cellulose	09004-34-6	N/A	24
Chromic Acid	11115-74-5	N/A	4.5E-05
Ethanol	00064-17-5	N/A	45,000
Ethyl Acetate	00141-78-6	N/A	3,400
Formaldehyde	00050-00-0	30	0.06
Hexanediamine	00124-04-9	N/A	5.5
Hexylene Glycol	00107-41-5	12,000	N/A
Hydrogen Chloride	07647-01-0	2,100	20
Iron Oxide	01309-37-1	N/A	12
Isobutanol	00078-83-1	N/A	360
Isopropanol	00067-63-0	98,000	7,000
Isopropyl Acetate	00108-21-4	84,000	1,000
Lead	07439-92-1	N/A	0.38
Methanol	00067-56-1	33,000	4,000
Methoxy 2 Propyl Acetate 1-	00108-65-6	55,000	2,000
Methyl Cholorform	00071-55-6	68,000	1,000
Methyl Ethyl Ketone	00078-93-3	13,000	5,000
Methyl Isobutyl Ketone	00108-10-1	31,000	3,000
Napthalene	00091-20-3	7,900	3
Nitric Acid Mist	07697-37-2	86	12
Nitrogen Dioxide	10102-44-0	N/A	100
Ozone	10028-15-6		
Particulates	NY075-00-0	380	45
Paraffin Wax	08002-74-2	N/A	4.8
Phosphoric Acid	07664-38-2	300	10
Potassium Hydroxide	01310-58-3	200	N/A
Propanol	00071-23-8	N/A	590
Propylene Glycol	00057-55-6	55,000	2,000
Sodium Hydroxide	01310-73-2	200	N/A
Styrene	00100-42-5	17,000	1,000
Sulfur Dioxide	07446-09-5	200	N/A
Tetrachloroethylene	00127-18-4	1,000	1
Tetrahydrofuran	00109-99-9	30,000	350
Tin	07440-31-5	20	0.24
Toluene	00108-88-3	37,000	5,000
V,M&P Naptha	08032-32-4	N/A	33,000
Xylene M,O&P	01330-20-7	4,300	100
Zinc Oxide	01314-13-2	380	45

Source: NYSDEC, DAR-1 AGC/SGC Tables (09/10/07)

DISPERSION MODELS FOR MICROSCALE ANALYSES

Maximum CO concentrations adjacent to streets within the project area, resulting from vehicle emissions, were predicted using the CAL3QHC model Version 2.0. The CAL3QHC model employs a Gaussian (normal distribution) dispersion assumption and includes an algorithm for estimating vehicular queue lengths at signalized intersections. CAL3QHC predicts emissions and dispersion of pollutants from idling and moving vehicles. The queuing algorithm includes site-specific traffic parameters, such as signal timing and delay calculations (from the 2000 *Highway Capacity Manual* traffic forecasting model), saturation flow rate, vehicle arrival type, and signal actuation (i.e., pre-timed or actuated signal) characteristics to accurately predict the number of idling vehicles. The CAL3QHC model has been updated with an extended module, CAL3QHCR, which allows for the incorporation of hourly meteorological data into the modeling, instead of worst-case assumptions regarding meteorological parameters. This refined version of the model is employed if maximum predicted future CO concentrations are greater than the applicable ambient air quality standards or when *de minimis* thresholds are exceeded using the first-level CAL3QHC modeling.

METEOROLOGY

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

CAL3QHC

In applying the CAL3QHC model, the wind angle was varied to determine the wind direction resulting in the maximum concentrations at each receptor. Following the EPA guidelines, CO computations were performed using a wind speed of 1 meter per second and the neutral stability class D. The 8-hour average CO concentrations were estimated by multiplying the predicted 1-hour average CO concentrations by a factor of 0.70 to account for persistence of meteorological conditions and fluctuations in traffic volumes. A surface roughness of 3.21 meters was chosen. At each receptor location, concentrations were calculated for all wind directions, and the highest predicted concentration was reported, regardless of frequency of occurrence. These assumptions ensured that worst-case meteorology was used to estimate impacts.

Analysis Year

The microscale analyses were performed for existing conditions and 2017, the year in which the full build-out of the proposed actions is expected to be completed. The future analyses were performed both without the proposed actions (future condition without the proposed actions) and with the proposed actions (future condition with the proposed actions).

VEHICLE EMISSIONS DATA

Engine Emissions

Vehicular CO emission factors were computed using the EPA mobile source emissions model, MOBILE6.2. This emissions model is capable of calculating engine emission factors for various vehicle types, based on the fuel type (gasoline, diesel, or natural gas), meteorological conditions, vehicle speeds, vehicle age, roadway types, number of starts per day, engine soak time, and various other factors that

influence emissions, such as changes in fuel and tailpipe emission standards, and inspection maintenance programs. The inputs and use of MOBILE6.2 incorporates the most current guidance available from the NYSDEC and NYCDEP.

Appropriate credits were used to accurately reflect the New York State inspection and maintenance program, which requires inspections of automobiles and light trucks to determine if pollutant emissions from the vehicles' exhaust systems are below emission standards. Vehicles failing the emissions test must undergo maintenance and pass a repeat test to be registered in New York State.
Vehicle classification data were based on field studies conducted for the project. The general categories of vehicle types for specific roadways were further categorized into subcategories based on their relative fleet-wide breakdown.[1]

An ambient temperature of 43' F was used in the model. The use of this temperature is recommended in the *CEQR Technical Manual* for the Borough of Queens and is consistent with current NYCDEP guidance.

