PROJECT REPORT
Synthetic Minor Permit Application

McCain Foods USA, Inc. / Othello Facility

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1. EXECUTIVE SUMMARY

McCain Foods USA Inc. (McCain) owns and operates a potato processing facility located in Othello, Washington (the Othello facility). The Othello facility operates under Approval Order 19AQ-E056, issued by the Washington Department of Ecology (Ecology). This approval order was issued on October 1, 2019.

Based on the emission estimates submitted in the Notice of Construction (NOC) application for Approval Order 19AQ-E056, the post-expansion project facility-wide potential to emit (PTE) exceeds the Title V Air Operating Permit (AOP) major source thresholds for oxides of nitrogen (NO_X) and carbon monoxide (CO). In the NOC application, McCain stated that a Title V AOP application would be submitted within 12 months from the startup date of Line 4, in accordance with the requirements under Washington Administrative Code (WAC) 173-401-500. Line 4 started in November 2021. After reviewing historical operation data and projected production levels, McCain has elected to request emission limits that will allow the facility to remain a synthetic minor source. As a synthetic minor source, a Title V AOP application will not be required. This report constitutes McCain's application to become a synthetic minor source and includes McCain's proposed emission limits for CO and NO_X.

This synthetic minor permit application contains the following sections:

- Section 2: Facility Description
- Section 3: Requested Permit Changes
- Section 4: Regulatory Review
- Appendix A: Process Flow Diagram
- Appendix B: Application Forms
- Appendix C: Emission Calculations
- Appendix D: Equipment Specifications

2. FACILITY DESCRIPTION

McCain operates the Othello facility under Approval Order 19AQ-E056. This order has established limits on production rates for Line 1 through 3 and separate operating limits for the recently-added Line 4. Current operations at the Othello facility include:

- Line 1 for processing battered or conventional french fry products. Line 1 includes a steam-heated dryer and a two-stage fryer.
- Line 2 for processing conventional french fry products. Line 2 includes a steam-heated dryer and a single-stage fryer.
- Line 3 for processing co-product potato products. Line 3 includes a direct-fired natural gas dryer and a single-stage fryer.
- Line 4 for processing battered, conventional and co-product potato products. Line 4 includes a potato dryer and a two-stage fryer.
- An air washer (Line 1 air washer) controlling particulate matter (PM) emissions from Line 1 Stage B of the two-stage fryer.
- An air washer (Line 2 air washer) controlling PM emissions from Line 2 single-stage fryer.
- A wet electrostatic precipitator (the Wet ESP) controlling PM emissions from Line 3 single-stage fryer and Line 1 Stage A of the two-stage fryer.
- A wet ESP (Line 4 wet ESP) controlling PM emissions from Line 4 dryer and fryer.
- Two natural gas-fired boilers, Boiler 1 and Boiler 2, providing process steam for Lines 1 and 2.
- One natural gas and biogas-fired boiler, Boiler 3, providing process steam for Line 4.
- A flare as a backup to Boiler 3 for burning off remaining biogas.
- A scrubber for removing hydrogen sulfide from the biogas.
- A wastewater treatment plant with a covered anaerobic lagoon system.
- Heating, ventilation, and air conditioning systems (HVAC) with natural gas combustion for all lines.

A process flow diagram for the Othello facility is provided in Appendix A.

3. EMISSION CALCULATIONS

Emission calculations for the facility-wide PTE are developed using the same methodology provided in McCain's NOC application for Approval Order 19AQ-E056 with the proposed natural-gas usage limits to remain a synthetic minor source. This section describes the methodologies and assumptions used to calculate emissions from each source at the facility. Detailed emission calculations are provided in Appendix C.

3.1 Production Lines

Emissions from production lines include primarily PM and Volatile organic compound (VOC). Emissions of sulfur dioxide (SO_2), NO_X and CO are from Line 3 dryer only since it is natural gas-fired.

3.1.1 Lines 1-3

Line 1 consists of a steam-heated dryer and a two-stage fryer and is capable of manufacturing conventional or battered french fry products. Line 2 consists of a steam-heated dryer and a single stage fryer and only manufactures conventional french fry products. Line 3 consists of a direct-fired dryer and a co-product fryer, manufacturing potato co-products only.

PM smaller than 10 microns (PM_{10}) and smaller than 2.5 microns ($PM_{2.5}$) emissions from the dryers at Lines 1, 2, and 3 are determined using Othello's dryer emission factor of 0.25 lb/finished ton product. PM_{10} and $PM_{2.5}$ emissions from the fryers at Lines 1, 2, and 3 are connected to various control devices:

- Line 1 Stage A fryer exhaust and Line 3 fryer exhaust are routed to the Wet ESP. PM emissions are estimated based on the Wet ESP emission limit of 0.0262 grain per dry standard cubic feet (gr/dscf), scaled to a lb/finished ton emission factor. The emission limit for the Wet ESP is from Condition 3.d of Approval Order 19AQ-E056.
- Line 1 Stage B fryer exhaust is routed to the Line 1 Air Washer. The Stage B fryer is used for both conventional and batter products. PM emissions are estimated based on the Line 1 Air Washer test result depending on the product type, with a 20% safety factor.
- Line 2 is only used to manufacture conventional products, and the Line 2 fryer exhaust is routed to the Line 2 Air Washer. Therefore, the same emission factor from the Line 1 Air Washer for conventional products is used (including the 20% safety factor).

VOC emissions are only expected from the fryers. Since the air washers and the Wet ESP are not used to control VOC emissions, VOC emissions from all fryers are estimated based on Othello's fryer emission factor of 0.092 lb/finished ton for Lines 1 through 3.

Since the Line 3 dryer is direct fired, SO_2 and VOC emissions from natural gas combustion are also included using AP-42 Chapter 1.4 emission factors. NO_X and CO emissions are based on a 1994 source test from McCain's Ontario, OR facility, which are the best available data for a direct-fired dryer. Speciated hazardous air pollutant (HAP) emissions are based on emission factors from Ventura County Air Pollution Control District AB2588 Combustion Emission Factors for natural gas. In the previous permit application submittal, the Line 3 dryer was conservatively calculated with a capacity of 10 MMBtu/hr. McCain confirmed the current size of the burners used at the Line 3 dryer. The dryer was retrofitted in 2011 with two 1.2 MMBtu/hr burners. This is also consistent with the equipment rating listed in Approval Order 19AQ-E056.

3.1.2 Line 4

Line 4 consists of a potato dryer and a two-stage fryer, both of which are steam heated, and the line produces both conventional products and battered french fry products.

