NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Air Resources
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July 24, 2024

Ms. Lisa F. Garcia
Regional Administrator
U.S. Environmental Protection Agency, Region 2
290 Broadway, 26th Floor
New York, NY 10007-1866

Dear Administrator Garcia:

On behalf of the Governor of the State of New York, I am submitting for approval by the U.S. Environmental Protection Agency (EPA) a Source-Specific State Implementation Plan Revision (SSSR) for Big Six Towers, Inc. in Woodside, New York.

Title 6 of the New York Codes, Rules, and Regulations (NYCRR) contains several regulations that define Reasonably Available Control Technology (RACT) for certain categories of stationary sources. The Air Title V Permit for Big Six Towers, Inc. that was issued on April 4, 2024 includes conditions that establish RACT variances for NOx emissions. The RACT analysis that was used by New York State Department of Environmental Conservation (NYSDEC) to evaluate and approve the RACT emission limits is included in this SSSR.

A public notice specifying that process specific RACT determinations would be submitted to EPA as a SSSR was published in the Environmental Notice Bulletin (ENB) on September 6, 2023, and is included in this submittal. A public comment period occurred from September 6, 2023 to October 6, 2023. No comments were received.

If you have any questions or concerns, please contact Daniel Goss, Assistant Engineer, Division of Air Resources, Bureau of Air Quality Planning, SIP Planning Section at (518) 402-8396.

Sincerely,

Christopher M. LaLone, P.E.
Director, Division of Air Resources

NEW YORK STATE | Department of Environmental Conservation

Enclosures

c: R. Ruvo, EPA Region 2
K. Wieber, EPA Region 2
R. Bielawa
D. Goss

Department of Environmental Conservation

Source Specific State Implementation Plan Revision

BIG SIX TOWERS, INC.

PERMIT ID: 2-6304-00004

JULY 2024

DIVISION OF AIR RESOURCES
BUREAU OF AIR QUALITY PLANNING
ALBANY, NEW YORK 12233-3251
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Acronyms and Abbreviations

CAA	Federal Clean Air Act
DAR	DEC Division of Air Resources
DEC	New York State Department of Environmental Conservation
EPA	United State Environmental Protection Agency
NAAQS	National Ambient Air Quality Standards
NO_X	Oxides of Nitrogen
NYCRR	New York Codes, Rules, and Regulations
RACT	Reasonably Available Control Technology
SIP	State Implementation Plan
SSSR	Source Specific SIP Revision
VOCs	Volatile Organic Compounds

Introduction

The United States Environmental Protection Agency (EPA) defines Reasonably Available Control Technology (RACT) as the lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility.

Title 6 of the New York Codes, Rules, and Regulations (NYCRR) contains several regulations that define Reasonably Available Control Technology (RACT) for certain categories of stationary sources in New York. These regulations seek emissions reductions of nitrogen oxides (NO_x) and/or volatile organic compounds (VOCs) to help attain and/or maintain the 8-hour ozone National Ambient Air Quality Standards (NAAQS).

Depending upon the relevant RACT regulation, a source that is required to implement RACT must meet a presumptive RACT limit, meet an alternate limit determined from an approved technical analysis if reaching a presumptive RACT limit is technically or economically infeasible, or meet an approved case-by-case RACT limit for sources which do not have a presumptive RACT limit established in regulation. Individual source specific RACT determinations that are included in a facility's operating permit must be submitted to EPA as a revision to the New York State Implementation Plan (SIP) to satisfy the NO_x and/or VOC RACT requirements under sections 182 and 184 of the Clean Air Act (CAA).

The New York State Department of Environmental Conservation's (NYSDEC's) DAR-20 guidance, titled "Economic and Technical Analysis for Reasonably Available Control Technology (RACT)," provides procedures for the economic and technical feasibility analysis that needs to be used to evaluate source-specific RACT determinations and to determine appropriate RACT emission limits. This analysis must also be completed at each renewal of the emission source owner's permit. The re-evaluation must contain the latest control technologies and strategies available for review and allow for an inflation-adjusted economic threshold.

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Facility Description

Big Six Towers, Inc. generates electrical power and steam for an apartment complex and mixed retail space located at 59-55 47th Avenue in Woodside, Queens. The facility has a power plant, which contains a total of six (6) internal combustion engines and three (3) small boilers. With the last conversion, the facility now has three (3) natural gas-fired engines, which are Caterpillar Model G399, rated at 650 KW each. The other three (3) No.2 fuel oil-fired engines are Caterpillar engines; two (2) of which are Model D399, rated at 850 KW each; and the third one is a Caterpillar Model D3516, rated at 1600 KW.

Electrical power is generated by a revolving field, 3-phase CAT generator coupled at each of the six engines. Exhaust heat is captured in six waste heat exchangers before being exhausted through a common 24-inch diameter manifold to stack. All six engines exhaust through a common stack (emission Point 00002). The heating plant contains three (3) new Easco Boiler Corp. boilers. One is rated at 10.46 MMBtu/hr., and two (2) are rated at 16.74 MMBtu/hr. each. These boilers fire Natural Gas as primary fuel and No.2 fuel oil as backup fuel. All three boilers exhaust through a common stack (emission point 00001).

Big Six Towers, Inc. applied for and was granted a permit renewal by NYSDEC on April 4, 2024. The facility also submitted a NO_x RACT analysis pursuant to 6 NYCRR Part 227-2 requesting alternate NO_x RACT emission limits for the three oil-fired engines. Specifically, the Part 227 regulations require boilers of this size to comply with a 2.3 g NOx/bhp-hr limit. The attached analysis demonstrates that installing any air pollution control is not technically or economically feasible, and the Department has granted Big Six Towers a variance of 5.0 g NOx/bhp-hr for their oil-fired engines. The gas-fired engines meet the presumptive limit.

Permit Condition 33 contains the rate limit and Condition 34 contains the annual NOx emission limit. Conditions 30 and 31 contain power output limits that the Department will also use as methods of verifying compliance. Conditions 39-42 contain procedures for testing and reporting of NOx emissions.

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Air Title V Facility Permit

The RACT variance has been incorporated into the facility's Title V Permit. The relevant permit conditions are included in this document in Appendix B. The full Title V permit is available at:

PERMIT

The Permit Review Report is available at:

PRR

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Appendix A: Technical Analyses

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New York State Department of Environmental Conservation

Notice of Incomplete Application - This is NOT a Permit

Application ID: 2-6304-00404/00004 *Batch Number*: 877693

Facility: BIG SIX TOWERS INC
59-55 47TH AVE
WOODSIDE, NY 11377

Applicant: BIG SIX TOWERS INC *Owner ID*: 49428
59-55 47TH AVE
WOODSIDE, NY 11377-5662

Permit(s) Applied for: 1 - Article 19 Air Title V Facility

Project Location: in QUEENS in QUEENS COUNTY

Your application for Permit is incomplete. The following items are required:

The Big Six Towers must submit a new case by case RACT analysis for the engines requesting alternate NOx RACT limits. This analysis should follow Air Guide 20 and 227-2.5(c) guidelines.

Provide the basis of the condition 6NYCRR Part 227- 2 (Cond # 26) limiting KW.

Please submit requested information by _____
No further action can be taken until all of these materials are received.

Contact Person:
LISA E HORWITZ
NYSDEC
47-40 21st St
Long Island City, NY 11101

Telephone Number:

*Signature:*_____

Date: December 16, 2021

Environmental, Planning, and Engineering Consultants
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Memorandum

To:	Lisa Horwitz/New York State Department of Environmental Conservation
From:	Jennifer M. Franco, Sheveta Sharma/AKRF
Date:	June 1, 2022
Re:	Big Six Towers Notice of Incomplete Application
cc:	Cicily Nirappel, Thomas John, Sam Lieblich, Saji Samuel, Steve Watts/NYSDEC; Maria Platis, Mike Olech/Big Six Towers

AKRF has reviewed the Notice of Incomplete Application (NOIA) sent by the New York State Department of Environmental Conservation in a letter dated December 16, 2022. Presented below are responses to the comments.

Comment 1: The Big Six Towers must submit a new case by case RACT analysis for the engines requesting alternate NOx RACT limits. This analysis should follow Air Guide 20 and 227-2.5(c) guidelines.

Response: As requested, the NO_x RACT analysis for the engines is attached.

Comment 2: Provide the basis of the condition 6NYCRR Part 227- 2 (Cond # 26) limiting KW.