TRAFFIC DATA

Traffic data for the air quality analysis were derived from existing traffic counts, projected future growth in traffic, and other information developed as part of the traffic analysis for the proposed actions (see Chapter 15, "Traffic and Parking"). Traffic data for the future without and with the proposed actions were employed in the respective air quality modeling scenarios. The weekday PM (4:30 to 5:30 pm) and Saturday Midday (12:30 to 1:30 pm) peak periods were analyzed. These time periods were selected for the mobile source analysis because they produce the maximum anticipated project-generated and future build traffic and, therefore, have the greatest potential for significant air quality impacts.

BACKGROUND CONCENTRATIONS

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

The 8-hour average background concentration used in this analysis was 2.0 ppm for the 2017 prediction, which is based on the highest second-highest 8-hour measurements over the most recent three-year period for which complete monitoring data is available (2004-2006), utilizing measurements obtained at the PS59 Monitoring Station. The 1-hour CO background employed in the analysis was 2.6 ppm.

MOBILE SOURCE ANALYSIS SITES

Three intersection locations were selected for microscale analysis (see Table 17-3). These intersections were selected because they are the locations in the primary study area where the largest levels of project-generated traffic are expected and, therefore, where the maximum changes in the concentrations would be expected and the highest potential for air quality impacts would occur. Each of these three intersections was analyzed for CO.

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

Table 17-3
Mobile Source Analysis Intersection Locations

Analysis Site	Location
1	31st Street and 39th Ave
2	39th Ave and Northern Boulevard
3	31st Street and 38th Ave

RECEPTOR LOCATIONS

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

PARKING FACILITIES

The proposed actions would include parking facilities to account for the new parking demand and supply. Emissions from vehicles using the proposed parking areas could potentially affect ambient levels of CO at the project intersections analyzed in the future condition with the proposed actions. Of the parking associated with the projected development sites, prototypical accessory parking garages at projected development Sites 3 and 4 were analyzed (see Table 17-4). These sites, collectively, have the greatest potential parking demand and, therefore, the highest potential air quality impact.

Table 17-4
Parking Garage—Analyzed Sites

Garage Site	No. of Spaces	Block/Lot No.
Projected Development Site 3	185	402 / 1,12,32,35
Projected Development Site 4	390	400 / 5

An analysis of the emissions from the outlet vents and their dispersion in the environment was performed, calculating pollutant levels in the surrounding area, using the methodology set forth in the *CEQR Technical Manual*. Emissions from vehicles entering, parking, and exiting the garages were estimated using the EPA MOBILE6.2 mobile source emission model and an ambient temperature of 43°F, as referenced in the *CEQR Technical Manual*. For all arriving and departing vehicles, an average speed of 5 miles per hour was conservatively assumed for travel within the parking garages. In addition, all departing vehicles were assumed to idle for 1 minute before proceeding to the exit. The concentration of CO within the garages was calculated assuming a minimum ventilation rate, based on New York City Building Code requirements, of 1 cubic foot per minute of fresh air per gross square foot of garage area. To determine compliance with the NAAQS, CO concentrations were determined for the maximum 8-hour average period. (No exceedances of the 1-hour standard would occur, and the 8-hour values are the most critical for impact assessment.)

To determine pollutant concentrations, the outlet vents were analyzed as a "virtual point source" using the methodology in EPA's *Workbook of Atmospheric Dispersion Estimates, AP-26.* This methodology

estimates CO concentrations at various distances from an outlet vent by assuming that the concentration in the garage is equal to the concentration leaving the vent, and determining the appropriate initial horizontal and vertical dispersion coefficients at the vent faces.

The CO concentrations were determined for the time periods when overall garage usage would be the greatest, considering the hours when the greatest number of vehicles would exit the facility. Departing vehicles were assumed to be operating in a "cold-start" mode, emitting higher levels of CO than arriving vehicles. Traffic data for the parking garage analysis was derived from the trip generation analysis described in the traffic section of this ~~D~~DEIS. Background and on-street CO concentrations were added to the modeling results to obtain the total ambient levels.

STATIONARY SOURCES

A stationary source analysis was conducted to evaluate potential impacts from the proposed actions' HVAC systems. In addition, an assessment was conducted to determine the potential for impacts due to industrial activities within and near the rezoning area.

HVAC SOURCE ANALYSES

Individual Sources

Screening Analysis

A screening analysis was performed to assess air quality impacts associated with emissions from the HVAC system of each projected and potential Dutch Kills Rezoning development site ("Development Sites"). The methodology described in the *CEQR Technical Manual* was used for the analysis and considered impacts on sensitive land uses. The CEQR screening analysis methodology determines the threshold of development size below which the action would not have a significant adverse impact. The screening procedures utilize information regarding the type of fuel to be used, the maximum development size, and the HVAC exhaust stack height to evaluate whether a significant adverse impact is likely. Based on the distance from the proposed development to the nearest building of similar or greater height, if the maximum development size is greater than the threshold size in the *CEQR Technical Manual*, there is the potential for significant air quality impacts, and a refined dispersion modeling analysis would be required. Otherwise, the source passes the screening analysis, and no further analysis is required.

Since information on the HVAC systems' design was not available to determine the stack height, it was conservatively assumed that the stack height would be three feet above the roof top (i.e., building height plus 3 feet) of the proposed sites. For buildings with different tier configurations (provided in the conceptual design), the analysis assumed that the HVAC stack would be installed on the highest tier. The maximum development floor areas of the proposed sites from the Reasonable Worst-Case Development Scenario ("RWCDS") were also used as input for the screening analysis. Potential receptors (used to determine source to receptor distances) included existing neighborhood buildings, future no build sites, and proposed development sites of a similar or greater height (except that an adjacent, "lot to lot" development site would be analyzed only if it was of a greater height).

For analysis purposes, it was first assumed that fuel oil (both No. 2 and No. 4) would be used in the HVAC system boilers. If the source did not pass the screening analysis using oil, it was then assumed that the boiler would use natural gas and restrictions would be placed on fuel oil. If a source did not pass any of the screening analyses (oil or gas) using the *CEQR Technical Manual* procedures or if the source and

receptor were immediately adjacent to each other (i.e., lot lines separated by less than 30 feet), a refined modeling analysis was performed, as described below.