PM_{10} and $PM_{2.5}$ emissions from Line 4 are controlled by the Line 4 Wet ESP. Emissions from the Line 4 Wet ESP are estimated based on McCain's recent source test performed at the Burley, ID plant. The lb/ton finished product emission factor is derived from emission testing results at the Burley, ID plant. A 20% safety factor is applied to those results to conservatively estimate emissions.

Similar to PM emissions, the lb/ton emission factor for VOC emissions from Line 4 is derived from the Burley, ID plant test results, and a 20% safety factor is applied for conservatism. Note that only total hydrocarbons (THC) were tested at Burley, and it is conservatively assumed that THC emissions are the same as VOC.

3.2 Boilers and HVACs

3.2.1 Boilers 1 and 2, Lines 1-3 HVACs

The maximum heat inputs for Boiler 1 and Boiler 2 are 65.98 MMBtu/hr and 95.55 MMBtu/hr, respectively. Both boilers are natural gas-fired. The existing Boiler 1 and Boiler 2 were installed before 2000, and no source test data is available. Therefore, PM_{10}, $PM_{2.5}$, SO_2, NO_X, CO, and VOC emissions from the existing boilers are based on AP-42 Chapter 1.4 emission factors for a boiler without any control. Speciated HAP emissions are also based on emission factors from Ventura County Air Pollution Control District AB2588 Combustion Emission Factors for natural gas.

HVAC units are used exclusively for comfort air conditioning purposes. Since they are not considered fugitive sources, the emissions are included for determining major source applicability. All HVAC units at the Othello facility are natural gas-fired. Emissions of PM_{10}, $PM_{2.5}$, SO_2, NO_X, CO, and VOC are conservatively calculated based on AP-42 Chapter 1.4 emission factors for small boilers without any control. The total heat input of Lines 1-3 HVACs is 48.87 MMBtu/hr based on the inventory of the HVAC units. Since the emission factors for Boilers 1 and 2 and Lines 1-3 HVACs are the same, emissions from these emission units are combined using the maximum hourly heat input of 210.4 MMBtu/hr, and the natural gas limit of 1,314.28 million standard cubic feet per year (scf/year) under Condition 1.f of Approval Order 19AQ-E056.

3.2.2 Boiler 3

Boiler 3 fires both natural gas and biogas. When biogas generation rate is low or biogas is unable to be routed to the boiler, Boiler 3 fires natural gas only. Therefore, emissions are calculated for two scenarios: natural gas only, and dual fuel (biogas and natural gas).

Emissions of PM_{10}, $PM_{2.5}$, SO_2, and VOC from firing natural gas are calculated using emission factors from AP-42 Chapter 1.4, for small boilers less than 100 MMBtu/hr. NO_X and CO emissions are estimated based on the burner emission limit of 30 and 50 parts per million (ppm), respectively, at 3% oxygen per Condition 4.e of Approval Order No. 19AQ-E056. Emissions from natural gas combustion are based on the maximum heat input of 97.6 MMBtu/hr. The PTE for the natural gas combustion scenario is based on the natural gas usage limit of 838.3 million scf/yr, per Condition 2.c of Approval Order 19AQ-E056.

When firing dual fuel, biogas will provide a portion of the heat input. On an hourly basis, the emission calculations are based on the maximum hourly biogas generation rate of 850 standard cubic feet per minute

(scfm). On an annual basis, the maximum biogas generation rate is limited to 325 million scf per Condition 4.e.vii of Approval Order No. 19AQ-E056. Emissions of PM_{10}, $PM_{2.5}$, and VOC are not expected to be different for biogas and natural gas combustion; therefore, emissions of these pollutants from dual fuel firing use the same emission factors from AP-42 Chapter 1.4. Emissions of NO_X and CO are dependent on the burner design; therefore, NO_X and CO emissions during dual fuel firing are based on the emission limits of 30 and 50 ppm, respectively.

Emissions of SO_2 when firing dual fuel are determined by the hydrogen sulfide (H_2S) content of the biogas. The H_2S content in the biogas stream is expected to be as high as 5000 ppm. McCain installed a sulfur scrubber to remove H_2S from the biogas and has an outlet concentration limit of 200 ppm H_2S. Emissions of SO_2 and H_2S from biogas combustion assume 98% destruction efficiency of H_2S converting to SO_2 in the waste stream after scrubber treatment. Hourly and annual SO_2 total emissions for the dual fuel scenario also includes natural gas combustion emissions, in supplement to the heat input provided by biogas.

Speciated pollutants, including HAPs, are based on emission factors from Ventura County Air Pollution Control District AB2588 Combustion Emission Factors. This source provides emission factors for natural gas external combustion sources in the size range of 10-100 MMBtu/hr in units of lb/MMscf, but does not specify the heating value to convert the factors from lb/MMscf to lb/MMBtu. For biogas, our emission calculations assume that the natural gas external combustion factors are representative, even though the heating value of biogas is much lower than that of natural gas. To adjust for the difference in heating value between natural gas and biogas, the lb/MMscf natural gas factors are applied to the biogas combustion rate in scfm directly, which is conservative for estimating speciated HAP emissions from biogas combustion.

3.2.3 Line 4 HVACs

Similar to Lines 1-3 HVACs, the Line 4 HVACs are used exclusively for comfort air conditioning purposes and all are natural gas-fired. McCain proposes a limit of 95 million scf/yr (96,900 MMBtu/yr) limit for Line 4 HVACs instead of the limit of 573,000 MMBtu/yr per Condition 4.a of Approval Order 19AQ-E056. Emissions of PM_{10}, $PM_{2.5}$, SO_2, NO_X, CO, and VOC are conservatively calculated based on AP-42 Chapter 1.4 emission factors for small uncontrolled boilers.

McCain proposes a facility-wide natural gas usage limit (in addition to the Boiler 3 natural gas usage limit) to establish the NO_X and CO limits that will make McCain's Othello plant a synthetic minor source. For simplicity and to allow for maximum operational flexibility for other combustion sources, it is assumed for the purposes of the PTE that each of the other combustion sources will operate at capacity, and the natural gas usage limit is factored into the calculations via HVAC unit combustion. Details of the proposed limits are included in Section 5 below.

3.3 Flare

A flare is used to burn off any generated biogas that cannot be routed to Boiler 3 for use. The flare uses propane as the pilot gas. To conservatively estimate the emissions from the flare, the emissions presented in this section assume a scenario in which all biogas generated is routed to the flare (i.e., 850 scfm and 325 million scf per year).