Response: This condition limits the total power requirement to a total of 11 million KWH/YR and the production from the Number 2 oil-fired engines is capped at 8,800 KWH/YR (80 percent). As per information obtained from the facility manager, facility production was close to approximately 10 to11 million KWH/YR around fifteen years ago. Over the years, the facility production output has decreased slightly to approximately 9 million KWH/YR due to efficiency improvements that were performed over the years. It should also be noted that the facility previously operated five oil-fired engines and one gas-fired engine as reflected in the Title V permit issued in 2007 but has since converted two of the diesel engines to gas-fired engines. The 2007 permit included a condition limiting the output from the new gas-fired engine to 20 percent.

NO_x RACT Analysis

Operation of Diesel Fuel-Fired Engine Generators

Big Six Towers, Inc.
Permit ID: 2-6304-00404/00004

Prepared for

New York State Department of Environmental Conservation
NYSDEC Region 2 Headquarters
47-40 21st Street
Long Island City, NY 11101

Prepared by

AKRF, Inc.
440 Park Avenue South, 7th Floor
New York, NY 10016

June, 2022

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1 Executive Summary

On May 20, 2021, the New York State Department of Environmental Conservation (NYSDEC) Region 2 office received an application for the renewal of the Big Six Towers, Inc. Air Title V Facility (Title V) permit (Permit ID: 2-6304-00404/00004). NYSDEC has requested that Big Six Towers, Inc. submit a Reasonably Available Control Technology (RACT) analysis for oxides of nitrogen (NO_x) for the internal combustion engines.

As specified in the current Title V permit, there are six (6) internal combustion (IC) engines at Big Six Towers (the Facility) consisting of three (3) natural gas-fired engines and three (3) No. 2 oil-fired engines. The three (3) No.2 oil fired engines are subject to a NO_x emissions cap of 5 grams per brake horsepower-hour (g/bhp-hr).

This NO_x RACT analysis was prepared to respond to NYSDEC Region 2's Notice of Incomplete Application (NOIA) received on December 16, 2021, requesting a NO_x RACT analysis for the three engines that have NO_x RACT variance emission limits.

The analysis was conducted pursuant to the NYSDEC RACT requirements of 6 NYCRR Part 227-2 for stationary internal combustion engines, and in accordance with New York State's Division of Air Resources (DAR) guidance document 20 (DAR-20).

The RACT analysis consists of identifying NO_x control technologies which meet feasibility standards for technical, economic, environmental, and energy performance. The following air pollution control technologies were considered in the RACT analysis for both technical and economic feasibility:

- Selective Catalytic Reduction (SCR);
- Selective Non-Catalytic Reduction (SNCR);
- Exhaust Gas Recirculation (EGR);
- Steam Injection Systems and Emulsified Fuels; and
- Injection Timing Retardation and Adjusted Cam Timing

In addition to the above air pollution control technologies, the analysis included an evaluation of the use of fuel switching and the use of a system averaging plan pursuant to 6 NYCRR 227-2.5.

The analysis presented in this report demonstrates that the available air pollution control technologies do not meet RACT requirements for the reduction of NO_x emissions from the engines. Consequently, adding air pollution control technology or modifying the engines cannot be justified because these options are either technically or economically infeasible.

As a result, RACT for the three oil-fired engines is determined to be no control, as defined in NYSDEC DAR-20. These engines, therefore, are considered to be in compliance with Part 227-2 at the existing NO_x variance limit in the current Title V permit. Stack testing will be performed once during the permit term to demonstrate compliance with these limits.

2 Introduction

NYSDEC has requested that Big Six Towers submit a RACT analysis for the IC engines. This NO_x RACT analysis is the evaluation of several emission control alternatives and the selection of RACT for the three oil-fired engines at Big Six Towers located at 59-55 47th Avenue in Woodside, Queens.

2.1 Source Background

Big Six Towers, Inc. operates a total of six IC engines consisting of three natural gas-fired rich burn Caterpillar G399 engines rated at 650 kilowatts (KW) and three No. 2 fuel-oil fired IC engines. The three fuel oil-fired IC engines are Caterpillar engines; two of which are Model D399 rated at 850 KW each; and a third which is a Caterpillar Model D3516 rated at 1,600 KW. The facility also operates three dual-fuel boilers, two of which are rated at 16.74 million British thermal units per hour (MMBtu/hr) and the third is rated at 10.46 MMBtu/hr. All the emission sources are grouped under Emission Unit 1-STACK (EU 1-STACK).

The gas-fired engines already meet the NO_x limit of 1.5 grams per brake horsepower-hour (g/bhp-hr). The 3 oil-fired engines are currently operating under a variance subject to a NO_x emissions cap of 5 g/bhp-hr.

2.1.1 NO_x Emissions

Pursuant to the Title V permit requirement to test each engine during the permit term, Environmental Laboratories, Inc. (ELI) tested 2 of the 3 engines on July 16, 2021, and the third engine on August 24, 2021.[1] The testing determined that the oil-fired engines operated with emissions above the presumptive NO_x RACT limit of 2.3 g/bhp-hr and below 5.0 g/bhp-hr. **Table 1** presents the stack test results.

For the purposes of this RACT determination, a baseline condition for compliance was established assuming potential-to-emit (PTE) emissions from the oil-fired engines. The baseline condition provides 80% of the power with the diesel engines and the balance with the gas-fired engines. The baseline NOx emissions were calculated based on representative fuel usage data from 2018, which was the maximum fuel usage at the Facility over the last three years. This RACT analysis is conducted by evaluating air pollution control technologies that can bring the baseline emissions down to at or below the Part 227-2 limit of 2.3 gm/bhp-hr for the oil-fired engines. This constitutes an approximately 50 percent reduction in NOx emissions. **Table 2** summarizes the baseline engine emissions based on 2018 fuel usage.

[1] *Compliance Test Report* – NO_x *and PM Emissions Evaluation, Big Six*, Environmental Laboratories, Inc., July 20, 2021 and September 17, 2021.

Table 1
2021 Stack Testing Results

Emission Source	Equipment	Max Generator Output (KW)	Engine Horsepower[(1)] (BHP)	Measured NO_x Emission Rate (g/bhp-hr)	NO_x Emission Limit (g/bhp-hr)	Over/Under Limit?
0ENG2	Cat D399	850	1,196	4.70	5.0	Under
0E4NG	Cat D399	850	1,196	4.70	5.0	Under
0ENG6	Cat D3516	1,600	2,146	4.54	5.0	Under

Notes:
(1) Conversion from KW to BHP assumes 92% generator efficiency and 0.7457 KW/bhp.

Table 2
Baseline Engine NO_x Emissions

Engine	Fuel	Total Capacity	Emission Factor	2018 Fuel Consumption (mmBtu/yr)	2018 Adjusted Fuel Consumption for Baseline PTE* (mmBtu/yr)	NO_x PTE Emissions (Tons)
Oil-fired Engines	No. 2 Oil	3,300 kW	5 g/bhp-hr	68,703	99,255	78.15
Gas-fired engines	Natural Gas	1,950 kW	1.2 gm/bhp-hr	55,365	24,184	5.86
Total for all engines						**84.0**

Note:
* Assumes 80% of the power with the oil-fired engines and the balance with the gas-fired engines.

2.2 RACT Requirements and Process

New York State's 6 NYCRR Part 200 defines RACT as the: "Lowest emission limit that a particular source is capable of meeting by application of control technology that is reasonably available, considering technological and economic feasibility." New York State has a guideline document, DAR-20, for conducting RACT analyses.

The provisions of Part 227-2 apply to major stationary sources of NO_x for different types of combustion equipment burning different fuels.

RACT requirements applicable to a particular emission source may fall into one of two categories - presumptive RACT limits or case-by-case RACT determinations. Presumptive RACT limits are category-wide requirements. Presumptive RACT limits are based on capabilities that are general to an emission source category. However, for some categories of emission sources, presumptive RACT limits may not be attainable at every individual emission source. Case-by-case RACT determinations consider the technological and economic circumstances of the individual emission source.

Specific requirements for stationary internal combustion engines are prescribed at 6 NYCRR 227-2.4(f). Big Six Towers is located in an area that is currently designated as a moderate nonattainment area for the 2015 ozone National Ambient Air Quality Standard, and three of the 1-STACK engines are greater than 400 brake horsepower and fire distillate oil. Therefore, pursuant to 6 NYCRR 227-2.4(f)(3), the engines must comply with a NO_x emission limit of 2.3 g/bhp-hr or a case-by-case RACT determination.

According to 6 NYCRR 227-2.5(c), for those sources that demonstrate that the applicable presumptive RACT emission limit in section 227-2.4 is not economically or technically feasible, the owner or operator can request the NYSDEC to set a higher emission source specific emission limit.

Big Six Towers, Inc. has elected to perform a RACT analysis to demonstrate compliance with Part 227-2 for the three engines per Part 227-2.4(f). The RACT analysis consists of identifying NO_x control technologies which meet feasibility standards for technical, economic, environmental, and energy performance.

