Queens Fresh Meadows
ASF Application
Application ID# 2-6306-00071/00004

CLCPA Analysis

References:

- **NYSDEC NOIA Batch No. 748223 dated 6/8/2022**
- **NYSDEC E-mail dated 6/21/2022**
- **NYSDEC CP-49 / Climate Change and DEC Action**
- **NYSDEC DAR -21**

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INTRODUCTION

The Queens Fresh Meadows Facility [QFM], DEC ID# 2-6306-00071, currently operates it eight [8] boilers under a NYSDEC Air Title V permit [ATV], which expires 8/28/2022. The facility fires natural gas as its primary fuel with distillate #2-oil as a backup fuel. QFM has reviewed its annual fuel consumption for years 2011 through 2021. Based upon this review, it has been concluded that QFM qualifies to operate under an Air State Facility [ASF] permit instead of an ATV permit. QFM submitted an application for an ASF permit dated May 23, 2022.

In review of the ASF permit application, NYSDEC has issued a Notice of Incomplete Application [NOIA] dated June 8, 2022; and a clarification e-mail dated June 21, 2022. The NOIA with clarification demands that CLCPA[1] analysis be conducted and submitted to enable the application attain complete status. This document presents the CPCLA analysis for the QFM's ASF permit application.

6NYCRR Part 496 addresses Statewide Greenhouse Gas [GHG] emission limits. §496.4 (a) states the estimated level of statewide GHG emissions in 1990 as 409.48 million tons of carbon dioxide equivalent [CO_{2e}]. §496.4 (b) states the objective statewide GHG emission levels in years 2030 and 2050 as a percentage of the 1990 level, respectively, 60 percent and 15 percent; or 245.87 and 61.47 million tons of carbon dioxide equivalent [CO_{2e}].

NYSDEC DAR-21, Climate Leadership and Community Protection Act and Air Permit Applications [Draft] states that when issuing permits, Section 7 (2) of CLCPA requires all state agencies to consider "whether such decisions are inconsistent with, or will interfere with, the attainment of the statewide GHG emission limits…" It also states that:

- It is important that each CLCPA analysis include potential GHG emissions from each porting of the project.
- A permit renewal that does not include a significant modification and would not lead to an increase in actual or potential GHG emissions would in most circumstances be considered consistent with the CLCPA pending finalization of the scoping plan and future regulations.
- Calculations describing the project's direct GHG emissions on PTE and actual emissions bases, using appropriate emission factors such as those found in USEPA's AP-42, et cetera in units of CO_{2e} based on GWP-20 years are required.

[1] CLCPA – Climate Leadership and Community Protection Act

PROJECT SCOPE

The project scope is solely an application to operate the QFM facility under an ASF permit instead of an ATV permit. The project scope does not include additional emission sources, changes to the existing emission sources in terms of capacity or types of fuel usage. The designation of emission units, emission sources and emission points for the ASF permit is identical to the designations in the ATV permit.

The project scope consists of opting out of the ATV permit in accordance with 6NYCRR Part 201-7.1, emission capping in facility permits. The project essentially is the commitment of the QFM facility to limit annual NOx emissions to less than or a maximum of 24.9 tons [49,800 lbs.].

CLCPA ANALYSIS

The current ATV permit is associated with a NOx PTE rate of 198,120 lbs./yr.[2]. The above project action will reduce the NOx PTE rate to 49,800 lbs. /yr. Table 1 of the ASF application lists the eight boiler capacities – four boilers rated at 16.7 million Btu heat input per hour and four boilers rated at 23.4 million Btu heat input per hour. Table 1 also lists the facility's annual fuel consumption for the years 2011 through 2021 with associated capacity factor. Table 7 of the ASF application lists the annual fuel consumption as recorded in therms for natural gas and gallons for #2 oil with the associated annual NOx emission rates in tons per year. Tables 1 and 7 are included with this analysis. As shown by these tables:

1. The maximum annual NOx emission rate for rate during this eleven-year period is 15.7 tons. The average annual NOx emission rate is 13.7 tons.
2. The highest capacity factor for firing natural gas during this eleven-year period is 21 percent.