Emissions of PM_{10}, $PM_{2.5}$, NO_X, and CO from biogas combustion are estimated based on flare factors from AP-42 Chapter 2.4, Municipal Solid Waste Landfills (October 2008 draft version). The factors for landfill flares are representative of biogas combustion, because the heating value of biogas is similar to that of landfill gas (both are about half the heating value of natural gas). Additionally, these factors are listed on the basis of standard cubic foot methane burned, which should provide a representative estimate for biogas

combustion when adjusted to the heating value of biogas. The lb/million dscf methane factor is converted to lb/MMBtu using methane's high heating value (HHV) of 1011 Btu/scf.

VOC emissions from the flare are conservatively estimated using the AP-42 Chapter 1.4 factor for boiler natural gas combustion. The factor in lb/MMscf is converted to lb/MMBtu using the default natural gas heating value of 1020 Btu/scf.

SO_2 and H_2S emissions are estimated using the mass balance approach, assuming the sulfur scrubber reduces the H_2S content of the biogas to 200 ppm, and the flare achieves a 98% destruction efficiency of H_2S, equaling the sulfur oxide (SO_X) limit of 1.78 lb/hr.

Propane combustion emissions from the flare pilot are estimated based on the AP-42 Chapter 1.5 factors. Note that the estimated propane usage is 8,400 gallons per year based on limited data from flare operations since the startup of the wastewater treatment plant. The emission estimates provided in the original NOC application was based on actual propane usage at another facility which has a different flare make/model. The actual propane usage at the Othello facility is higher than the original estimate because the use of pilot gas is continuous to avoid flame-out. Since propane emissions account for less than 5% of the total emissions at the flare, the flare emissions affect facility-wide emissions marginally. Table 3-1 shows the comparison of the emission estimates from the originally application and with the updated propane usage rate.

Table 3-1. Flare Emission Comparison

Pollutant	Emission Rates Provided in NOC Application for No. 19AQ-E056		Updated Emission Rates	
	(lb/hr)	(tpy)	(lb/hr)	(tpy)
PM_{10} / $PM_{2.5}$	0.48	1.53	0.48	1.54
SO_2	1.78	5.68	1.78	5.68
NO_X	1.25	3.99	1.26	4.04
VOC	0.18	0.56	0.18	0.56
CO	1.48	4.71	1.48	4.73
H_2S	0.02	0.06	0.02	0.06
HAPs	0.15	0.48	0.15	0.48
CO_2e	3,745	11,932	3,755	11,977

Similar to Boiler 3 emissions, speciated HAP emissions are based on emission factors from Ventura County Air Pollution Control District AB2588 Combustion Emission Factors. The heating values of propane and biogas are used to convert the factors provided in lb/MMscf to lb/MMBtu.

3.4 Emergency Generators

McCain operates two emergency generators at the Othello facility. The first generator has a Cummins engine with a maximum engine output of 465 horsepower (hp). This engine was manufactured in 1996 and therefore predates NSPS Subpart IIII promulgation. Therefore, emission factors for criteria pollutants for the PTE calculations are taken from the EPA's AP-42, Table 3.3-1 Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines. Emission factors for greenhouse gas (GHG) emissions are obtained from 40 CFR 98, Tables C-1 and C-2.

The second emergency generator is a Caterpillar C9 generator with a Tier III certified engine and a maximum engine output of 480 hp. Therefore, for the purposes of PM, CO, and NO_X emissions calculations

the Tier III limits for those pollutants is used for the PTE calculations. SO_2 emissions calculations are obtained from AP-42 Table 3.3-1. For PM_{10} and $PM_{2.5}$ emissions, the combined filterable and condensable PM emissions are conservatively assumed to be equal to the filterable PM emissions plus the total hydrocarbon (HC) emissions. All HC are assumed to be VOC, and the highest HC emission rate across all operating loads specified in vendor specifications are conservatively used to calculate VOC, PM_{10}, and $PM_{2.5}$ emissions. As with the first emergency generator, emission factors for GHG emissions are obtained from 40 CFR 98, Tables C-1 and C-2.

For calculating PTE, it is assumed that all generators will operate up to 500 hours per year in accordance with U.S. EPA policy for estimating PTE for emergency engines.[1]

In both instances, the emergency generators have a brake horsepower (bhp) of less than 500 bhp. Therefore, the generators are exempt from permitting under Washington's minor new source review program per WAC 173-400-110(4)(h)(xxxix). Because the emergency generators are not a fugitive source as defined in WAC 173-401, the emissions are included when determining the facility-wide PTE for the purposes of Title V applicability.

[1] The generators will only be used as emergency backup generators. Per U.S. EPA memorandum for emergency equipment that was authored by John S. Seitz, dated September 6, 1995, (https://www.epa.gov/sites/production/files/2015-08/documents/emgen.pdf), "500 hours is an appropriate default of assumption for estimating the number of hours that an emergency generator could be expected to operate under worst-case conditions".

3.5 Facility-Wide PTE

A summary of the PTE for the Othello facility, after accounting for the requested synthetic minor permit limits, is provided in Table 3-1 below.

Table 3-2. Facility-Wide Potential To Emit (tpy)

Emission Point	Annual Emission Rate (tpy)							
	PM_{10}	$PM_{2.5}$	SO_2	NO_X	VOC	CO	HAPs	CO_2e
Line 1	35.29	35.29	--	--	15.76	--	--	--
Line 2	30.64	30.64	--	--	7.88	--	--	--
Line 3	7.81	7.81	0.01	1.58	2.08	3.84	8.45E-04	1,231
Boiler 1 & 2, Lines 1-3 HVACs	4.92	4.92	0.39	64.68	3.56	54.33	0.05	77,258
Boiler 3	3.19	3.19	5.87	15.57	2.31	15.78	0.04	50,058
Line 4	8.41	8.41	--	--	53.59	--	--	--
Flare	1.54	1.54	5.68	4.04	0.56	4.73	0.48	11,977
Line 4 HVAC Systems	0.36	0.36	0.03	4.75	0.26	3.99	3.90E-03	5,673
Emergency Generators	0.32	0.32	0.48	4.39	0.31	1.47	6.12E-03	259
Facility-Wide Potential Emissions	**92.5**	**92.5**	**12.5**	**95.0**	**86.3**	**84.1**	**0.6**	**146,456**
Title V Threshold	100	100	100	100	100	100	25	--
Title V Required?	No	No	No	No	No	No	No	--

4. REGULATORY REVIEW

This section identifies the regulatory requirements applicable to the proposed permitting actions.