The selection of RACT for the NO_x sources described herein was made using the "top-down" approach for evaluating control technologies. The "top-down" analysis method stipulates that available control technologies first be assessed for technical feasibility, including both demonstrated and transferable technologies with practical potential application to the source. Options which are considered technically feasible are then ranked for control effectiveness in descending order. The environmental, economic, and energy impacts of the "top" (most stringent) control alternatives are examined first.

Each feasible technology must undergo an economic analysis, consisting of an evaluation of the lowest of actual budgetary bids from vendors. A total annualized equipment cost based on the installed capital cost (and capital recovery factor) and operations and maintenance costs must be determined, then divided by the tons of NO_x controlled each year to determine the technology's cost effectiveness in dollars per ton NO_x reduced ($/ton). Per DAR-20, a source will not be required to implement any emission control or strategy if the resultant cost exceeds the $5,800/ton[2] cost threshold that defines economic feasibility. This RACT analysis follows these procedures.

After technical, economic, environmental, and energy analyses have been completed, the overall impact of each alternative is either determined to be "reasonably available" and selected as RACT or is rejected due to "unreasonable" economic, energy, or environmental impacts. The most stringent technology not rejected is designated as RACT for the source.

As a result of this analysis, Big Six Towers, Inc. is requesting that the NYSDEC set a higher emission source specific emission limit for each oil-fired engine than the 2.3 g/bhp-hr prescribed at 6 NYCRR 227-2.4(f).

[2] RACT cost threshold was established as $3,000/ton in 1994 dollars. The NYSDEC uses the Bureau of Labor Statistics CPI Inflation Calculator to adjust this $3,000 economic feasibility threshold over time for inflation (http://www.bls.gov/data/inflation_calculator.htm).

3 Available Control Technologies and Strategies

There are two primary mechanisms by which NO_x is formed in an IC engine: (1) the oxidation of atmospheric nitrogen found in the combustion air (thermal NO_x) and (2) the conversion of nitrogen chemically bound in the fuel (fuel-bound NO_x or organic NO_x). These mechanisms are discussed below.

Thermal NO_x is created by the high temperature reaction in the combustion chamber between atmospheric nitrogen and oxygen. The amount that is formed is a function of time, turbulence, temperature, and the fuel to air ratio within the combustion flame zone. The majority of NO_x emissions result from thermal NO_x generation.

Fuel-bound NO_x is created by the gas-phase oxidation of the elemental nitrogen contained within the fuel. Its formation is a function of the fuel nitrogen content and the amount of oxygen in the combustion chamber. Most IC engines are presently fueled by natural gas or light distillate oil that typically contains little or no fuel-bound NO_x. As a result, when compared to thermal NO_x, fuel NO_x is not currently a major contributor to overall NO_x emissions from most IC engines.[3]

A third form of NO_x, prompt NO_x, is formed during the oxidation of molecular nitrogen present in the combustion air stream in areas of the flame envelope that are fuel rich. In most cases, prompt NO_x emissions are negligible.

Nitrogen oxides emission controls are divided into two categories: post-combustion emission reduction and in-engine combustion control. Post-combustion NO_x controls reduce a portion of the NO_x exiting the combustion zone to nitrogen. In-engine formation controls reduce the quantity of NO_x formed during the combustion process.

In addition to potentially feasible control technologies, this section evaluates fuel switching and the use of a system averaging plan as per 6 NYCRR 227-2.5(c) because Big Six Towers is requesting that NYSDEC set emission limits for the oil-fired engines that are higher than the presumptive NO_x RACT levels for stationary internal combustion engines prescribed in 227-2.4.

3.1 Potentially Feasible Control Technologies

Descriptions of potentially feasible control technologies in both categories, post-combustion and in-engine control, are provided below.

3.1.1 Post-Combustion NO_x Control Technologies

Post-combustion NO_x control processes reduce NO_x emissions by converting NO_x in the exhaust stream to nitrogen gas and water. SCR is the primary post-combustion NO_x removal technology used for internal combustion engines. Selective non-catalytic reduction (SNCR) is also a potentially feasible control technology.

3.1.1.1 Selective Catalytic Reduction (SCR)

SCR is a post-combustion control technology that can significantly reduce NO_x emissions from internal combustion engines. In an SCR system, ammonia (NH_3) or urea is injected into the exhaust where it reacts with NO_x in the presence of a catalyst (typically a metal oxide) to form nitrogen (N_2) and water.

[3] Alternative Control Techniques Document -- NO_x Emissions from Stationary Reciprocating Internal Combustion Engines, EPA-453/R-93032, U.S. EPA, July 1993.

The following equations describe the SCR reaction process:

$$4NO + 4NH_3 + O_2 \rightarrow 4N_2 + 6H_2O$$

$$6NO_2 + 8NH_3 \rightarrow 7N_2 + 12H_2O$$

$$NH_3 + O_2 \rightarrow NO_x + H_2O$$

The first and second equations represent the NO_x reduction reaction. The third equation represents the formation of NO_x by a side reaction in an SCR system if the actual temperature exceeds the optimum reaction temperature. At very high temperatures, NO_x emissions actually increase and SCR is counter-productive.

The above discussion illustrates how temperature is a key SCR performance parameter. The NO_x reduction reaction is effective only within a given temperature range. In an SCR system, the optimum temperature depends on two reaction components: the type of catalyst and the flue gas composition. According to EPA's *Control Cost Manual*,[4] for the majority of commercial catalysts (metal oxides), the operating temperatures for the SCR process range from 480°F to 800°F. The rate of NO_x removal increases with temperature up to a maximum between 700°F and 750°F. As the temperature increases above 750°F, the reaction rate and resulting NO_x removal efficiency begin to decrease.

The exhaust gas temperatures measured during the 2021 testing (470-545°F) are within the range at which SCR is effective at reducing NO_x.

According to EPA's *Control Cost Manual* SCR systems can typically achieve NO_x removal efficiencies at or above 90%.

3.1.1.2 Selective Non-Catalytic Reduction (SNCR)

SNCR is a post-combustion NO_x control technology in which a reagent (anhydrous ammonia or urea) is injected into the flue gas stream to react chemically with NO_x, forming nitrogen gas and water. The relevant reaction is:

$$2NO + CO{\cdot}(NH_2)_2 + \tfrac{1}{2}O_2 \rightarrow 2N_2 + CO_2 + 2H_2O$$

The success of this process in reducing NO_x emissions is highly dependent on the ability to achieve uniform mixing of the reagent into the flue gas. Without the use of a catalyst, the reaction requires a high temperature range to obtain activation energy. This must occur within a zone of the exhaust stream where the flue gas temperature is within a narrow range, typically from 1,600°F to 2,100°F. In order to achieve the necessary mixing and reaction, the residence time of the flue gas within this temperature window should be at least 0.5 to 1.0 second. The consequences of operating outside the optimum temperature range are severe. Above the upper end of the temperature range, the reagent will be converted to NO_x and the NO_x control efficiency decreases rapidly. Below the lower end of the temperature range, the reagent will not react with the NO_x and the NH_3 discharge from the stack (known as "ammonia slip") will be very high. The normal NO_x control efficiency range for SNCR is 50 percent to 70 percent.

[4] EPA Air Pollution Control Cost Manual, Seventh Edition, available at https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution

SNCR is most appropriate for applications with high exhaust gas temperatures (1,600 to 1,800°F), while the exhaust gas temperature of the engines at Big Six Towers are much lower (470 to 545). At the observed exhaust temperature range, SNCR would not provide NO_x control and thus will not be considered further for this application.

3.1.2 In-Engine NO_x Control Technologies

In-engine technologies that have been demonstrated to reduce NO_x emissions include exhaust gas recirculation, steam injection systems and emulsified fuels, adjusted engine timing, and operational controls such as modified operating schedules and good combustion practices.

3.1.2.1 Exhaust Gas Recirculation (EGR)

EGR reintroduces exhaust gas from the system outlet into the combustion air system. Recirculation of exhaust gas lowers the flame temperature, which reduces the formation of thermal NO_x. EGR is most effectively applied as a control technology as part of a new engine installation. Retrofitted EGR systems for existing engine installations are possible but require significant development and design costs. EGR retrofits can also be harmful to the engine. In particular, the recirculation of exhaust gas back into the engine cylinder can increase engine wear as carbon particulates wash past the rings and into the oil and requires use of a diesel particulate filter to ensure that particulate matter is not introduced into the intake air. EGR systems can also add abrasive contaminants and increase engine oil acidity, which in turn can reduce engine longevity. As EGR systems are more appropriate when applied to new engine installations, this control technology will not be evaluated further for this application.