Dispersion Modeling

Development sites that did not pass the HVAC screening analysis were analyzed using a refined modeling approach with the EPA's AERMOD dispersion model. The AERMOD model was designed as a replacement to the EPA Industrial Source Complex (ISC3) model and is applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources). The meteorological data set consisted of the five recent years of concurrent meteorological data: surface data collected at LaGuardia Airport (2002-2006) and concurrent upper air data collected at Brookhaven, Suffolk County, New York.

The *CEQR Technical Manual* states that refined models should be run with and without building downwash (the downwash option accounts for the dispersion effects from a stack plume due to the structure the stack is located at, as well as other nearby structures). In general, modeling without building downwash produces higher estimates of pollutant concentrations when assessing the impact of elevated sources on elevated receptor locations. Therefore, refined HVAC analyses were performed using the "no downwash" option only. Additionally, HVAC stacks were assumed to be placed at the edge of the source site's building façade (if known) and would be set back in 10 foot increments (to determine if it could pass the analysis with a prescribed set back distance) if the site could not pass using the building's edge. It was also assumed that no stack would be located closer than 10 feet to an adjacent building façade. A modeled site is considered to pass the analysis if the total modeled concentration (i.e., project increment plus background) is less than the applicable NAAQS.

NYCDEP Report 12 was used to determine fuel usage rates per unit of floor area. Emission factors as reported in AP-42 for No. 2 fuel oil and natural gas fired boilers were used to estimate emissions from each source, based on the site's total developments size and calculated fuel usage estimate.

Cumulative Impacts from HVAC Sources

In addition to the individual HVAC source analysis, groups or "clusters" of HVAC sources with similar stack heights were analyzed, in order to address the cumulative impacts of multiple sources. This analysis was performed using the EPA SCREEN3 Model (version 96043). This model is a screening version of the ISC3 model, and is used for determining maximum concentrations from a single source using predefined meteorological conditions. Three separate clusters were modeled for the analysis using the area source option in the SCREEN3 model. Cumulative impacts on nearby buildings of a similar or greater height were determined for each cluster.

The analysis also required an estimation of air emission rates for each cluster. NYCDEP Report 12 was used to determine fuel usage rates per unit of floor area. Emission factors as reported in AP-42 for fuel oil and natural gas fired boilers were used to estimate the emissions from each cluster, based on the cluster's total development size and calculated fuel usage.

BACKGROUND CONCENTRATIONS

To estimate the maximum expected pollutant concentration at a given receptor for the HVAC analyses, the calculated impact must be added to a background value that accounts for existing pollutant concentrations from other sources (see Table 17-5). Background values were collected from nearby

NYSDEC ambient air monitoring stations. Annual values represent the overall highest reported concentrations for the years 2002 through 2006 (i.e., the most recently available five year data set). Short-term values in the table (i.e., 24 hour averaging periods or less) are the highest 2nd high reported concentrations.

Table 17-5
Background Pollutant Concentrations

Pollutants	Averaging Period	Monitoring Station	Background Concentration (µg/m^3)	Ambient Standard (µg/m^3)
NO_2	Annual	PS 59	71.5	100
SO_2	3 hour	PS 59	201.6	1,300
	24 hour		123	365
	Annual		36.6	80
PM_{10}	24 Hour	PS 59/JHS 126	60	150

Source: 2002–2006 Annual New York State Air Quality Report, Ambient Air Monitoring System, NYSDEC.

INDUSTRIAL SOURCE ANALYSIS

Within the rezoning area of the proposed action, provisions allowing for mixed-use development could result in sensitive residential land uses in close proximity to existing industrial businesses. As a result, pollutants emitted from the exhaust vents of existing permitted industrial facilities could create the potential for adverse impacts on future residents of the proposed development sites. Therefore, an analysis was conducted to determine the potential for air quality impacts resulting from existing industrial operations in the surrounding area.

Information regarding the release of air pollutants from existing industrial sources was obtained from the NYCDEP's Bureau of Environmental Compliance ("BEC") air permits database. All industrial air pollutant emission sources within 400 feet of a projected or potential development site were identified and considered for inclusion in the air quality impact analysis. A field survey was conducted in February 2008 to determine the operating status of these permitted industrial sources and to identify any potential industrial sites not included in the permit database. Since the potential development sites of the rezoning action may or may not be developed as part of the proposed action, any existing permitted industries found on a potential development site were assumed to remain at that location in the future condition with the proposed actions scenario (i.e., the site was analyzed as a source in addition to the site also being analyzed as a sensitive receptor). However, any industrial source found to be located on a projected site development was considered to be eliminated by the proposed action.

In addition to the DEP permitted sources, the *CEQR Technical Manual* requires an assessment of any actions that could result in the location of residential developments within 1,000 feet of a large emission source (e.g., a power plant) or within 400 feet of commercial, institutional, or large-scale residential development (i.e., large heating boilers burning fossil fuels). A search was performed to identify these types of facilities in or near the rezoning area which included a search of NYSDEC state facility and Title V air permits within 1,000 feet of the rezoning area.

The above permitting information was compiled into a database of source locations, air emission rates, and other pertinent data in order to perform a refined modeling analysis. The information was based on the most current air permit data available to assure its accuracy. When permit data was available

regarding stack location (relative to the roof) and stack exhaust parameters (i.e., stack velocity, stack diameter, and stack temperature), it was used as input to the model. When this data was lacking, conservative CEQR default values or data collected by NYCDEP from a particular source were used as input. In a similar manner, input data was conservatively adjusted in order to account for industrial sources with horizontal stacks (e.g., wall fans). When it was determined that a source had a horizontal stack, a stack velocity of 0.001 meters per second was used to replace the actual stack velocity as per guidance in the *CEQR Technical Manual*. This was necessary because the AERMOD dispersion model incorporates the effects of rising plumes that exit a vertical stack and would attribute greater amounts of dispersion to the source than expected from a horizontal source.