4.1 NOC Applicability

An NOC permit application must be filed and an approval order issued by Ecology prior to the construction or modification of an affected facility per WAC 173-400-110(2)(a). The only emission units included in the PTE above that were not previously represented in Order of Approval No. 19AQ-E056 were the emergency engines. However, per WAC 173-400-110(4)(h)(xxxix), emergency engines with a maximum combustion rating of 500 hp or less are exempt from NOC permitting. Therefore, no emission units are subject to the NOC review requirements under WAC 173-400-110 through -114. An NOC application is required for modifying Approval Order No. 19AQ-E056 to establish the synthetic minor limits.

Additionally, estimated emissions from the flare have increased compared to the original application due to new information. McCain proposes to revise the emission limits for the flare under Condition 4.c of Approval Order No. 19AQ-E056 as part of this permit modification effort.

4.2 PSD Applicability

PSD is the major New Source Review permitting program for attainment pollutants. The Othello facility is located in Adams County, which is an attainment area for all criteria pollutants. Currently, the Othello facility is not a major source under the PSD program. There is no construction or modification associated with the establishment of synthetic minor status. Therefore, PSD review is not required for this permit action.

4.3 Title V Operating Permits

The Othello facility is currently operated under Approval Order No. 19AQ-E056, indicating a Title V permit application would be required within 12 months of startup of Line 4. Based on McCain's review of historical data and projections for future productions, McCain is proposing to establish synthetic minor limits to keep the PTE of the Othello facility below Title V major source thresholds. Therefore, the Title V operating permit requirements under WAC 173-410 does not apply.

4.4 Federal Standards

WAC 173-400-115 adopts federal New Source Performance Standards (NSPS) by reference. NSPS apply to certain types of equipment that are newly constructed, modified, or reconstructed after a given applicability date. Since no construction or physical modification of any equipment is taking place, there will be no change to NSPS applicability or requirements to the existing equipment.

National Emission Standards for Hazardous Air Pollutants (NESHAPs) have been established in 40 CFR Part 61 and Part 63 to control emissions of HAP from stationary sources. This permitting application does not impact existing requirements or trigger any additional NESHAP requirements at the facility.

4.5 State And Local Regulatory Applicability

There are no physical changes or new sources proposed as part of this permit action. However, the propane usage at the flare is higher than the estimated usage provided in the original NOC application, resulting in

and emission increase in NO_X, CO, VOC, and TAPs. Therefore, the regulatory applicability discussions below focus on these emissions.

4.5.1 Washington Toxic Air Pollutant Regulations

In Washington, all new sources emitting TAPs are required to demonstrate compliance with the Washington TAP program pursuant to WAC 173-460. Ecology has established a de minimis emission rate, a small quantity emission rate (SQER), and an acceptable source impact level (ASIL) for each listed TAP. If the total project-related TAP emissions increase exceeds the de minimis level for a pollutant, then permitting and a control technology review is triggered. If the emissions increases exceed their respective SQERs, further determination of compliance with the ASIL using air dispersion modeling is required.

With the proposed higher propane usage at the flare, TAP emissions are updated from the original application. In the original application, six TAPs had Line 4 project emissions greater than the SQER, and dispersion modeling analysis was performed to demonstration compliance with the ASILs for these six TAPs. As mentioned in Section 3.3, the updated propane emissions only increase the total TAP emissions marginally (less than 1% increase for all TAPs). Table 4-1 shows the updated TAP emissions compared to the current version of WAC 173-460-150. The updated emissions show that only five TAPs (i.e., less acrolein) exceed the SQER and require compliance demonstration against the ASILs.

Table 4-1. Updated TAP Emissions Summary

Pollutant	Averaging Period	Updated Project Emission Rate [a]	Emission Rates from Original Application	De Minimis [b]	SQER [b]	Modeling Required?	Increase Compared to Original Application [c]
		(lb/averaging period)					
Benzene	Year	57.29	57.25	1.0E+00	2.1E+01	Yes	0.07%
Formaldehyde	Year	392.05	391.75	1.4E+00	2.7E+01	Yes	0.08%
Naphthalene	Year	3.87	3.86	2.4E-01	4.8E+00	No	0.07%
Acetaldehyde	Year	16.96	16.95	3.0E+00	6.0E+01	No	0.07%
Acrolein	24-hr	0.02	0.02	1.3E-03	2.6E-02	No	0.04%
Propylene	24-hr	4.45	4.45	1.1E+01	2.2E+02	De Minimis	0.04%
Toluene	24-hr	0.14	0.14	1.9E+01	3.7E+02	De Minimis	0.03%
Xylenes	24-hr	0.09	0.09	8.2E-01	1.6E+01	De Minimis	0.02%
Ethyl Benzene	Year	476.31	475.94	3.2E+00	6.5E+01	Yes	0.08%
Hexane	24-hr	0.05	0.05	2.6E+00	5.2E+01	De Minimis	0.04%
H_2S	24-hr	0.93	0.93	7.4E-03	1.5E-01	Yes	0.00%
SO_2	1-hr	3.60	3.60	4.6E-01	1.2E+00	Yes	0.00%
NO_2	1-hr	0.48	0.48	4.6E-01	8.7E-01	No	0.22%
CO	1-hr	5.08	5.08	1.1E+00	4.3E+01	No	0.14%

a. Project emissions are conservatively determined to be the sum of the dual fuel scenario for the new boiler and the projected biogas emissions for the flare for all TAPs.
b. De Minimis and SQER are updated to WAC 173-460-150 (effective December 31, 2019).
c. No emission increase to H_2S and SO_2 because they are driven by biogas combustion.

The dispersion modeling analysis performed with the original application demonstrated that the modeled concentrations from Boiler 3 and the flare combined were 1-2% of the respective ASILs. Since the propane

emissions increases from the original application are marginal, the model results for these five TAPs are scaled based on the modeled concentrations from the original application. The estimated model results for the increased propane usage at the flare and the comparison to the current ASILs are provided in Table 4-2. As shown in Table 4-2, the model results have no noticeable increase from the modeled concentrations submitted in the original application, and remain well below the respective ASILs. Therefore, no further analysis is required.

Table 4-2. Updated TAP Results

Pollutant	Averaging Period	Modeled Concentration in Original Application [a] ($\mu g/m^3$)	Estimated Model Results [b] ($\mu g/m^3$)	Current ASIL ($\mu g/m^3$)	% of ASIL
Benzene	Year	0.0005	0.0005	3.7E-01	0%
Formaldehyde	Year	0.003	0.003	1.7E-01	2%
Ethyl Benzene	Year	0.004	0.004	4.0E-01	1%
H_2S	24-hr	0.03	0.03	2.0E+00	1%
SO_2	1-hr	8	8	6.6E+02	1%

a. The modeled concentration represents the total impact from Boiler 3 (firing dual fuel) and the flare (including pilot gas). The results are conservative because the flare would not be operated if all biogas generated is fired at Boiler 3.

b. The estimated model results are simply scaling the modeled concentrations from the original application by the percentage increase in the emission rates from Table 4-1.