3.1.2.2 Steam Injection Systems and Emulsified Fuels

Both steam injection systems and emulsified fuels seek to reduce the combustion temperature by introducing water into the combustion process. Steam injection systems add water by injecting steam directly into the combustion zone. Emulsified fuel systems add water to the combustion process by incorporating water into the fuel spray droplets. The addition of water into the combustion process, through application of either of these control technologies, reduces the combustion temperature and thus reduces the formation of thermal NO_x. In general, these technologies have been demonstrated to reduce NO_x formation by 20 to 25 percent. However, introduction of water to the combustion zone may have long-term negative effects on engine function due to corrosion and reduced lubrication. As these technologies may be detrimental to engine function and would not be able to meet the presumptive 2.3 g/bhp-hr NO_x emissions standard, they will not be evaluated further in this analysis.

3.1.2.3 Injection Timing Retardation and Adjusted Cam Timing

Both injection timing retard (ITR) and adjusted cam timing technologies rely on adjustments to existing engine components to reduce NO_x emissions. ITR delays the ignition event until later in the power stroke, when the piston has begun to move downward. This adjustment increases the volume of the combustor chamber, resulting in a lower fuel to air ratio, which reduces the peak flame temperature and in turn reduces thermal NO_x formation. Adjusting cam timing increases the volume of combustion air trapped in the engine cylinder by opening the intake valve earlier in the engine cycle. Similarly to ITR, this reduces NO_x emissions by reducing the fuel to air ratio during combustion.

Modification of engine timing to reduce NO_x emissions typically results in increases in particulate matter, carbon monoxide, and hydrocarbon emissions. Given the potential negative side-effects, these control technologies will not be considered further in this analysis.

3.2 Fuel Switching

The facility already primarily uses natural gas engines with the oil-fired engines used for supplemental demand. There is insufficient gas engine capacity to only use natural gas during the ozone season, therefore fuel switching was eliminated as an option for this NOx RACT analysis.

3.3 System Averaging

The Big Six Towers boilers are small and only used intermittently to supplement the internal combustion engines during peak periods and when the engines are down for maintenance. Therefore, system averaging was eliminated as an option in this analysis.

3.4 Summary of Feasible RACT Technologies and Strategies

Based on the discussion above concerning available control technologies and control strategies, the only NO_x reduction strategy that has been determined to be feasible and worthy of further evaluation to meet RACT for the Big Six Towers engines is SCR. The economic feasibility of SCR is evaluated next to determine whether it is RACT in accordance with DAR-20.

4 NO_x RACT Economic Analysis

As required by DAR-20, this section presents an economic analysis of the only technically feasible control equipment or control strategy determined based on the findings presented in Section 3 of this report, that is, installation of SCR technology.

The following evaluation has been conducted in accordance with New York State's DAR-20. DAR-20 includes a "Table 1" worksheet outlining the procedure for the economic analysis. Worksheets for SCR examined in this analysis are included in Appendix A. Vendor budgetary quotes for supplying SCR systems on the engines are included in Appendix B.

The Capital Recovery Factor (CRF) used in this analysis is 0.13 based on a 10 year equipment life and a 6.5% interest rate. The cost effectiveness of the control option ("Cost of Controls per Ton Reduced") was determined in cost per ton of NO_x controlled on an annualized basis. The cost was then compared to the RACT upper limit of $5,800 of annualized cost per ton of NO_x removed per DAR-20.

Budgetary cost quotes for the capital cost of SCR systems were obtained from two (2) vendors:

- Hug Engineering, Inc.
- Johnson Matthey

The quotations contain budgetary estimates for a conventional SCR system. Both Hug Engineering, Inc. and Johnson Matthey excluded many items from the scope of supply (e.g., installation of new computer hardware, silencer, mounting hardware including mating flanges, gaskets, etc. (see Appendix B)), therefore it was assumed that the capital costs used in the economic analysis were conservatively low .

Annualized cost per ton of NO_x removed ($/ton) were estimated for each of the two vendors, resulting in two (2) separate $/ton estimates to compare to the DAR-20 economic feasibility cost threshold of $5,800/ton. If the cost exceeded this threshold, then the control is not economically feasible and thus is not RACT.

The tables in Appendix A provide all of the details for the $/ton estimates for each vendor quote. The major assumptions are summarized below.

The cost of the emissions control equipment was provided by the vendors. Direct and indirect installation costs were estimated using guidance published by the EPA's Control Cost Manual[5]. These factors are applied to the Purchased Equipment Cost (PEC) for each engine group. The PEC is estimated from the vendor-supplied Equipment Cost (EC) by applying percentages of the EC for instrumentation, sales tax and freight cost, which total to 14% of the EC. The PEC also includes the cost of the urea tank installation and remote monitoring systems.

The direct installation cost was estimated as 50 percent of the capital equipment cost and includes 8 percent for foundation and supports, 14 percent for handling and erection, 6 percent for piping and electrical, 1 percent for installation of ductwork, 1 percent for painting and ancillary items, and a 20 percent allowance for retrofits. The indirect installation cost was estimated as 35 percent of the capital equipment cost. The indirect installation cost includes 5 percent for construction and field expenses, 10 percent for contractor fees, 3 percent for process contingency, 10 percent for engineering costs, and 7 percent for start-up and performance tests.

[5] EPA Air Pollution Control Cost Manual, Seventh Edition, available at https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution

Annual operating costs include annual maintenance as well as urea, electricity and power usage, and catalyst replacement costs, and were estimated using EPA guidance. Engine operating hours were estimated based on the operating records obtained from the facility for the past three years (2018-2020)

The NO_x tonnage reduction was calculated by multiplying the percent of NO_x reduced through the SCR system by the baseline annual emissions from the facility. The baseline NOx emissions were calculated based on representative fuel usage data from 2018, which was the maximum fuel usage at the Facility over the last three years. This RACT analysis is conducted by evaluating air pollution control technologies that can bring the baseline emissions down to at or below the Part 227-2 limit of 2.3 gm/bhp-hr for the oil-fired engines. This constitutes a 50 percent reduction in NOx emissions.

Table 3 provides a summary of the cost effectiveness estimates for each vendor. The results show that the cost effectiveness of installing SCR on the engines ranges from about $7417 to $7,661. These values exceed the DAR-20 economic feasibility cost threshold of $5,800/ton. Therefore, installing SCR is not considered RACT for the Big Six Towers oil-fired engines.

Table 3
Summary of Economic Feasibility Calculations

Vendor	Engine(s)	Emission Source No.(s)	Total Costs of Controls Per Ton of NOx Reduced for Each Engine in Group ($/ton)
Johnson Matthey	(2) Cat D399	0ENG2, 0ENG4 and 0ENG6	7,417
Hug Engineering, Inc.	850 KW and (1) Cat D3516	0ENG2, 0ENG4 and 0ENG6	7,661

5 Summary and Conclusions

This RACT analysis was conducted pursuant to the requirements in 6 NYCRR Part 227-2. The three existing oil-fired engines at Big Six Towers are subject to the regulations in Part 227-2, specifically the requirements for stationary internal combustion engines. A RACT analysis was performed on the engines to meet Part 227-2 requirements. Potential control options were evaluated in accordance with New York State DAR-20 RACT analysis procedures.

Control technologies and control strategies evaluated pursuant to the NYSDEC RACT guidelines for the oil-fired engines included CSR, SNCR, exhaust gas recirculation, steam injection, emulsified fuels, timing retardation, adjusted cam timing, fuel switching, and system averaging. Of these technologies and strategies, only selective catalytic reduction was determined to be technically feasible for the Big Six Towers engines.

SCR was evaluated for cost effectiveness using DAR-20 guidelines. The RACT analysis showed that SCR did not meet the DAR-20 economic feasibility cost threshold of $5,800/ton NO_x controlled. Therefore, RACT for the three Big Six Towers oil-fired engines is considered no control.