Table 9 presents the calculation of GHG emission rates associated with this project [application for a ASF permit] relative to the GHG emission rates associated with the ATV permit.

Calculation #1:
The ATV PTE NOx emission limit is 198,120 lbs. per year as reported in NYSDEC's ATV Permit Review Report page 6. Utilizing USEPA AP-42 emission factor [E.F.] for NOx emissions, 100 lbs. per million SCF NG[3], limits the annual natural gas fuel consumption under ATV at 1981.2 million SCF.

[2] NYSDEC Permit Review Report ID:2-6306-00071/00003, dated 8/29/2017, page 6 of 17.
[3] Standard Cubic Feet Natural Gas; EPA AP-42 Table 1.4-1 NOx emission factor for small boilers

Calculation #2:
Utilizing the natural gas high heating value [NG HHV] of 1026 Btu per SCF NG and the maximum natural gas annual consumption from "calculation #1", the total annual heat input is calculated at 2,032,711 million Btu. Utilizing the GHG emission factor for CO_2 for firing natural gas [kg CO_2 per million Btu] and converting from kg to pounds to metric tons, the annual GHG CO_2 emission rate is 107,856 metric tons [calculation 2.4]. The associated calculations for GHG CH_4 and N_2O are, respectively, 1 and 0.1 metric tons [calculations 2.5 and 2.6]. Utilizing the GWP-20 factors, the CO_{2e} for CO_2, CH_4, and N_2O emissions totals at 107,957 metric tons.

Calculation #1:
The ASF Permit PTE NOx emission limit is 49,800 lbs. per year as stated in NYSDEC's Draft ASF Permit Working Copy dated 6/2/2022. Utilizing USEPA AP-42 emission factor [E.F.] for NOx emissions, 100 lbs. per million SCF NG[4], limits the annual natural gas fuel consumption under ATV at 498 million SCF.

Calculation #2:
Utilizing the natural gas high heating value [NG HHV] of 1026 Btu per SCF NG and the maximum natural gas annual consumption from "calculation #1", the total annual heat input is calculated at 510,948 million Btu. Utilizing the GHG emission factor for CO_2 for firing natural gas [kg CO_2 per million Btu] and converting from kg to pounds to metric tons, the annual GHG CO_2 emission rate is 27,111 metric tons [calculation 2.4]. The associated calculations for GHG CH_4 and N_2O are, respectively, 1 and 0.1 metric tons [calculations 2.5 and 2.6]. Utilizing the GWP-20 factors, the CO_{2e} for CO_2, CH_4, and N_2O emissions totals at 27,136 metric tons

The project [ASF Permit Application] is associated with a 75% reduction in PTE GHG emissions compared to renewing the current ATV permit.

The project GHG reduction, 75%, is almost twice NYS's 40% reduction for year 2030 and is 10% less that NYS's 85% reduction for year 2050.

The current ATV permit PTE GHG annual emission rate, 107957 metric tons, is 0.026% of NYS's estimated GHG emissions for year 1990. The project's [ASF permit application's] PTE GHG annual rate, 27136 metric tons, is 0.011% of NYS's objective annual GHG emission rate for year 2030.

Concerning year 2050, the boilers would be 50 years in operation. It is questionable if they would still be active.

[4] Standard Cubic Feet Natural Gas; EPA AP-42 Table 1.4-1 NOx emission factor for small boilers

The average actual GHG emissions for the eleven-year period is presented in Table 9A. It is about 52% of the project's PTE GHG CO_{2e} rate.

It is concluded that this project, ASF permit application instead of ATV permit renewal, is in alignment with NYS's CLCPA objectives.