The industrial source analysis was conducted using the AERMOD dispersion model (see description above under "Dispersion Modeling"). Computations with the AERMOD model to determine impacts from exhaust stacks were made assuming stack tip downwash, buoyancy-induced dispersion, gradual plume rise, urban dispersion coefficients and wind profile exponents, no collapsing of stable stability classes, and elimination of calms. Since the highest impacts are predicted to occur on elevated (flagpole) receptors, the AERMOD model was run without downwash, consistent with the HVAC analysis. Model receptors were placed along the perimeter of the lot line (at various heights to represent the building facades) at the locations of proposed development sites. The meteorological data set consisted of the five recent years of concurrent meteorological data: surface data collected at LaGuardia Airport (2002-2006) and upper air data collected at Brookhaven, Suffolk County, New York.

The modeling analysis predicted worst-case impacts by determining maximum cumulative short-term (1-hour) and annual impacts for each individual air toxic compound (i.e., all sources of an individual toxic compound in the rezoning area within 400 feet of a projected or potential site were modeled simultaneously to derive the cumulative concentration at each model receptor). The results were compared with the short-term guideline concentrations (SGCs) and annual guideline concentrations (AGCs) recommended in the NYSDEC's DAR-1 AGC/SGC Tables. These guideline concentrations present the airborne concentrations which are applied as a threshold to determine whether sensitive receptors could be significantly impacted from nearby sources of air pollution.

Cumulative Health Risk Assessment

Potential cumulative impacts of all industrial source compounds modeled in the air quality analysis that are simultaneously affecting any single development site were evaluated based on EPA's Hazard Index Approach for noncarcinogenic compounds and EPA's Unit Risk Factors for carcinogenic compounds. Both methods are based on equations that use EPA health risk information at referenced concentrations for individual compounds to determine the level of health risk posed by the ambient concentrations of multiple compounds at a sensitive receptor. The cumulative impacts are derived by summing the indices for individual compounds. For non-carcinogenic compounds, EPA considers a concentration-to-reference dose level ratio of less than 1 to be acceptable. For combined carcinogenic compounds, the EPA unit risk factors represent the concentration at which an excess cancer risk of 1-in-1 million is predicted. In cases where an EPA reference dose or unit risk factor does not exist, the NYSDEC AGC was used to supplement this value.

D. EXISTING CONDITIONS

Monitored background concentrations of SO_2, NO_2, CO, ozone, lead, PM_{10}, and $PM_{2.5}$ for the study area are shown in Table 17-6. These values (2006) are the most recent monitored data that have been made available by NYSDEC. In the case of the 8-hour ozone and 24-hour $PM_{2.5}$, concentrations reflect the most recent 3 years of data, consistent with the basis for these standards.

Table 17-6
Representative Monitored Ambient Air Quality Data

Pollutants	Location	Units	Period	Concentration	Federal Standard	
					Primary	Secondary
CO	P.S. 59, Manhattan	ppm	8-hour	2.3	9	-
			1-hour	1.7	35	-
SO_2	P.S. 59, Manhattan	$\mu g/m^3$	Annual	26.2	80	-
			24-hour	83.8	365	-
			3-hour	183.2	-	1,300
PM_{10}	P.S. 59, Manhattan	$\mu g/m^3$	24-hour	60	150	150
$PM_{2.5}$	P.S. 59, Manhattan	$\mu g/m^3$	Annual	41	15	15
			24-hour	14.5	35	35
NO_2	P.S. 59, Manhattan	$\mu g/m^3$	Annual	64	100	100
Lead	JHS 126	$\mu g/m^3$	3-month	0.02	1.5	1.5
Ozone (O_3)	Queens College,2	ppm	8-hour	0.079	157	157

Source: NYSDEC, 2006 New York State Ambient Air Quality Report.

PREDICTED POLLUTANT CONCENTRATIONS IN THE STUDY AREA

As noted previously, a mobile source analysis was performed in which receptors were placed at multiple sidewalk locations next to the intersections under analysis. The receptors with the highest predicted CO concentrations were used to represent these intersection sites for the existing conditions. CO concentrations were calculated for each receptor location, at each intersection, for each peak period specified above.

Table 17-7 shows the maximum predicted existing (2008) CO 8-hour average concentrations at the receptor sites. (No 1-hour values are shown since predicted values are much lower than the 1-hour standard of 35 ppm.) At all receptor sites, the maximum predicted 8-hour average concentrations are well below the national standard of 9 ppm.

E. FUTURE CONDITION WITHOUT THE PROPOSED ACTIONS

MOBILE SOURCES ANALYSIS

CO concentrations without the proposed actions were determined for the 2017 Build year using the methodology previously described. Table 17-8 shows future maximum predicted 8-hour average CO concentrations at the analysis intersections without the proposed actions (i.e., 2017 No Build values). The values shown are the highest predicted concentrations for the receptor locations for any of the time periods analyzed. As shown in the table, 2017 No Build values are predicted to be well below the 8-hour CO standard of 9 ppm.

Table 17-7
Maximum Predicted Existing 8-Hour Average
CO Concentrations for 2008

Receptor Site	Location	Time Period	8-Hour Concentration (ppm)
1	31st Street and 39th Ave	Weekday PM	2.6
		Saturday MD	2.2
2	39th Ave and Northern Boulevard	Weekday PM	3.3
		Saturday MD	2.8
3	31st Street and 38th Ave	Weekday PM	2.4
		Saturday MD	2.2

Note: 8-hour standard is 9 ppm.