APPENDIX A

ECONOMIC ANALYSIS TABLES

Economic Analysis - Air Emissions Control Equipment
ENGINES

Big Six Towers

Group	Vendor	Engine(s)	Emission Source No.(s)	Total Costs of Controls Per Ton of NOx Reduced ($/ton)
1	Hug Engineering	(2) Cat D399 850 kW and (1) Cat D3516 1,600 kW	0ENG2, 0ENG4 and 0ENG6	$7,661
2	Johnson Matthey	(2) Cat D399 850 kW and (1) Cat D3516 1,600 kW	0ENG2, 0ENG4 and 0ENG6	$7,417

Table A-1
Economic Analysis - Air Emissions Control Equipment

FACILITY NAME AND ADDRESS:	Big Six Towers; 59-55 47th Avenue, Woodside, NY 11377		
FACILITY ID AND CONTROL TYPE:	2-6304-00404/00004 SCR -- Hug Engineering (Cat D399: 850 kW, CAT D3516: 1600 kW) Emission Sources 0ENG2, 0ENG4, 0ENG6		
			Notes:
COST OF EMISSIONS CONTROL EQUIPMENT (PEC)	$ 354,498	(1)	Includes 14% of Equipment Cost (EC): 1% for instrumentation, 8% for sales tax for SCR/Urea system, and 5% freight cost for SCR system; also includes cost for urea tank installation and remote monitoring tie-ins
A. DIRECT INSTALLATION COST	$ 177,249	(1A)	includes 50% of PEC: 8% foundation & supports, 14% handling & erection, 6% Piping & Electrical, 1% ductwork, 1% painting, and 20% retrofit factor
B. INDIRECT INSTALLATION COST	$ 124,074	(1B)	See below
1) COST OF EMISSIONS CONTROL EQUIPMENT INCLUDING INSTALLATION	$ 655,821	(1C)	
2) CAPITAL RECOVERY FACTOR	0.14	(2)	See below; 6.5% interest, 10 yr life
3) ANNUAL EQUIPMENT COST (MULTIPLY ITEM 1C BY ITEM 2)	$ 91,228	(3)	
4) ANNUAL OPERATING COSTS			
A. ELECTRICITY	$ 15,289	(4A)	
B. NATURAL GAS	$ -	(4B)	
C. CATALYST REPLACEMENT	$ 3,947	(4C)	
D. REAGENT REPLACEMENT	$ 145,119	(4D)	
E. MAINTENANCE	$ 67,525	(4E)	includes labor at $60/hr, 1hrs/shift, 1 shift/8hrs, 8760 hrs/yr + 2% PEC for materials
5) TOTAL ANNUAL COSTS [ADD ITEMS 3 AND 4 (A TO E)]	$ 323,107	(5)	
6) VOC OR NOx TONNAGE REDUCTION			
A. NOx POTENTIAL TO EMIT	84.0	(6A)	PTE assuming 80% diesel, 20% gas
B. PERCENT REDUCTION ACHIEVED	50%	(6B)	PTE from 5 g/bhp-hr to 2.3 g/bhp-hr
C. TONS REDUCED (MULTIPLY ITEM 6A BY ITEM 6B)	42.2	(6C)	
TOTAL COST OF CONTROLS PER TON REDUCED	**$7,661 /ton**		

Table A-1
Economic Analysis - Air Emissions Control Equipment

Supporting Calculations

PEC - Purchased Equipment Cost

Direct Installation Costs

$	28,360	Foundations & supports	0.08 PEC
$	49,630	Handling & erection	0.14 PEC
$	14,180	Electrical	0.04 PEC
$	7,090	Piping	0.02 PEC
$	3,545	Insulation	0.01 PEC
$	**102,804**	**TOTAL**	

Indirect Installation Costs

$	17,725	Construction and field expenses	0.05 PEC
$	35,450	Contractor fees	0.10 PEC
$	10,635	Contingency	0.03 PEC
$	35,450	Engineering	0.10 PEC
$	7,090	Start-up	0.02 PEC
$	17,725	Performance test	0.05 PEC
$	**124,074**	**TOTAL**	

Capital Recovery Factor 0.14

Annual interest rate (I)	6.5%	
Equipment life in years (n)	10	

D399 Units

Annual Reagent Costs	$	105,707	$/yr
Urea flow rate		3	gal/hr
Urea cost	$	3.70	$/gal
Annual operating hours		9,838	hrs/year
Annual Electricity Costs		8984	$/yr
Power usage		4.3	kW
Cost of electricity	$	0.21	$/kWh
Annual operating hours		9,838	hrs/yr
Power Usage		4.3	kW
Engine net energy rate		8.0	MMBtu/hr
NOx Removal Efficiency		50%	
Catalyst Replacement Costs	$	2,875	
Annual operating hours		9,838	
Catalyst lifetime hours		22,500	
Catalyst replacement cost	$	6,575	

D3516 Unit

Annual Reagent Costs	$	39,412	$/yr
Urea flow rate		3	gal/hr
Urea cost	$	3.70	$/gal
Annual operating hours		3,668	hrs/year
Annual Electricity Costs		6305	$/yr
Power usage		8.2	kW
Cost of electricity	$	0.21	$/kWh
Annual operating hours		3,668	hrs/yr
Power Usage		8.2	kW
Engine net energy rate		15.0	MMBtu/hr (Each engine has this max heat input v
NOx Removal Efficiency		50%	
Catalyst Replacement Costs	$	1,072	
Annual operating hours		3,668	
Catalyst lifetime hours		22,500	
Catalyst replacement cost	$	6,575	

Based on Eqn. 2.61 in 7th Edition Control Cost Manual (2016)
Heat Rate = 9.39 MMBtu/MWh (AP-42 BSFC of 7000 Btu/bhp-hr)
Heat Rate Factor = 0.94

Table A-2
Economic Analysis - Air Emissions Control Equipment

FACILITY NAME AND ADDRESS:	Big Six Towers; 59-55 47th Avenue, Woodside, NY 11377		
FACILITY ID AND CONTROL TYPE:	2-6304-00404/00004 SCR -- Johnson Matthey (Cat D399: 850 kW, CAT D3516: 1600 kW) Emission Sources 0ENG2, 0ENG4, 0ENG6		
			Notes:
COST OF EMISSIONS CONTROL EQUIPMENT (PEC)	$ 385,890	(1)	Includes 14% of Equipment Cost (EC): 1% for instrumentation, 8% for sales tax for SCR/Urea system, and 5% freight cost for SCR system; also includes cost for urea tank installation and remote monitoring tie-ins
A. DIRECT INSTALLATION COST	$ 192,945	(1A)	includes 50% of PEC: 8% foundation & supports, 14% handling & erection, 6% Piping & Electrical, 1% ductwork, 1% painting, and 20% retrofit factor
B. INDIRECT INSTALLATION COST	$ 135,062	(1B)	See below
1) COST OF EMISSIONS CONTROL EQUIPMENT INCLUDING INSTALLATION	$ 713,897	(1C)	
2) CAPITAL RECOVERY FACTOR	0.14	(2)	See below; 6.5% interest, 10 yr life
3) ANNUAL EQUIPMENT COST (MULTIPLY ITEM 1C BY ITEM 2)	$ 99,306	(3)	
4) ANNUAL OPERATING COSTS			
A. ELECTRICITY	$ 15,289	(4A)	
B. NATURAL GAS	$ -	(4B)	
C. CATALYST REPLACEMENT	$ 7,007	(4C)	
D. REAGENT REPLACEMENT	$ 123,510	(4D)	
E. MAINTENANCE	$ 67,686	(4E)	includes labor at $60/hr, 1hrs/shift, 1 shift/8hrs, 8760 hrs/yr + 2% PEC for materials
5) TOTAL ANNUAL COSTS [ADD ITEMS 3 AND 4 (A TO E)]	$ 312,798	(5)	
6) VOC OR NOx TONNAGE REDUCTION			
A. NOx POTENTIAL TO EMIT	84.0	(6A)	PTE assuming 80% diesel, 20% gas
B. PERCENT REDUCTION ACHIEVED	50%	(6B)	PTE from 5 g/bhp-hr to 2.3 g/bhp-hr
C. TONS REDUCED (MULTIPLY ITEM 6A BY ITEM 6B)	42.2	(6C)	
TOTAL COST OF CONTROLS PER TON REDUCED	**$7,417 /ton**		

Table A-2
Economic Analysis - Air Emissions Control Equipment

Supporting Calculations

PEC - Purchased Equipment Cost

Direct Installation Costs			
$	30,871	Foundations & supports	0.08 PEC
$	54,025	Handling & erection	0.14 PEC
$	15,436	Electrical	0.04 PEC
$	7,718	Piping	0.02 PEC
$	3,859	Insulation	0.01 PEC
$	**111,908**	**TOTAL**	
Indirect Installation Costs			
$	19,295	Construction and field expenses	0.05 PEC
$	38,589	Contractor fees	0.10 PEC
$	11,577	Contingency	0.03 PEC
$	38,589	Engineering	0.10 PEC
$	7,718	Start-up	0.02 PEC
$	19,295	Performance test	0.05 PEC
$	**135,062**	**TOTAL**	

Capital Recovery Factor		0.14
Annual interest rate (I)		6.5%
Equipment life in years (n)		10

D399 Units

Annual Reagent Costs		$ 80,081	$/yr
Urea flow rate		2.2	gal/hr
Urea cost	$	3.70	$/gal
Annual operating hours		9,838	hrs/year
Annual Electricity Costs		8984	$/yr
Power usage		4.3	kW
Cost of electricity	$	0.21	$/kWh
Annual operating hours		9,838	hrs/yr
Power Usage		4.3	kW
Engine net energy rate		8.0	MMBtu/hr
NOx Removal Efficiency		50%	
Catalyst Replacement Costs		$ 4,525	
Annual operating hours		9,838	
Catalyst lifetime hours		22,500	
Catalyst replacement cost	$	10,350	