Attachments:

Table 1 of ASP Permit Application – Combustion Equipment Ratings
Table 7 of ASP Permit Application – Actual Annual Fuel Consumption
Years 2011 – 2021
Table 9 – ASF Permit Application CLCPA Analysis GHG PTE Emission Rates
Table 9A – ASF Permit Application CLCPA Analysis GHG Actual Rates

Table 1
Queens Fresh Meadows Facility
67-10 192nd St., Flushing, NY 11365

COMBUSTION EQUIPMENT RATINGS
Annual Fuel Consumption Rates

Fuel Oil and Gas Parameters (AP-42, Appendix A)

Natural Gas:	1,020	Btu/scf
Residual Oil:	150,000	Btu/gal
Distillate Oil:	140,000	Btu/gal
Diesel Oil:	138,500	Btu/gal
hp:	2,542.5	Btu/hr
kW:	1.341	hp

EQUIPMENT SOURCES

BOILERS		MBH (gas)	GPH (#2-oil)	Heat Input X 10^6 Btu/hr	Natural Gas SCFH
1	Cleaver Brooks MD7197	16,700	119.3	16.7	16,373
2	Cleaver Brooks MD7197	16,700	119.3	16.7	16,373
3	Cleaver Brooks MD7197	16,700	119.3	16.7	16,373
4	Cleaver Brooks MD7197	16,700	119.3	16.7	16,373
5	Cleaver Brooks MD3531	23,400	167.1	23.40	22,941
6	Cleaver Brooks MD3531	23,400	167.1	23.40	22,941
7	Cleaver Brooks MD3531	23,400	167.1	23.40	22,941
8	Cleaver Brooks MD3531	23,400	167.1	23.40	22,941
	Total	160,400	1,146	160	157,255

X 10^6 Btu/yr	X 10^6 SCF/yr	Oil- X10^3 gal/yr
1377552941	1377.55	10036

Annual Fuel Consumption Rates		
	#2-Oil	Nat'l Gas
Year	gallons	X 10^6 SCF
2011	48916	264.3
2012	11685	243.0
2013	45636	231.4
2014	290763	255.4
2015	228088	268.8
2016	63616	273.2
2017	61145	250.4
2018	78361	281.9
2019	71460	286.8
2020	13898	198.9
2021	14308	285.5
Average	84352	258
Maximum	290763	286.8

Capacity Factor	
Nat'l Gas	#2 oil
19%	0.5%
18%	0.1%
17%	0.5%
19%	2.9%
20%	2.3%
20%	0.6%
18%	0.6%
20%	0.8%
21%	0.7%
14%	0.1%
21%	0.1%
19%	1%
21%	3%

Table 7
Fresh Meadows
Actual Annual Fuel Consumption
Years: 2011 - 2021

Facility ID# 2-6306-00071/00003

Natural Gas: 1,020 Btu/scf

	Nat'l Gas DKT	therm	Btu
		1	100000
Year	1	10	1000000

NOx	
Gas	Oil
lbs./10^6 SCF	lbs./gal
100	0.02

Year	Therms	X10^6 Btu	X 10^6 SCF	#2-Oil Gallons	NOx - tons/yr Gas	Oil	Total
2011	2696120	269612	264.3	48916	13.2	0.49	13.71
2012	2474100	247410	242.6	11685	12.1	0.12	12.24
2013	2359990	235999	231.4	45636	11.6	0.46	12.02
2014	2604590	260459	255.4	290763	12.8	2.91	15.68
2015	2742100	274210	268.8	228088	13.4	2.28	15.72
2016	2786360	278636	273.2	63616	13.7	0.64	14.29
2017	2553620	255362	250.4	61145	12.5	0.61	13.13
2018	2875660	287566	281.9	78361	14.1	0.78	14.88
2019	2925140	292514	286.8	71460	14.3	0.71	15.05
2020	2029230	202923	198.9	13898	9.9	0.14	10.09
2021	2912060	291206	285.5	14308	14.3	0.14	14.42
Average	2632634	263263	258	84352	12.9	0.8	13.7
Maximum	2925140	292514	286.8	290763	14.3	2.9	15.7

Table 9
Fresh Meadows
ASF Permit Application
CLCPA Analysis
GHG PTE Emission Rates