Table 17-8
Future (2017) Maximum Predicted 8-Hour
Average Carbon Monoxide No Build Concentrations

Receptor Site	Location	Time Period	8-Hour Concentration (ppm)
1	31st Street and 39th Ave	Weekday PM	2.7
		Saturday MD	2.4
2	39th Ave and Northern Boulevard	Weekday PM	3.6
		Saturday MD	2.9
3	31st Street and 38th Ave	Weekday PM	2.6
		Saturday MD	2.3

Note: 8-hour standard is 9 ppm.

STATIONARY SOURCE ANALYSIS

Minimal growth and development within the Project Area would occur in the future condition without the proposed actions by 2017. As noted in Chapter 1, "Project Description," as-of-right development is anticipated on only 16 of the 40 projected development sites and 7 of the 192 potential development sites within the rezoning area. Given this, HVAC and industrial source emissions in the future condition without the proposed actions would likely be similar to existing conditions.

F. PROBABLE IMPACTS OF THE PROPOSED ACTIONS

MOBILE SOURCES ANALYSIS

CO concentrations with the proposed actions were determined for the 2017 Build year at traffic intersections using the methodology previously described. Table 17-9 shows the future maximum predicted 8-hour average CO concentration with the proposed actions at the three intersections studied. (No 1-hour values are shown since no exceedances of the standard would occur and the *de minimis* criteria are only applicable to 8-hour concentrations. Therefore, the 8-hour values are the most critical for impact assessment). The values shown are the highest predicted concentrations for the time periods analyzed. Also shown in the table is a Not-to-Exceed value based on the *de minimis* criteria used to determine the significance of the incremental increase in CO concentrations that would result from the proposed action. The *de minimis* criteria are derived using procedures outlined in the *CEQR Technical Manual* (2001) that set a minimum allowable change in 8-hour average CO concentrations due to a proposed action (i.e., the No Action concentration plus half the difference between No Action concentration and the 9.0 ppm standard).

Table 17-9
Build (2017) Maximum Predicted 8-Hour
Carbon Monoxide Concentrations (parts per million)

Site	Location	Time Period	Project Build 8-Hour Concentration (ppm)	Not-To-Exceed *De minimis* Criteria (ppm)
1	31st Street and 39th Ave	Weekday PM	2.7	5.9
		Saturday MD	2.5	5.7
2	39th Ave and Northern Boulevard	Weekday PM	3.6	6.3
		Saturday MD	3.0	6.0
3	31st Street and 38th Ave	Weekday PM	2.7	5.8
		Saturday MD	2.4	5.6

Notes:
8-hour CO standard is 9 ppm.
An adjusted ambient background concentration of 2.0 ppm is included in the project build values presented above.

The results in Table 17-9 indicate that in the future with the proposed actions, there would be no significant adverse mobile source air quality impacts (i.e., *de minimis* criteria were not exceeded). In addition, with or without the proposed actions in 2017, maximum predicted CO concentrations in the study area of the proposed actions would be less than the corresponding ambient air quality standards.

PARKING FACILITIES

Based on the methodology previously discussed, the maximum overall predicted 8-hour CO concentrations for the accessory parking associated with Projected Development Site #3, including ambient background levels and on-street traffic, would be 4.0 ppm and 3.5 ppm for the near and far side (across Northern Blvd) receptors, respectively. For the accessory parking associated with Projected Development Site #4, the maximum overall predicted 8-hour CO concentrations would be 3.5 ppm and 2.5 ppm for the near and far side (across 31st Street) receptors, respectively. These values are the highest predicted concentrations for any time period analyzed. These maximum predicted CO levels are below the applicable CO standards, and therefore, no significant adverse impacts from the proposed actions' parking facilities are expected.

STATIONARY SOURCES

HVAC SOURCE ANALYSES

Individual Sources

Screening Analysis

The screening analysis was performed to determine whether impacts from projected and potential development sites could potentially impact other projected and potential development sites, no build sites, or existing buildings. The analysis was initially performed assuming both natural gas and fuel oil (No.4 and No.2) as the HVAC systems' fuel type. The action includes a total of 40 projected and 192 potential development sites. Since 85 of the development sites were immediately adjacent to each other and therefore, required as discussed in the Methodology Section to be analyzed with AERMOD (a refined

analysis with direct comparison to the NAAQS), only 144 development sites were analyzed using the screening analysis procedures.

A total of 141 projected and potential sites passed the screening analysis using No.4 fuel oil (a worst case assumption). Three additional sites (Projected Sites 3 & 4, and Potential Site 166) failed using No. 4 oil. Sites 3 and 166 passed using No. 2 oil or natural gas as fuel. Site 4 failed using No. 2 oil but passed using natural gas as fuel.

Dispersion Modeling

For each of the 85 adjacent development sites (and Sites 3, 4 & 166) that required further study, a refined analysis was performed utilizing the AERMOD dispersion model. The minimum distance between the source and receptor was used in the analysis (assumed to be ten feet for sites with adjoining lot lines, which regarding NYC building codes, would not be less). The results indicated that using the minimum distances, 77 Sites would not pass the analysis using No.4 oil, 66 Sites would not pass using No. 2 oil, and using natural gas, a total of 9 Sites would not pass. As a result, E-designations would be employed for these Sites that would either require a specific fuel be used at the designated locations or some other minimum distance beyond 10 feet be applied to the Site. The list of applicable E-designations are provided in Appendix F[2].