D3516 Unit

Annual Reagent Costs		$ 43,429	$/yr
Urea flow rate		3.2	gal/hr
Urea cost	$	3.70	$/gal
Annual operating hours		3,668	hrs/year
Annual Electricity Costs		6305	$/yr
Power usage		8.2	kW
Cost of electricity	$	0.21	$/kWh
Annual operating hours		3,668	hrs/yr
Power Usage		8.2	kW
Engine net energy rate		15.0	MMBtu/hr
NOx Removal Efficiency		50%	
Catalyst Replacement Costs		$ 2,481	
Annual operating hours		3,668	
Catalyst lifetime hours		22,500	
Catalyst replacement cost	$	15,220	

(Each engine has this max heat input v

Based on Eqn. 2.61 in 7th Edition Control Cost Manual (2016)

Heat Rate =	9.39	MMBtu/MWh (AP-42 BSFC of 7000 Btu/bhp-hr)
Heat Rate Factor =	0.94	

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Appendix B: Case-by-case Permit Conditions

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(iv) sample or monitor at reasonable times substances or parameters for the purpose of assuring compliance with the permit or applicable requirements.

Condition 17: **Accidental release provisions.**
Effective between the dates of 04/04/2024 and 04/03/2029

Applicable Federal Requirement:40 CFR Part 68

Item 17.1:
If a chemical is listed in Tables 1,2,3 or 4 of 40 CFR §68.130 is present in a process in quantities greater than the threshold quantity listed in Tables 1,2,3 or 4, the following requirements will apply:

a) The owner or operator shall comply with the provisions of 40 CFR Part 68 and;

b) The owner or operator shall submit at the time of permit issuance (if not previously submitted) one of the following, if such quantities are present:

1) A compliance schedule for meeting the requirements of 40 CFR Part 68 by the date provided in 40 CFR §68.10(a) or,

2) A certification statement that the source is in compliance with all requirements of 40 CFR Part 68, including the registration and submission of the Risk Management Plan. Information should be submitted to:

Risk Management Plan Reporting Center
C/O CSC
8400 Corporate Dr
Carrollton, Md. 20785

Condition 18: **Recycling and Emissions Reduction**
Effective between the dates of 04/04/2024 and 04/03/2029

Applicable Federal Requirement:40CFR 82, Subpart F

Item 18.1:
The permittee shall comply with all applicable provisions of 40 CFR Part 82.

The following conditions are subject to annual compliance certification requirements for Title V permits only.

Condition 19: **Emission Unit Definition**
Effective between the dates of 04/04/2024 and 04/03/2029

Applicable Federal Requirement:6 NYCRR Subpart 201-6

Item 19.1:
The facility is authorized to perform regulated processes under this permit for:
Emission Unit: 1-STACK
Emission Unit Description:
The emission unit consists of six internal combustion engines and three boilers.
Three engines N0.2 fuel oil fired engines (OENG2, OENG4 and OENG6) are compression ignition, lean burn engines. Engines, OENG2 & OENG4 are Caterpillar model D399, rated at 850 kw each and the third engine (OENG6) is a Caterpillar model D3516, rated at 1600 kw.

The three natural gas fired engines (OENG1, OENG3, and OENG5) are caterpillar model G399, rated at 650 kw each, and are spark ignition, rich burn engines.

All six engines exhaust through a common stack (emission Point 00002).

The old boilers have been replaced by three (3) new Easco Boiler Corp models FST-250, FST-400, and ISB-400. The FST-250 boiler is rated at 10.46 MMBtu/hr., while FST-400 and ISB-400 are rated at approximately 16.74 MMBtu/hr. The three new boilers have commenced operation. All three boilers exhaust through a common stack (emission point 00001).

Building(s): BLDG3

~~**Condition 20: Progress Reports Due Semiannually**~~
~~**Effective between the dates of 04/04/2024 and 04/03/2029**~~

~~**Applicable Federal Requirement:6 NYCRR 201-6.4 (d) (4)**~~

~~**Item 20.1:**~~
~~Progress reports consistent with an applicable schedule of compliance are to be submitted at least semiannually, or at a more frequent period if specified in the applicable requirement or by the department. Such progress reports shall contain the following:~~

~~(i) dates for achieving the activities, milestones, or compliance required in the schedule of compliance, and dates when such activities, milestones or compliance were achieved; and~~

~~(ii) an explanation of why any dates in the schedule of compliance were not or will not be met, and any preventive or corrective measures adopted.~~

~~**Condition 21: Operational Flexibility**~~
~~**Effective between the dates of 04/04/2024 and 04/03/2029**~~

~~**Applicable Federal Requirement:6 NYCRR 201-6.4 (f)**~~

Inclement weather conditions shall be recorded for those days when observations are prohibited. This logbook must be retained at the facility for five (5) years after the date of the last entry.

3) If the operator observes any visible emissions (other than steam - see below) for two consecutive days while firing oil (the firing of other fuels in between days of firing oil does not count as an interruption in the consecutive days of firing oil), then a Method 9 analysis (based upon a 6-minute mean) of the affected emission point(s) must be conducted within two (2) business days of such occurrence. The results of the Method 9 analysis must be recorded in the logbook. The operator must contact the Regional Air Pollution Control Engineer within one (1) business day of performing the Method 9 analysis if the opacity standard is contravened. Upon notification, any corrective actions or future compliance schedules shall be presented to the Department for acceptance.

** NOTE ** Steam plumes generally form after leaving the top of the stack (this is known as a detached plume). The distance between the stack and the beginning of the detached plume may vary, however, there is (normally) a distinctive distance between the plume and stack. Steam plumes are white in color and have a billowy consistency. Steam plumes dissipate within a short distance of the stack (the colder the air the longer the steam plume will last) and leave no dispersion trail downwind of the stack.

Monitoring Frequency: AS REQUIRED - SEE PERMIT MONITORING DESCRIPTION
Reporting Requirements: AS REQUIRED - SEE MONITORING DESCRIPTION

Condition 30: Compliance Certification
Effective between the dates of 04/04/2024 and 04/03/2029

Applicable Federal Requirement:6 NYCRR 227-2.5 (c)

Item 30.1:
The Compliance Certification activity will be performed for the facility:
The Compliance Certification applies to:

Emission Unit: 1-STACK
Process: PEO Emission Source: 0ENG2

Emission Unit: 1-STACK
Process: PEO Emission Source: 0ENG4

Emission Unit: 1-STACK
Process: PEO Emission Source: 0ENG6

Regulated Contaminant(s):
CAS No: 0NY210-00-0 OXIDES OF NITROGEN

Item 30.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: WORK PRACTICE INVOLVING SPECIFIC OPERATIONS
Monitoring Description:
Three engines burning No. 2 fuel oil will produce no more than 80% of the power requirement limited at a total of 11 million kwh/yr. The rest will come from the three natural gas fired engines.

The facility shall monitor power output in Kilowatt hours continuously. The owner or operator will maintain records on-site for a minimum of five years.

Work Practice Type: PARAMETER OF PROCESS MATERIAL
Process Material: DISTILLATES - NUMBER 1 AND NUMBER 2 OIL
Parameter Monitored: ELECTRICAL OUTPUT
Upper Permit Limit: 8800 megawatt-hours per year
Reference Test Method: CATERPILLAR KWH METE
Monitoring Frequency: MONTHLY
Averaging Method: ANNUAL MAXIMUM ROLLED MONTHLY
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 7/30/2024.
Subsequent reports are due every 6 calendar month(s).

Condition 31: Compliance Certification
Effective between the dates of 04/04/2024 and 04/03/2029

Applicable Federal Requirement:6 NYCRR 227-2.5 (c)

Item 31.1:
The Compliance Certification activity will be performed for the facility:
The Compliance Certification applies to:

Emission Unit: 1-STACK
Process: PEG Emission Source: 0ENG1

Emission Unit: 1-STACK
Process: PEG Emission Source: 0ENG3

Emission Unit: 1-STACK
Process: PEG Emission Source: 0ENG5

Emission Unit: 1-STACK

Process: PEO Emission Source: 0ENG2

Emission Unit: 1-STACK
Process: PEO Emission Source: 0ENG4

Emission Unit: 1-STACK
Process: PEO Emission Source: 0ENG6

Regulated Contaminant(s):
CAS No: 0NY210-00-0 OXIDES OF NITROGEN

Item 31.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: MONITORING OF PROCESS OR CONTROL DEVICE PARAMETERS AS SURROGATE
Monitoring Description:
The total electrical output limit of six engines. The facility shall monitor power output in Kilowatt hours continuously.