Facility ID# 2-6306-00071/00003

1		**Title V PTE NOx emission limit**	**lbs./yr**	**198120**	Note 1	
	1.1	NOx emission factor [EPA AP-42]	lbs./10^6 SCF	100	Note 2	
	1.2	Max. Nat'l Gas Annual consumption	10^6 SCF /yr	1981.2		
2		GHG emissions annual rate				
	2.1	NG HHV	10^6 Btu / scf	0.001026		
	2.2	NG Heat Input /yr	NG 10^6 Btu/yr	2032711		
	2.3	E.F. CO_2	kg CO_2 per 10^6 Btu	53.06	Note 3	
	2.4	CO_2 Annual emission rate	kg CO_2 per yr	107855656		
		kg to lbs.		2.2046		
			lbs CO_2 per yr	237778579.8		
			lbs. to metric tons	2204.6		
			metric tons CO_2 per yr	107856		
	2.5	E.F. CH_4	kg CH_4 per 10^6 Btu	0.001	Note 4	
		CH_4 Annual emission rate	kg CH_4 per yr	2033		
			metric tons CH_4 per yr	1		
	2.6	E.F. N_2O	kg N_2O per 10^6 Btu	0.0001	Note 4	
		N_2O Annual emission rate	kg N_2O per yr	203.3		
			metric tons N_2O per yr	0.1		

2.7 Carbon dioxide equivalent value [CO_{2e}]

GWP20				Note 5
CO_2				1
CH_4				84
N_2O				264
CO_2	[CO_{2e}]	metric tons		107856
CH_4	[CO_{2e}]	metric tons		77
N_2O	[CO_{2e}]	metric tons		24
Total	**[CO_{2e}]**	**metric tons**		**107957**

1		**ASF Permit Appl. PTE NOx Limit**	**lbs./yr**	**49800**	Note 1	
	1.1	NOx emission factor [EPA AP-42]	lbs./10^6 SCF	100	Note 2	
	1.2	Max. Nat'l Gas Annual consumption	10^6 SCF /yr	498		
2		GHG emissions annual rate				
	2.1	NG HHV	10^6 Btu / scf	0.001026		
	2.2	NG Heat Input /yr	NG 10^6 Btu/yr	510948		
	2.3	E.F. CO_2	kg CO_2 per 10^6 Btu	53.06	Note 3	
	2.4	CO_2 Annual emission rate	kg CO_2 per yr	27110901		
		kg to lbs.		2.2046		
			lbs CO_2 per yr	59768692		
			lbs. to metric tons	2204.6		
			metric tons CO_2 per yr	27111		
	2.5	E.F. CH_4	kg CH_4 per 10^6 Btu	0.001	Note 4	
		CH_4 Annual emission rate	kg CH_4 per yr	511		
			metric tons CH_4 per yr	0.2		
	2.6	E.F. N_2O	kg N_2O per 10^6 Btu	0.0001	Note 4	
		N_2O Annual emission rate	kg N_2O per yr	51.1		
			metric tons N_2O per yr	0.02		

2.7 Carbon dioxide equivalent value [CO_{2e}]

GWP20				Note 5
CO_2				1
CH_4				84
N_2O				264
CO_2	[CO_{2e}]	metric tons		27111
CH_4	[CO_{2e}]	metric tons		19
N_2O	[CO_{2e}]	metric tons		6
Total	**[CO_{2e}]**	**metric tons**		**27136**

GHG Emissions:		**[CO_{2e}] metric tons**
ATV Permit		**107957**
ASF Permit		**27136**
% Reduction - ASF Permit vs ATV Permit		**-75%**
1990	**NYS**	**409480000**
	ATV Permit Percent	**0.026%**
2030	**NYS**	**245870000**
	ASF Permit Percent	**0.011%**

Notes:

1 NYSDEC ATV Permit Review Report page 6, or, NYSDEC Draft ASF Working Copy 6/2/2022; PC2
2 EPA AP-42 Table 1.4-1 NOx Emisson Factor, small boilers, uncontrolled
3 40 CFR Part 98 Table C-1 updated 12/9/2016
4 40 CFR Part 98 Table C-2 updated 12/9/2016
5 NYSDEC Part 496.5

Table 9A
Fresh Meadows
ASF Permit Application
CLCPA Analysis
GHG Average Actual Rate