Cumulative Impacts from HVAC Sources

Three HVAC site clusters (HVAC sources in close proximity that have similar stack heights) were identified and a quantitative analysis was performed to determine their potential impacts using the SCREEN3 model. The total floor area of the individual sites was summed together and an area-wide emission rate was determined for each cluster using Report 12 fuel factors (discussed in the Methodology). The three clusters consisted of the following proposed Dutch Kills development sites:

1. Cluster A: Potential Development Sites 89, 132, 193, 210, 214, 219, and 220 – comprising a total floor area of 72,453 square feet with a stack height at 40 feet;
2. Cluster B: Potential Development Sites 58, 59, 85, 176, and 182 – comprising a total floor area of 160,458 square feet with a stack height at 70 feet;
3. Cluster C: Potential Development Sites 82 through 85, 119, 173, and 189 – comprising a total floor area of 135,408 square feet with a stack height at 70 feet.

The results of the analysis (presented in Table 17-10) indicated that the maximum impacts from Cluster B exceeded the 24-hour NAAQS for SO_2 when assuming the use of No. 4 fuel oil. However, all three clusters passed the SCREEN3 analysis assuming that the fuel types would be restricted to No. 2 oil or natural gas. Therefore, to preclude the potential for significant adverse air quality impacts on other projected and potential developments from the HVAC emissions, an E-designation would be incorporated into the rezoning proposal for each of the five development sites contained in Cluster B. This E-designation would specify the type of fuel to be used for building heat must be either natural gas or No. 2 fuel oil.

[2] Prior to publication of the FEIS, DCP learned that certain development sites within the rezoning area are being developed for hotel use (see footnote on page 1-15). Therefore, these sites have been removed from the list of sites receiving E-designations (see Appendix F, "Air Quality E-Designations"). All other Air Quality HVAC E-designations remain unchanged

Table 17-10
Cluster Impacts from HVAC Sources Using No. 4 Fuel Oil
Maximum Concentrations (micrograms per cubic meter)

Cluster	Pollutant	Averaging Period	Maximum Predicted Concentration ug/m^3	Total Concentration with Background[a] ug/m^3	NAAQS[b]
A	NO_2	Annual	5.9	77.4	100
	SO_2	Annual	13.0	49.6	80
		24-Hr	237	360	365
		3-Hr	533	734.6	1,300
	PM_{10}	24-Hr	44.8	104.3	150
B	NO_2	Annual	6.4	77.9	100
	SO_2	Annual	14.5	51.1	80
		24-Hr	264	387	365
		3-Hr	593	794.6	1,300
	PM_{10}	24-Hr	49.8	109.8	150
C	NO_2	Annual	4.4	75.9	100
	SO_2	Annual	9.9	46.5	80
		24-Hr	180	303	365
		3-Hr	405	606.6	1,300
	PM_{10}	24-Hr	34	94	150

Notes:
a. Background concentrations are presented in Table 18-5.
b. Cluster impacts using natural gas or No.2 fuel oil were well below the NAAQS.

INDUSTRIAL SOURCE ANALYSIS

Using the approach outlined in the Methodology for Industrial Sources (and including data obtained through NYCDEP field investigations as discussed in the chapter introduction), air contaminant emissions from a total of 58 facilities (consisting of 47 air contaminants) were used as input for the cumulative impact modeling analysis. The maximum predicted concentration for each pollutant modeled in the analysis is provided in Table 17-11. As indicated in the table, these concentrations are below the applicable SGC or AGC. In the case of particulate matter (PM), the analysis compared the ambient concentrations of this pollutant to that of the NAAQS for the short term 24 hour averaging period. PM concentrations, when added to ambient background levels, are below the NAAQS (i.e., 150 µg/m^3). Based on NYSDEC guidance, a comparison to the NAAQS supersedes a comparison to the SGC for criteria pollutants (PM is a criteria pollutant).

~~The results of the analysis that are presented in Table 17-11 also reflect restrictions placed on certain of the Dutch Kills development sites due to elevated concentrations of tetrachloroethylene and sodium hydroxide (i.e., without the restrictions in place, significant air quality impacts may occur at the identified development sites). To preclude the potential for significant adverse industrial source air quality impacts, an E-designation for air quality would be incorporated into the rezoning proposal. The text of the E-designation~~

Table 17-11
Industrial Source Impacts
Maximum Predicted Concentrations at Projected and Potential Development Sites
Micrograms per Cubic Meter (µg/m^3)