5. PROPOSED PERMIT ACTIONS

5.1 Synthetic Minor Limits

As noted in the NOC application for Order of Approval No. 19AQ-E056, potential NO_X and CO emissions may be above the Title V major source threshold of 100 tpy after startup of Line 4. McCain is requesting synthetic minor limits to constrain potential emissions from the Othello facility to levels below the major source threshold. Since NO_X and CO emissions are solely generated from combustion, the synthetic minor limits will be focused on natural gas usage for various emission units.

Currently, Order of Approval No. 19AQ-E056 includes the following operation limits:

- Condition 1.f: Lines 1-3, Boilers 1 and 2, Line 3 dryer, and Lines 1-3 HVACs should be limited to 1,314.28 million cubic feet per calendar year;
- Condition 2.c: The annual natural gas usage for Boiler 3 is limited to 838.3 million standard cubic feet per year, or 855,000 MMBtu per year.
- Condition 4.a: The natural gas for the Line 4 HVAC units is limited to a combined 65.35 MMBtu/yr or 573,000 MMBtu/yr or less.
- Condition 4.e.vii: The biogas fed to Boiler 3 during dual fire scenario is limited to 850 standard cubic feet per minute or 325 million standard cubic feet per year.

Based on McCain's review of historical natural gas usage and projected production rates, McCain proposes to change the natural gas usage limit for Line 4 HVAC units to 96,900 MMBtu per year. The other limits will remain applicable to the site, but McCain proposes to convert all natural gas usage limits to a MMBtu per year basis to be consistent throughout the facility and for the ease of demonstrating compliance.[2] This approach will result in a facility-wide natural gas usage limit of 2,292,442 MMBtu per year. In addition, McCain proposes a 95 tpy NO_X emission limit for the Othello facility. Lastly, limiting the natural gas usage for these units will reduce the facility-wide PTE for CO to 84 tpy. Therefore, McCain does not propose a separate CO emission limit for the Othello facility.

In order to demonstrate compliance against the operation limits and the 95 tpy NO_X limit for the Othello facility, McCain proposes the following monitoring method:

- McCain will record the facility-wide natural gas usage determined by natural gas bills on a monthly basis.
- If any 12-month rolling facility-wide natural gas usage exceeds 1,340,566 MMBtu (equivalent to 1,314.28 million scf), McCain will review the monthly natural gas usage for the following units to compare against their applicable natural gas usage limits for that 12-month period:
  - Boilers 1 and 2, Line 3 dryer, and Lines 1-3 HVACs combined natural gas usage should not exceed 1,340,566 MMBtu determined by the natural gas bills for Lines 1-3;
  - Boiler 3 natural gas usage should not exceed 854,976 MMBtu determined by natural gas bills for Boiler 3;
  - Line 4 HVACs natural gas usage should not exceed 96,900 MMBtu determined by the Line 4 total usage and Boiler 3 usage.

[2] The natural gas usage is billed on therms basis, which can be converted to MMBtu without any adjustment for standard conditions.

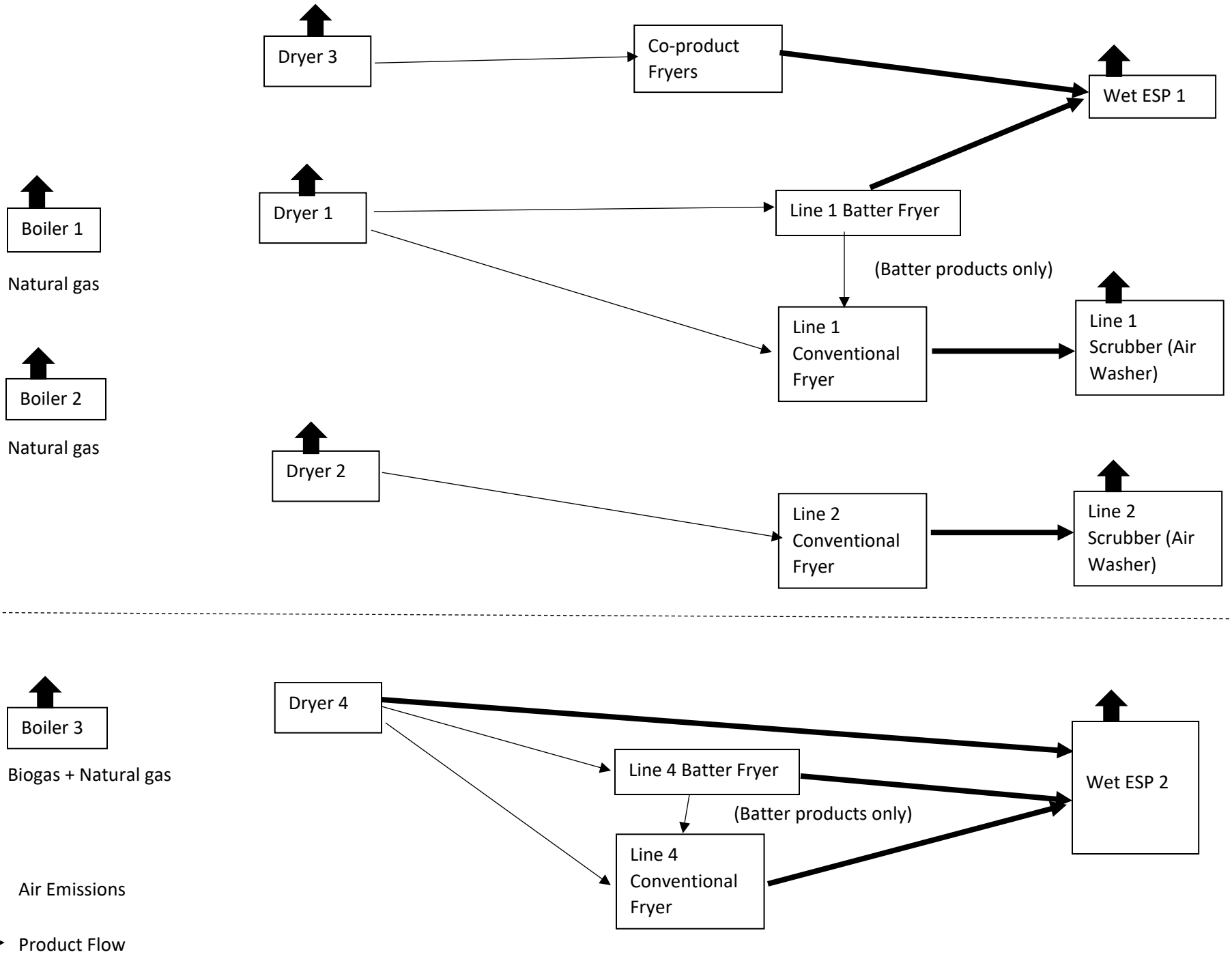
5.2 Other Proposed Permit Modifications

McCain proposes the following modifications or removal for the conditions in Order of Approval No. 19AQ-E056:

- Equipment table on the first page of the permit:
  - Change the manufacturer for item 8 to "Eclipse Combustion". As mentioned in Section 3.1.1, the Line 3 dryer were retrofit in 2011 with two 1.2 MMBtu/hr Eclipse burners. The rating of 3.2 MMBtu/hr is incorrect. A copy of the Eclipse burner specification is provided in Appendix D.
  - Change the equipment rating for Items 10-12 to their respective maximum heat input. The capacities of the Boilers 1 and 2 and Lines 1-2 HVACs are provided in Section 3.2.1.
- Condition 1.f: Remove "in order to limit nitrogen oxide emissions to no more than 92 tons per calendar year" from this condition. McCain is proposing a new facility-wide NO_X emission limit of 95 tpy and this NO_X limit on units for Lines 1-3 will potentially be conflicting and confusing for permit compliance.
- Condition 1.h: Remove this condition. Condition 1.h is solely used to explain the basis for setting the 92 tpy limits for PM and NO_X for Lines 1-3 and procedures for adjustment of the limits. With the proposed facility-wide NO_X limit, this condition will no longer be valid since a new permit will be issued.
- Condition 2.e.i: Remove this condition. Condition 2.e.i sets a temperature limit for the flare. However, temperature measurement is not feasible for an open-flame flare. The flare is firing propane continuously which ignites the biogas when sending to the flare. Additionally, the flare has an auto-restart system preventing flame-out. The design and proper operational practices of the flare will ensure the flare is operating in design conditions; thus a temperature limit is not necessary for compliance.
- Condition 4.a: Change the natural gas limit for Line 4 HVACs from "573,000 MMBtu/yr" to "96,900 MMBtu per year" to match the proposed synthetic minor limit.
- Condition 4.c: Change the NO_X, CO and VOC limits with the updated propane usage rate. Specifically:
  - NO_X to 1.26 lb/hr, 4.04 ton/yr;
  - CO to 1.48 lb/hr, 4.73 ton/yr; and
  - VOC to 0.18 pounds per hour.
- Condition 4.e.v: Add "when firing natural gas" for the SO_X limit of 0.04 pounds per hour. This limit is consistent with the emission calculations submitted for Order of Approval No. 19AQ-E056 and Appendix C. The hourly SO_X emission rate will be higher when firing biogas because of higher sulfur content in biogas compared to natural gas.
- Condition 4.e.vii: Add "on an hourly basis" for the 850 standard cubic feet per minute limit. McCain tracks the biogas generation rate instantaneously and the reading could be higher than 850 scfm but the hourly flow rate is expected to be lower than 51,000 scf. Adding the clarification here would avoid potential compliance issues.

APPENDIX A. PROCESS FLOW DIAGRAM

McCain Othello Facility Process Flow Diagram



APPENDIX B. APPLICATION FORMS

Notice of Construction Application

A notice of construction permit is required before installing a new source of air pollution or modifying an existing source of air pollution. This application applies to facilities in Ecology's jurisdiction. Submit this application for review of your project. For general information about completing the application, refer to Ecology Forms ECY 070-410a-g, "Instructions for Ecology's Notice of Construction Application."

Ecology offers up to two hours of free pre-application assistance. We encourage you to schedule a pre-application meeting with the contact person specified for the location of your proposal, below. If you use up your two hours of free pre-application assistance, we will continue to assist you after you submit Part 1 of the application and the application fee. You may schedule a meeting with us at any point in the process.

Upon completion of the application, please enclose a check for the initial fee and mail to:

Department of Ecology
Cashiering Unit
P.O. Box 47611
Olympia, WA 98504-7611

For Fiscal Office Use Only:
001-NSR-216-0299-000404

Check the box for the location of your proposal. For assistance, call the contact listed below:		
Ecology Permitting Office		**Contact**
☐ **CRO**	**Chelan, Douglas, Kittitas, Klickitat, or Okanogan County** Ecology Central Regional Office – Air Quality Program	Lynnette Haller (509) 457-7126 lynnette.haller@ecy.wa.gov
☒ **ERO**	**Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Stevens, Walla Walla or Whitman County** Ecology Eastern Regional Office – Air Quality Program	Karin Baldwin (509) 329-3452 karin.baldwin@ecy.wa.gov
☐ **NWRO**	**San Juan County** Ecology Northwest Regional Office – Air Quality Program	David Adler (425) 649-7267 david.adler@ecy.wa.gov
☐ **IND**	**For actions taken at Kraft and Sulfite Paper Mills and Aluminum Smelters** Ecology Industrial Section – Waste 2 Resources Program Permit manager: _____	James DeMay (360) 407-6868 james.demay@ecy.wa.gov
☐ **NWP**	**For actions taken on the US Department of Energy Hanford Reservation** Ecology Nuclear Waste Program	Lilyann Murphy (509) 372-7951 lilyann.murphy@ecy.wa.gov

Check the box below for the fee that applies to your application.

DEPARTMENT OF ECOLOGY
State of Washington

Notice of Construction Application

New project or equipment:

☐	**$1,500: Basic project** initial fee covers up to 16 hours of review.
☐	**$10,000: Complex project** initial fee covers up to 106 hours of review.

Change to an existing permit or equipment:

☐	**$200: Administrative or simple change** initial fee covers up to 3 hours of review Ecology may determine your change is complex during completeness review of your application. If your project is complex, you must pay the additional $675 before we will continue working on your application.
☒	**$875: Complex change** initial fee covers up to 10 hours of review
☐	**$350** flat fee: **Replace or alter control technology equipment under WAC 173-400-114** Ecology will contact you if we determine your change belongs in another fee category. You must pay the fee associated with that category before we will continue working on your application.

Read each statement, then check the box next to it to acknowledge that you agree.	
☒	The initial fee you submitted may not cover the cost of processing your application. Ecology will track the number of hours spent on your project. If the number of hours Ecology spends exceeds the hours included in your initial fee, Ecology will bill you $95 per hour for the extra time.
☒	You must include all information requested by this application. Ecology may not process your application if it does not include all the information requested.
☒	Submittal of this application allows Ecology staff to visit and inspect your facility.