Facility ID# 2-6306-00071/00003

1		**Title V PTE NOx emission limit**	**lbs./yr**	**198120**	Note 1	**1**		ASF Permit Appl. PTE NOx Limit	**lbs./yr**	**N. A.**	Note 1
	1.1	NOx emission factor [EPA AP-42]	lbs./10^6 SCF	100	Note 2		1.1	NOx emission factor [EPA AP-42]	lbs./10^6 SCF	100	Note 2
	1.2	Max. Nat'l Gas Annual consumptior	10^6 SCF /yr	1981.2			**1.2**	**Average Nat'l Gas Annual consumption - 2011-2021**	**10^6 SCF /yr**	**258**	Note 6
2		GHG emissions annual rate				2		GHG emissions annual rate			
	2.1	NG HHV	10^6 Btu / scf	0.001026			2.1	NG HHV	10^6 Btu / scf	0.001026	
	2.2	NG Heat Input /yr	NG 10^6 Btu/yr	2032711			2.2	NG Heat Input /yr	NG 10^6 Btu/yr	264853	
	2.3	E.F. CO_2	kg CO_2 per 10^6 Btu	53.06	Note 3		2.3	E.F. CO_2	kg CO_2 per 10^6 Btu	53.06	Note 3
	2.4	CO_2 Annual emission rate	kg CO_2 per yr	107855656			2.4	CO_2 Annual emission rate	kg CO_2 per yr	14053107	
		kg to lbs.		2.2046				kg to lbs.		2.2046	
			lbs CO_2 per yr	237778579.8					lbs CO_2 per yr	30981479	
			lbs. to metric tons	2204.6					lbs. to metric tons	2204.6	
			metric tons CO_2 per yr	107856					metric tons CO_2 per yr	14053	
	2.5	E.F. CH_4	kg CH_4 per 10^6 Btu	0.001	Note 4		2.5	E.F. CH_4	kg CH_4 per 10^6 Btu	0.001	Note 4
		CH_4 Annual emission rate	kg CH_4 per yr	2033				CH_4 Annual emission rate	kg CH_4 per yr	265	
			metric tons CH_4 per yr	1					metric tons CH_4 per yr	0.1	
	2.6	E.F. N_2O	kg N_2O per 10^6 Btu	0.0001	Note 4		2.6	E.F. N_2O	kg N_2O per 10^6 Btu	0.0001	Note 4
		N_2O Annual emission rate	kg N_2O per yr	203.3				N_2O Annual emission rate	kg N_2O per yr	26.5	
			metric tons N_2O per yr	0.1					metric tons N_2O per yr	0.01	
	2.7	Carbon dioxide equivalent value [CO_{2e}]					2.7	Carbon dioxide equivalent value [CO_{2e}]			
		GWP20			Note 5			GWP20			Note 5
		CO_2		1				CO_2		1	
		CH_4		84				CH_4		84	
		N_2O		264				N_2O		264	
		CO_2	[CO_{2e}]	metric tons	107856			CO_2	[CO_{2e}]	metric tons	14053
		CH_4	[CO_{2e}]	metric tons	77			CH_4	[CO_{2e}]	metric tons	10
		N_2O	[CO_{2e}]	metric tons	24			N_2O	[CO_{2e}]	metric tons	3
		Total	**[CO_{2e}]**	**metric tons**	**107957**			**Total**	**[CO_{2e}]**	**metric tons**	**14066**

GHG Emissions:	**[CO_{2e}] metric tons**
ATV Permit	**107957**
ASF Permit	**14066**
% Reduction - ASF Permit vs ATV Permit	**-87%**
ASF Permit PTE	**27136**
ASF Permit Actual	**14066**
% Actual vs PTE	**52%**

Notes:

1 NYSDEC ATV Permit Review Report page 6, or, NYSDEC Draft ASF Working Copy 6/2/2022; PC2
2 EPA AP-42 Table 1.4-1 NOx Emisson Factor, small boilers, uncontrolled
3 40 CFR Part 98 Table C-1 updated 12/9/2016
4 40 CFR Part 98 Table C-2 updated 12/9/2016
5 NYSDEC Part 496.5
6