Pollutant	CAS Number	Modeled Cumulative Short-Term Impact (µg/m^3)	SGC (µg/m^3)	Modeled Cumulative Annual Impact (µg/m^3)	AGC (ug/m^3)
Acetone	00067-64-1	80.65	180,000	0.15	28,000
Ammonia	07664-41-7	0.11	2,400	0.0015	100
Aqueous Ammonia	01336-21-6	249	2,400	3.6	100
Antimony	07440-36-0	0.15	N/A	0.00033	1.2
Butoxyethenol 2-	00111-76-2	75.6	14,000	0.0013	13,000
Butoxyethyl Acetate	00112-07-2	191.7	N/A	0.13	310
Butyl Acetate	00123-86-4	1,077	95,000	5.9	17,000
Butyl Alcohol N-	00071-36-3	114.5	N/A	0.29	1,500
Carbon Monoxide	00630-08-0	470	14,000	1.8	N/A
Cellulose	09004-34-6	180.9	N/A	0.98	24
Chromic Acid	11115-74-5	0.0067	N/A	0.00031	4.5E-04[a]
Ethanol	00064-17-5	28.5	N/A	0.39	45,000
Ethyl Acetate	00141-78-6	915.9	N/A	0.68	3,400
Formaldehyde	00050-00-0	0.11	30	0.00055	0.06
Hexanediamine	00124-04-9	1.16	N/A	0.0027	5.5
Hexylene Glycol	00107-41-5	5.0	12,000	0.029	N/A
Hydrogen Chloride	07647-01-0	37	2,100	0.25	20
Iron Oxide	01309-37-1	0.14	N/A	0.00081	12
Isobutanol	00078-83-1	880.5	N/A	5.47	360
Isopropal Alcohol	00067-63-0	14,508	98,000	~~TBD~~ 0.371	7,000
Isopropyl Acetate	00108-21-4	361.1	84,000	2.0	1,000
Lead	07439-92-1	0.15	N/A	0.0016	0.38
Methanol	00067-56-1	286.2	33,000	0.28	4,000
Methoxy 2 Propyl Acetate 1-	00108-65-6	536.8	55,000	0.36	2,000
Methyl Cholorform	00071-55-6	38,801	68,000	27.9	1,000
Methyl Ethyl Ketone	00078-93-3	1,713	13,000	13.8	5,000
Methyl Isobutyl Ketone	00108-10-1	1,128	31,000	12.4	3,000
Napthalene	00091-20-3	48.9	7,900	0.39	3
Nitric Acid Mist	07697-37-2	0.54	86	0.0028	12
Nitrogen Dioxide	10102-44-0	848.6	N/A	27.9	100
Ozone	10028-15-6	0.102	N/A	0.00081	N/A
Particulates	NY075-00-0	118.4	150[b]	11.05	45
Paraffin Wax	08002-74-2	7.8	N/A	0.091	4.8
Phosphoric Acid	07664-38-2	36.8	300	0.31	10
Potassium Hydroxide	01310-58-3	0.11	200	0.001	N/A
Propanol	00071-23-8	0.42	N/A	0.0039	590
Propylene Glycol	00057-55-6	1.3	55,000	0.002	2,000
Sodium Hydroxide	01310-73-2	~~190~~ 6.14	200	~~89.1~~ 0.09	N/A
Styrene	00100-42-5	0.11	17,000	0.0016	1,000
Sulfur Dioxide	07446-09-5	45	200	0.20	N/A
Tetrachloroethylene	00127-18-4	~~536~~ 279	1,000	~~8.56~~ 3.02	10[a]
Tetrahydrofuran	00109-99-9	2.1	30,000	0.031	350
Tin	07440-31-5	0.15	20	0.00033	0.24
Toluene	00108-88-3	1,035	37,000	3.07	5,000
V,M&P Naptha	08032-32-4	2,926	N/A	9.15	33,000
Xylene M,O&P	01330-20-7	2,683	4,300	1.93	100
Zinc Oxide	01314-13-2	1.2	380	0.00026	45

Notes: a. According to NYSDEC guidelines, if the AGC is based on a one-in-a-million risk level (10E-06) as calculated with an inhalation cancer risk value, then a risk level of 10E-05 (i.e., 10 times the AGC) may be permitted if the source(s) causing the impacts includes BACT control technology. For chromic acid and tetrachloroethylene, this guidance applies.
b. For PM, the short term analysis was performed using a 24 hour average impact for comparison to the NAAQS.

~~is presented in Appendix F along with a listing of the 10 development sites (comprising one projected and nine potential development sites).~~

~~The proposed (E) designations are conservative and based on limited permit data; therefore, it is possible, however, that the E-designations, as currently proposed, may not be needed pending further analyses, or may be refined with respect to the location of inoperable windows and air intakes. It is possible that the further analyses will show that the air quality impacts would not be as significant as currently identified herein. With respect to the proposed E-designations, the lead agency will continue to coordinate with NYCDEP between the Draft EIS and Final EIS to undertake the following:~~

- ~~Confirm that facility operations are consistent with air emission permits~~
- ~~Refine the industrial source analysis~~
- ~~Evaluate alternative approaches to reducing air quality impacts, including the potential for facilities to implement best available technologies~~

~~If further analyses show that the proposed E-designations would continue to be necessary, the lead agency may revise the zoning proposal to eliminate or reduce the potential for air quality impacts.~~

Cumulative Health Risk Assessment

Cumulative impacts were also determined for the combined effects of air contaminants affecting a proposed development site. The maximum hazard index and total cancer risk were determined using the AERMOD model results with the applicable reference concentrations and unit risk factors discussed in the methodology. Tables 17-12 and 17-13 present the results of an assessment made of cumulative carcinogenic and non-carcinogenic effects on the proposed actions. As presented in the table for non-carcinogenic compounds, EPA's Hazard Index Approach resulted in a calculated value of 0.548, which is less than 1.0, which is considered to be insignificant. For carcinogenic compounds, the maximum total estimated cancer risk is 3.42 E-06 or 3.42 per million. While the maximum cancer risk is above the level considered by USEPA to be potentially significant (i.e., 1 per million), it should be noted that the concentrations are compared against EPA unit risk factors and NYSDEC AGC's (each of which was developed by these agencies based on a factor of safety above which health effects may potentially occur), whereas the health risk analysis is based upon a lifetime exposure at the predicted concentrations for a single location, which is a very conservative approach. Therefore, based upon the cumulative air toxics analysis, the proposed action would not result in a significant cancer risk.

Table 17-12
Estimated Maximum Cancer Risk

Pollutant	CAS Number	Receptor696[a] Estimated Pollutant Concentration (ug/m^3)	Unit Risk Factor Or AGC (ug/m^3)	Pollutant Concentration to AGC Pollutant Ratio
Chromic Acid	11115-74-5	3.32 E-05	1.2E-02	3.98 E-07
Formaldehyde	00050-00-0	2.00 E-05	1.3E-05	2.60 E-10
Tetrachloroethylene	00127-18-4	3.02	1.0E-06	3.02 E-06
			Total Estimated Cancer Risk	3.42 E-06
			Cancer Risk Threshold Value	1.0E-06

Note: a. Receptor 696 is located at Site 184 and is the point of maximum multi-compound cumulative impacts.