DEPARTMENT OF ECOLOGY
State of Washington

Notice of Construction Application
Part 1: General Information

I. Project, Facility, and Company Information

1. Project Name Synthetic Minor Status
2. Facility Name McCain Foods USA, Inc.
3. Facility Street Address 100 Lee Street, Othello, WA 99344
4. Facility Legal Description NW 1/4 of the NW 1/4 of sec. 34 T 16 N., R 29, E.W.M. Farm Unit 89 in Block 45, Parcel #2629280120001
5. Company Legal Name (if different from Facility Name)
6. Company Mailing Address (street, city, state, zip)

II. Contact Information and Certification

1. Facility Contact Name (who will be onsite) John Lallas	
2. Facility Contact Mailing Address (if different than Company Mailing Address) 100 Lee Street, Othello, WA 99344	
3. Facility Contact Phone Number (509) 331-7734	4. Facility Contact E-mail john.lallas@mccain.com
5. Billing Contact Name (who should receive billing information) John Lallas	
6. Billing Contact Mailing Address (if different than Company Mailing Address) 100 Lee Street, Othello, WA 99344	
7. Billing Contact Phone Number (509) 331-7734	8. Billing Contact E-mail john.lallas@mccain.com
9. Consultant Name (optional – if 3rd party hired to complete application elements) Hui Cheng	
10. Consultant Organization/Company Trinity Consultants	
11. Consultant Mailing Address (street, city, state, zip) 20819 72nd Avenue S, Suite 610, Kent, WA 98032	
12. Consultant Phone Number (253) 867-5600 x 1003	13.Consultant E-mail hcheng@trinityconsultants.com
14. Responsible Official Name and Title (who is responsible for project policy or decision-making) Evan Buell, Vice President of Engineering	
15. Responsible Official Mailing Address One Tower Lane, Oakbrook Terrance, IL 60181	
16. Responsible Official Phone (858) 699-6495	17. Responsible Official E-mail Evan.buell@mccain.com
18. Responsible Official Certification and Signature I certify that the information on this application is accurate and complete. Signature Evan Buell Date April 20, 2022	

Notice of Construction Application

Part 2: Technical Information

The Technical Information may be sent with this application form to the Cashiering Unit, or may be sent directly to the Ecology regional office with jurisdiction along with a copy of this application form.

For all sections, check the box next to each item as you complete it.

III. Project Description

Please attach the following to your application.

☒ Written narrative describing your proposed project.
☐ Projected construction start and completion dates.
☐ Operating schedule and production rates.
☒ List of all major process equipment with manufacturer and maximum rated capacity.
☒ Process flow diagram with all emission points identified.
☐ Plan view site map.

☐ Manufacturer specification sheets for major process equipment components.
☐ Manufacturer specification sheets for pollution control equipment.
☐ Fuel specifications, including type, consumption (per hour & per year) and percent sulfur.

IV. State Environmental Policy Act (SEPA) Compliance

Check the appropriate box below.

☐ SEPA review is complete:
Include a copy of the final SEPA checklist and SEPA determination (e.g., DNS, MDNS, EIS) with your application.

☐ SEPA review has not been conducted:

☐ If review will be conducted by another agency, list the agency. You must provide a copy of the final SEPA checklist and SEPA determination before Ecology will issue your permit.
Agency Reviewing SEPA:

_____

☐ If the review will be conducted by Ecology, fill out a SEPA checklist and submit it with your application. You can find a SEPA checklist online at https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-document-templates

Notice of Construction Application

V. Emissions Estimations of Criteria Pollutants

Does your project generate criteria air pollutant emissions? ☒ Yes ☐ No

If yes, please provide the following information regarding your criteria emissions in your application.

☒ The names of the criteria air pollutants emitted (i.e., NO_x, SO_2, CO, $PM_{2.5}$, PM_{10}, TSP, VOC, and Pb)

☒ Potential emissions of criteria air pollutants in tons per hour, tons per day, and tons per year (include calculations)

☐ If there will be any fugitive criteria pollutant emissions, clearly identify the pollutant and quantity

VI. Emissions Estimations of Toxic Air Pollutants

Does your project generate toxic air pollutant emissions? ☒ Yes ☐ No

If yes, please provide the following information regarding your toxic air pollutant emissions in your application.

☒ The names of the toxic air pollutants emitted (specified in WAC 173-460-150[1])

☒ Potential emissions of toxic air pollutants in pounds per hour, pounds per day, and pounds per year (include calculations)

☐ If there will be any fugitive toxic air pollutant emissions, clearly identify the pollutant and quantity

VII. Emission Standard Compliance

☒ Provide a list of all applicable new source performance standards, national emission standards for hazardous air pollutants, national emission standards for hazardous air pollutants for source categories, and emission standards adopted under Chapter 70.94 RCW.

Does your project comply with all applicable standards identified? ☒ Yes ☐ No

VIII. Best Available Control Technology

☐ Provide a complete evaluation of Best Available Control Technology (BACT) for your proposal.

[1] http://apps.leg.wa.gov/WAC/default.aspx?cite=173-460-150

Notice of Construction Application

IX. Ambient Air Impacts Analyses

Please provide the following:

☐ Ambient air impacts analyses for Criteria Air Pollutants (including fugitive emissions)

☒ Ambient air impacts analyses for Toxic Air Pollutants (including fugitive emissions)

☐ Discharge point data for each point included in air impacts analyses (include only if modeling is required)

- ☐ Exhaust height
- ☐ Exhaust inside dimensions (ex. diameter or length and width)
- ☐ Exhaust gas velocity or volumetric flow rate
- ☐ Exhaust gas exit temperature
- ☐ The volumetric flow rate
- ☐ Description of the discharges (i.e., vertically or horizontally) and whether there are any obstructions (ex., raincap)
- ☐ Identification of the emission unit(s) discharging from the point
- ☐ The distance from the stack to the nearest property line
- ☐ Emission unit building height, width, and length
- ☐ Height of tallest building on-site or in the vicinity and the nearest distance of that building to the exhaust
- ☐ Whether the facility is in an urban or rural location

Does your project cause or contribute to a violation of any ambient air quality standard or acceptable source impact level? ☐ Yes ☒ No