The owner or operator will maintain records on-site for a minimum of five years.

Parameter Monitored: ELECTRICAL OUTPUT
Upper Permit Limit: 11,000,000 kilowatt hours
Monitoring Frequency: CONTINUOUS
Averaging Method: ANNUAL MAXIMUM ROLLED MONTHLY
Reporting Requirements: SEMI-ANNUALLY (ANNIVERSARY)
Initial Report Due: 11/02/2024 for the period 04/04/2024 through 10/03/2024

Condition 32: Compliance Certification
Effective between the dates of 04/04/2024 and 04/03/2029

Applicable Federal Requirement:6 NYCRR 227-2.5 (c)

Item 32.1:
The Compliance Certification activity will be performed for the facility:
The Compliance Certification applies to:

Emission Unit: 1-STACK Emission Point: 00002
Process: PEO Emission Source: 0ENG2

Emission Unit: 1-STACK Emission Point: 00002
Process: PEO Emission Source: 0ENG4

Emission Unit: 1-STACK Emission Point: 00002
Process: PEO Emission Source: 0ENG6

Regulated Contaminant(s):
CAS No: 0NY210-00-0 OXIDES OF NITROGEN

Item 32.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: INTERMITTENT EMISSION TESTING
Monitoring Description:

Alternate NOx RACT limit for the three engines is 5.0grams/bhp-hr as demonstrated in the June 2022 NOx RACT analysis. The facility shall submit a testing protocol to the Department for approval a minimum of 90 days prior to any stack testing.

The owner or operator will maintain records on-site for a minimum of five years.

Parameter Monitored: OXIDES OF NITROGEN
Upper Permit Limit: 5.0 grams per brake horsepower-hour
Reference Test Method: 40 CFR 60 Appendix A - Method 7, 7E, or 19
Monitoring Frequency: Once every five years
Averaging Method: 1-HOUR AVERAGE
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 7/30/2024.
Subsequent reports are due every 6 calendar month(s).

Condition 33: Compliance Certification
Effective between the dates of 04/04/2024 and 04/03/2029

Applicable Federal Requirement:6 NYCRR 231-6.2

Item 33.1:
The Compliance Certification activity will be performed for the facility:
The Compliance Certification applies to:

Emission Unit: 1-STACK
Process: PBG Emission Source: 00NB1

Emission Unit: 1-STACK
Process: PBG Emission Source: 00NB2

Emission Unit: 1-STACK
Process: PBG Emission Source: 00NB3

Emission Unit: 1-STACK
Process: PBO Emission Source: 00NB1

Emission Unit: 1-STACK
Process: PBO Emission Source: 00NB2

Emission Unit: 1-STACK
Process: PBO Emission Source: 00NB3

Regulated Contaminant(s):

CAS No: 0NY210-00-0 OXIDES OF NITROGEN

Item 33.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: MONITORING OF PROCESS OR CONTROL DEVICE PARAMETERS AS SURROGATE
Monitoring Description:

Total annual NOx emissions from the three boilers shall be limited to 19.24 tons per year on a 12-month rolling basis. The facility shall calculate the monthly and 12-month NOx emissions using fuel usage and most recent AP-42 emission factors.The following formula shall be used to calculate the NOx emissions to demonstrate compliance with the annual NOx emission limit:

(Voil x A + Vgas x B)) x 1 ton/2000 lbs < 19.24 tons/year

Where :
Voil = 12-month rolling No.2 distillate fuel oil consumed in 1000 gallons
A = AP-42 Table 1.3-1 NOx emission factor (20 lbs/1000gallons)
Vgas = 12-month rolling natural gas consumed in million scf
B = AP-42 Table 1.4-1 NOx emission factor (100 lbs/million scf)

The facility shall keep on site records to demonstrate compliance with this limit for a minimum period of five years.

Parameter Monitored: OXIDES OF NITROGEN
Upper Permit Limit: 19.24 tons per year
Monitoring Frequency: MONTHLY
Averaging Method: ANNUAL MAXIMUM ROLLED MONTHLY
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 7/30/2024.
Subsequent reports are due every 6 calendar month(s).

Condition 34: Compliance Certification
Effective between the dates of 04/04/2024 and 04/03/2029

Applicable Federal Requirement:6 NYCRR 231-6.2

Item 34.1:
The Compliance Certification activity will be performed for the facility:
The Compliance Certification applies to:

Emission Unit: 1-STACK
Process: PBO Emission Source: 00NB1

Emission Unit: 1-STACK
Process: PBO Emission Source: 00NB2

Emission Unit: 1-STACK
Process: PBO Emission Source: 00NB3

Regulated Contaminant(s):
CAS No: 0NY210-00-0 OXIDES OF NITROGEN

Item 34.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: MONITORING OF PROCESS OR CONTROL DEVICE PARAMETERS AS SURROGATE
Monitoring Description:
Annual NOx emissions from the process PBO, the firing of No.2 fuel oil in the three boilers, rolled on a monthly basis, shall not exceed 6.92 tons and shall be calculated on a monthly basis by monitoring the fuel consumption of No.2 fuel oil through the boilers.

The following formula shall be used to calculate the NOx emissions to demonstrate compliance with this cap:

(Voil x A + Vgas x B)) x 1 ton/2000 lbs < 6.92 tons/year
where:
Voil = 12-month rolling No.2 distillate fuel oil consumed in 1000 gallons
A = AP-42 Table 1.3-1 NOx emission factor (20 lbs/1000gallons)
The facility shall keep on site records to demonstrate compliance with this limit for a minimum period of five years.

Parameter Monitored: OXIDES OF NITROGEN
Upper Permit Limit: 6.92 tons per year
Monitoring Frequency: MONTHLY
Averaging Method: ANNUAL MAXIMUM ROLLED MONTHLY
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 7/30/2024.
Subsequent reports are due every 6 calendar month(s).

~~**Condition 35: EPA Region 2 address.**~~
~~**Effective between the dates of 04/04/2024 and 04/03/2029**~~

~~**Applicable Federal Requirement:40CFR 60.4, NSPS Subpart A**~~

portions of 40 CFR 63 Subpart ZZZZ.

****** Emission Unit Level ******

Condition 39: Emission Point Definition By Emission Unit
Effective between the dates of 04/04/2024 and 04/03/2029

Applicable Federal Requirement:6 NYCRR Subpart 201-6

Item 39.1:
The following emission points are included in this permit for the cited Emission Unit:

Emission Unit: 1-STACK

Emission Point: 00001
Height (ft.): 212 Diameter (in.): 40
NYTMN (km.): 4510.75 NYTME (km.): 592.17 Building: BLDG3

Emission Point: 00002
Height (ft.): 205 Diameter (in.): 36
NYTMN (km.): 4510.75 NYTME (km.): 592.7 Building: BLDG3

Condition 40: Process Definition By Emission Unit
Effective between the dates of 04/04/2024 and 04/03/2029

Applicable Federal Requirement:6 NYCRR Subpart 201-6

Item 40.1:
This permit authorizes the following regulated processes for the cited Emission Unit:

Emission Unit: 1-STACK
Process: PBG Source Classification Code: 1-03-006-02
Process Description:
This process is for the firing of Natural gas as primary fuel in the three new Easco boilers

Emission Source/Control: 00NB1 - Combustion
Design Capacity: 10.46 million Btu per hour

Emission Source/Control: 00NB2 - Combustion
Design Capacity: 16.74 million Btu per hour

Emission Source/Control: 00NB3 - Combustion
Design Capacity: 16.74 million Btu per hour

Item 40.2:
This permit authorizes the following regulated processes for the cited Emission Unit:

Emission Unit: 1-STACK

Process: PBO Source Classification Code: 1-03-005-02
Process Description:
This process is for the firing of Distillate No. 2 fuel oil as backup fuel in the three new Easco boilers. The No. 2 fuel oil is used only as a backup during periods of interruptible natural gas supply.

Emission Source/Control: 00NB1 - Combustion
Design Capacity: 10.46 million Btu per hour

Emission Source/Control: 00NB2 - Combustion
Design Capacity: 16.74 million Btu per hour

Emission Source/Control: 00NB3 - Combustion
Design Capacity: 16.74 million Btu per hour

Item 40.3:
This permit authorizes the following regulated processes for the cited Emission Unit:

Emission Unit: 1-STACK
Process: PEG Source Classification Code: 2-03-002-01
Process Description:
Combustion of natural gas in the caterpillar engine generator set model G399 engines.