Table 17-13
Estimated Maximum Hazard Index

Pollutant	CAS Number	Receptor 13,640[a] Estimated Pollutant Concentration (ug/m^3)	Reference Concentration Or AGC (ug/m^3)	Pollutant Concentration to Rfc-AGC Ratio
Acetone	00067-64-1	9.07E-03	28,000	3.24E-07
Ammonia	07664-41-7	2.00E-05	100	2.00E-07
Aqueous Ammonia	01336-21-6	2.57E-03	100	2.57E-05
Antimony	07440-36-0	1.00E-05	1.2	8.33E-06
Butoxyethenol 2-	00111-76-2	2.00E-05	13,000	1.54E-09
Butoxyethyl Acetate	00112-07-2	1.30E-04	310	4.19E-07
Butyl Acetate	00123-86-4	1.68E-01	17,000	9.86E-06
Butyl Alcohol N-	00071-36-3	1.14E-02	1,500	7.57E-06
Cellulose	09004-34-6	1.99E-02	24	8.30E-04
Ethanol	00064-17-5	7.89E-02	45,000	1.75E-06
Ethyl Acetate	00141-78-6	1.48E-02	3,400	4.35E-06
Hexanediamine	00124-04-9	6.00E-05	5.5	1.09E-05
Hydrogen Chloride	07647-01-0	3.20E-03	20	1.60E-04
Iron Oxide	01309-37-1	2.00E-05	12	1.67E-06
Isobutyl Alcohol	00078-83-1	1.39E-01	360	3.85E-04
Isopropyl Alcohol	00067-63-0	3.71E-01	7,000	5.30E-05
Isopropyl Acetate	00108-21-4	3.98E-02	1,000	3.98E-05
Lead	07439-92-1	9.00E-05	0.38	2.37E-04
Methanol	00067-56-1	1.40E-01	4,000	3.49E-05
Methoxy 2 Propyl Acetate 1-	00108-65-6	3.80E-04	2,000	1.90E-07
Methyl Cholorform	00071-55-6	3.86E-01	1,000	3.86E-04
Methyl Ethyl Ketone	00078-93-3	1.38E-01	5,000	2.76E-05
Methyl Isobutyl Ketone	00108-10-1	1.09E-01	3,000	3.63E-05
Napthalene	00091-20-3	2.26E-01	3	7.54E-02
Nitric Acid Mist	07697-37-2	4.00E-05	12	3.33E-06
Nitrogen Dioxide	10102-44-0	2.80E+01	100	2.80E-01
Particulates	NY075-00-0	7.45+00	45	1.65E-01
Paraffin Wax	08002-74-2	2.93E-03	4.8	6.10E-04
Phosphoric Acid	07664-38-2	2.27E-01	10	2.27E-02
Propanol	00071-23-8	4.00E-05	590	6.78E-08
Propylene Glycol	00057-55-6	3.00E-05	2,000	1.50E-08
Styrene	00100-42-5	2.00E-05	1,000	2.00E-08
Sulfur Dioxide	07446-09-5	1.14E-01	80	1.42E-03
Tetrahydrofuran	00109-99-9	4.10E-04	350	1.17E-06
Tin	07440-31-5	1.00E-05	0.24	4.17E-05
Toluene	00108-88-3	8.79E-02	5,000	1.76E-05
V,M&P Naptha	08032-32-4	2.76E-02	33,000	8.37E-07
Xylene M,O&P	01330-20-7	3.12E-02	100	3.12E-04
Zinc Oxide	01314-13-2	1.00E-05	45	2.22E-07
			Total Hazard Index	0.548
			Hazard Index Threshold Value	1.0

Note: a. Receptor 13,640 is located on the lot line between Sites 16 and 185 and is the point of maximum multi-compound cumulative impacts.

CONSISTENCY WITH NEW YORK STATE AIR QUALITY IMPLEMENTATION PLAN

As addressed above, maximum predicted CO concentrations with the proposed actions would be less than the applicable ambient air standard. Therefore, the proposed actions would be consistent with the New York State Implementation Plan for the control of ozone and CO.

G. CONCLUSION

The analyses conclude that the proposed actions would not result in any significant adverse air quality impacts on sensitive uses in the surrounding community, and the proposed actions would not be adversely affected by existing sources of air emissions in the rezoning area. A summary of the general findings is presented below.

Carbon monoxide (CO) concentrations due to project-generated traffic would not result in any violations of National Ambient Air Quality Standards (NAAQS) or exceed the City's current interim guidance criteria. In addition, the parking garage analysis determined that the parking facilities under the proposed action would not cause any significant adverse air quality impacts.

The stationary source analyses determined that there would be no potential significant adverse air quality impacts from HVAC systems of the projected and potential development sites. At certain sites, an E-designation would be mapped as part of the zoning proposal to ensure the developments would not result in any significant air quality impacts from HVAC emissions due to individual or groups of development sites.

~~An analysis of the cumulative impacts of industrial sources on projected and potential development sites was performed. At most of the development sites, the maximum concentrations of each pollutant were below the NYSDEC guideline concentrations and health risk criteria established by regulatory agencies, and below the NAAQS. However, at certain projected and potential development sites in the vicinity of existing sources of sodium hydroxide and tetrachloroethylene, ambient levels of these pollutants were found to result in elevated concentrations. Therefore, at these projected and potential development sites an E-designation for air quality will be mapped as part of the zoning proposal to ensure that there would not be any significant adverse air quality impacts associated with the rezoning. As discussed above, the E-designations may not be needed to the extent proposed, pending further analysis and refinements that will be undertaken between the Draft and Final EIS.~~

The industrial source analysis determined that there would be no potential significant adverse air quality impacts from industrial sources on the projected and potential development sites, since the maximum concentrations of each pollutant were below the NYSDEC guideline concentrations and health risk criteria established by regulatory agencies, and below the NAAQS.