Emission Source/Control: 0ENG1 - Combustion
Design Capacity: 650 kilowatts

Emission Source/Control: 0ENG3 - Combustion
Design Capacity: 650 kilowatts

Emission Source/Control: 0ENG5 - Combustion
Design Capacity: 650 kilowatts

Item 40.4:
This permit authorizes the following regulated processes for the cited Emission Unit:

Emission Unit: 1-STACK
Process: PEO Source Classification Code: 2-02-004-01
Process Description:
Combustion of No.2 distillate oil in three (3) caterpillar engine generator sets, two (2) model D399's and one (1) model D3516. Each generator set includes a 16-cylinder, 4 stroke water cooled engine running on no.2 fuel oil. Electrical power is generated by a revolving field, 3-phase cat generator coupled at each of the three engines. Exhaust heat is captured in three waste-heat exchangers before being exhausted through a common 24-inch diameter manifold. These engines are housed in the power plant and discharge underground to a common stack.

Emission Source/Control: 0ENG2 - Combustion
Design Capacity: 850 kilowatts

Emission Source/Control: 0ENG4 - Combustion
Design Capacity: 850 kilowatts

Emission Source/Control: 0ENG6 - Combustion
Design Capacity: 1,600 kilowatts

Condition 41: Compliance Certification
Effective between the dates of 04/04/2024 and 04/03/2029

Applicable Federal Requirement:6 NYCRR 227-2.4 (d)

Item 41.1:
The Compliance Certification activity will be performed for the facility:
The Compliance Certification applies to:

Emission Unit: 1-STACK
Process: PBG Emission Source: 00NB1

Emission Unit: 1-STACK
Process: PBG Emission Source: 00NB2

Emission Unit: 1-STACK
Process: PBG Emission Source: 00NB3

Emission Unit: 1-STACK
Process: PBO Emission Source: 00NB1

Emission Unit: 1-STACK
Process: PBO Emission Source: 00NB2

Emission Unit: 1-STACK
Process: PBO Emission Source: 00NB3

Regulated Contaminant(s):
CAS No: 0NY210-00-0 OXIDES OF NITROGEN

Item 41.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: RECORD KEEPING/MAINTENANCE PROCEDURES
Monitoring Description:
The owner or operator of a small boiler, small combustion turbine, or small internal combustion engine must perform an annual tune-up of their equipment. This tune-up should be performed in accordance with the requirements of the DAR-5 guidance document. Records of each tune-up must be kept on-site for a minimum of five years.

Monitoring Frequency: ANNUALLY

Reporting Requirements: ANNUALLY (CALENDAR)
Reports due 45 days after the reporting period.
The initial report is due 2/14/2025.
Subsequent reports are due every 12 calendar month(s).

Condition 42: Compliance Certification
Effective between the dates of 04/04/2024 and 04/03/2029

Applicable Federal Requirement:6 NYCRR 227-2.4 (f) (1)

Item 42.1:
The Compliance Certification activity will be performed for the facility:
The Compliance Certification applies to:

Emission Unit: 1-STACK
Process: PEG Emission Source: 0ENG1

Emission Unit: 1-STACK
Process: PEG Emission Source: 0ENG3

Emission Unit: 1-STACK
Process: PEG Emission Source: 0ENG5

Regulated Contaminant(s):
CAS No: 0NY210-00-0 OXIDES OF NITROGEN

Item 42.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: INTERMITTENT EMISSION TESTING
Monitoring Description:
This condition applies to stationary internal combustion engines that have a maximum mechanical output rating equal to or greater than 200 brake horsepower in a severe ozone nonattainment area or 400 brake horsepower outside a severe ozone nonattainment area and are fired by natural gas. The owner or operator is required to submit a compliance testing protocol to the department for approval at least 90 days prior to testing. The owner or operator will maintain all records on-site for a minimum of five years.

Parameter Monitored: OXIDES OF NITROGEN
Upper Permit Limit: 1.5 grams per brake horsepower-hour
Reference Test Method: 40 CFR 60 Appendix A - Method 7, 7E, or 19
Monitoring Frequency: Once every five years
Averaging Method: 1-HOUR AVERAGE
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 7/30/2024.
Subsequent reports are due every 6 calendar month(s).

Appendix C: Public Notice Documents

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ENB PUBLISH DATE: 09/06/2023

BIG SIX TOWERS INC

Applicant:

BIG SIX TOWERS INC
59-55 47TH AVE
WOODSIDE, NY 11377

Facility:

BIG SIX TOWERS INC
59-55 47TH AVE
WOODSIDE, NY 11377

Application ID:

2-6304-00404/00004

Permit(s) Applied for:

Article 19 Air Title V Facility

Project is Located:

QUEENS, QUEENS COUNTY

Project Description:

The Department has prepared a draft permit and has made a tentative determination, subject to public comment or other information, to approve an application for the renewal of Big Six Towers, Inc.'s Title V Facility permit for their existing facility, Bix Six Towers, located at 59-55 47th Avenue in Queens, which is currently permitted to operate a power plant and heating plant to generate electrical power and steam for an apartment complex and mixed retail space.

The Facility's power plant currently consists of six (6) internal combustion engines and three (3) small boilers. The three natural gas-fired engines are rated at 650 KW each and the two No. 2 fuel oil-fired engines are rated at 850 KW each and the third No.2 fuel oil-fired engine is rated at 1600 KW. Exhaust heat is captured in six waste heat exchangers before being exhausted through a common stack. The heating plant also contains three (3) Easco Boiler Corp. boilers (one rated at 10.46 mmBtu/hr and two rated at 16.74 mmBtu/hr each) that fire natural Gas as primary fuel and No.2 fuel oil as backup fuel. All three boilers exhaust through a common stack (emission point 00001).

No new emission sources or modifications to existing emission units are proposed as part of this permit renewal. With this renewal, the Facility will not increase emissions and no change to the facility's emissions cap is proposed. As part of the renewal application, Big Six Towers submitted a NOx RACT analysis pursuant to 6 NYCRR Part 227-2. The draft permit includes alternate NOx RACT limits for the three oil burning engines for which the Facility demonstrated that cost per ton of NOx reduced with any controls will be greater than the NOx RACT cost threshold. This alternative RACT emission limit must be approved by USEPA as a revision to the New York State Implementation Plan (SIP).

As per the terms of the draft permit, the Facility will remain subject to the provisions of 6 NYCRR 201-6 (Title V Facility Permits) and, among other state and federal laws, rules, and regulations: 6NYCRR Subparts 225-1, 227-1 and 227-2. The draft Air Title V Renewal 3 permit contains a complete listing of the applicable state and federal laws, rules, and regulations, including emission limits, control requirements and compliance monitoring, testing, recordkeeping and reporting requirements for the facility, its emission units and emission points.

In accordance with 6NYCRR Parts 621.7(b)(9) and 201-6.3(c), the Administrator of the United States Environmental Protection Agency (USEPA) has the authority to bar issuance of any Title V Facility Permit if it is determined not to be in compliance with applicable requirements of the Clean Air Act or 6NYCRR Part 201.

Persons wishing to inspect the subject Title V files, including the application with all relevant supporting materials, the draft permit, and all other materials available to the DEC (the "permitting authority") that are relevant to this permitting decision should contact the DEC representative listed below. The Draft Permit and Permit Review Report may be viewed and printed from the Department web site at: https://www.dec.ny.gov/chemical/8569.html </environmental-protection/air-quality/controlling-pollution-from-facilities/permits-registrations-fees>.

DEC will evaluate the application and the comments received on it to determine whether to hold a public hearing. Comments and requests for a public hearing should be in writing and addressed to the Department representative listed below. A copy of the Department's permit hearing procedures is available upon request or on the Department web site at: https://www.dec.ny.gov/permits/6234.html </regulatory/permits-licenses/environmental-permits/guide-to-permit-hearings>.

Availability of Application Documents:

Filed application documents, and Department draft permits where applicable, are available for inspection during normal business hours at the address of the contact person. To ensure timely service at the time of inspection, it is recommended that an appointment be made with the contact person.

State Environmental Quality Review (SEQR) Determination:

Project is not subject to SEQR because it is a Type II action.

SEQR Lead Agency: None Designated

State Historic Preservation Act (SHPA) Determination:

The proposed activity is not subject to review in accordance with SHPA. The application type is exempt and/or the project involves the continuation of an existing operational activity.

Coastal Management:

This project is not located in a Coastal Management area and is not subject to the Waterfront Revitalization and Coastal Resources Act.

DEC Commissioner Policy 29, Environmental Justice and Permitting (CP-29)

It has been determined that the proposed action is not subject to CP-29.

Opportunity for Public Comment:

Comments on this project must be submitted in writing to the Contact Person no later than *Oct 6, 2023*.

Primary Contact

Caitlyn Nichols
NYSDEC Region 2 Headquarters
47-40 21st St
Long Island City, New York 11101

Phone: 718-482-4997
comment.saltwaterpumphouse2022@dec.ny.gov

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