APPENDIX C. EMISSION CALCULATIONS

Table C-1a. Potential Emission Summary

Emission Point	Annual Emission Rate (tpy)							
	PM_{10}	$PM_{2.5}$	SO_2	NO_X	VOC	CO	HAPs	CO_2e
Line 1	35.29	35.29	--	--	15.76	--	--	--
Line 2	30.64	30.64	--	--	7.88	--	--	--
Line 3 [a]	7.81	7.81	6.18E-03	1.58	2.08	3.84	8.45E-04	1,231
Boiler 1 & 2, Lines 1-3 HVACs [a]	4.92	4.92	0.39	64.68	3.56	54.33	0.05	77,258
Boiler 3	3.19	3.19	5.87	15.57	2.31	15.78	0.04	50,058
Line 4	8.41	8.41	--	--	53.59	--	--	--
Flare	1.54	1.54	5.68	4.04	0.56	4.73	0.48	11,977
Line 4 HVAC Systems	0.36	0.36	0.03	4.75	0.26	3.99	3.90E-03	5,673
Emergency Generators	0.32	0.32	0.48	4.39	0.31	1.47	6.12E-03	259
Facility-Wide Potential Emissions [b]	**92.5**	**92.5**	**12.5**	**95.0**	**86.3**	**84.1**	**0.6**	**146,456**
Title V Threshold [c]	100	100	100	100	100	100	25	--
Title V Required?	No	No	No	No	No	No	No	--

[a] Line 3 includes a natural gas-fired burner. The emissions from Line 3 burner, Boilers 1 & 2, and Lines 1-3 HVACs are estimated based on the natural gas usage limit from Approval Order 19AQ-E056 (listed below). Boiler 3, Line 4 and Flare emissions are shown as PTE assuming continous operation at the capacity. The proposed natural gas usage limit for Line 4 HVACs and the facility-wide limit are presented below.

Approval Order 19AQ-E056 Natural Gas Usage Limit for Lines 1-3:	1,314.28	million cf/yr =	1,340,566	MMBtu/yr
Line 4 Proposed Natural Gas Usage Limit (including Boiler 3 and Line 4 HVACs):	933.21	million cf/yr =	951,876	MMBtu/yr
Boiler 3:	*838.21*	*million cf/yr =*	*854,976*	*MMBtu/yr*
Line 4 HVACs:	*95.00*	*million cf/yr =*	*96,900*	*MMBtu/yr*
Facility-wide Natural Gas Usage Limit:	2,247.49	million cf/yr =	2,292,442	MMBtu/yr

[b] Facility-wide SO_2 emissions take the maximum of biogas firing at the boiler or the flare. HVACs are for comfort air conditioning purposes only and emissions from the HVAC systems are included for the facility-wide emissions.

[c] Per 40 CFR 70.2 and 70.3, a Title V Permit is required for any major source which is defined as the potential to emit emissions greater or equal to 100 tpy for any air pollutant subject to regulation, 10 tpy of an individual HAP, or 25 tpy of combined HAPs. Fugitives sources do not need to be considered in determining the potential to emit for the facility since the source is not one of the listed 28 source categories. As the Othello facility is not categorized as a listed source category, fugitive emissions are not required to be included. The EPA definition of "fugitive emissions" is "those emissions which could not reasonable pass through a stack, chimney, vent, or other functionally-equivalent opening" per the February 10, 1999 memorandum *Interpretation of the Definition of Fugitive Emissions in Parts 70 and 71*, from Thomas C. Current, Director Information Transfer and Program Integration Division. All fugitive emissions of HAP must be included when determining major source status. Fugitive emissions in this case would include truck traffic for products/raw materials transportation, which does not emit any HAP.

Table C-1b. Updated Line 4 Project TAP Emissions

Pollutant	Averaging Period	Project Emission Rate [a]	De Minimis [b]	SQER [b]	Modeling Required?
		(lb/averaging period)			
Benzene	Year	57.29	1.0E+00	2.1E+01	Yes
Formaldehyde	Year	392.05	1.4E+00	2.7E+01	Yes
Naphthalene	Year	3.87	2.4E-01	4.8E+00	No
Acetaldehyde	Year	16.96	3.0E+00	6.0E+01	No
Acrolein	24-hr	0.02	1.3E-03	2.6E-02	No
Propylene	24-hr	4.45	1.1E+01	2.2E+02	De Minimis
Toluene	24-hr	0.14	1.9E+01	3.7E+02	De Minimis
Xylenes	24-hr	0.09	8.2E-01	1.6E+01	De Minimis
Ethyl Benzene	Year	476.31	3.2E+00	6.5E+01	Yes
Hexane	24-hr	0.05	2.6E+00	5.2E+01	De Minimis
H_2S	24-hr	0.93	7.4E-03	1.5E-01	Yes
SO_2	1-hr	3.60	4.6E-01	1.2E+00	Yes
NO_2	1-hr	0.48	4.6E-01	8.7E-01	No
CO	1-hr	5.08	1.1E+00	4.3E+01	No

[a] Project emissions are conservatively determined to be the sum of the dual fuel scenario for the new boiler and the projected biogas emissions for the flare for all TAPs.

[b] De Minimis and SQER are updated to use WAC 173-460-150 (effective 12/31/2019).

Table C-2a. Potential Emissions from the New Boiler 3 - Natural Gas Combustion

Maximum Operating Hours	8,760	hr/year
Maximum Heat Input Capacity [b]	97.6	MMBtu/hr
Estimated Heat Input by Natural Gas [a]	854,976	MMBtu/yr

Pollutant		Natural Gas Emission Factor (lb/MMscf)	Exhaust Gas Emission Factor (lb/dry 10^6 scf)	Emission Factor [a] (lb/MMBtu)	Emission Rate (lb/hr)	Emission Rate (tpy)
PM_{10}	[c]	7.6	--	7.45E-03	0.73	3.19
$PM_{2.5}$	[c]	7.6	--	7.45E-03	0.73	3.19
SO_2	[c]	0.6	--	5.88E-04	0.06	0.25
NO_X	[d]	--	4.18	3.64E-02	3.56	15.57
VOC	[c]	5.5	--	5.39E-03	0.53	2.31
CO	[c]	--	4.24	3.69E-02	3.60	15.78
CO_2e	[e]		--	--	11,428.76	50,057.97
CO_2	[e]	--	--	116.98	11,416.97	50,006.32
N_2O	[e]	--	--	2.20E-04	0.02	0.09
CH_4	[e]	--	--	2.20E-03	0.22	0.94

[a] The natural gas heating value below is used to convert the AP-42 emission factors in lb/MMscf to lb/MMBtu, in accordance with footnotes in Chapter 1.4. The boiler can fire all of the biogas generated and supplement the remaining heat input by natural gas, or fire 100% natural gas.

Natural gas heating value 1,020 Btu/scf

[b] The maximum heat input is based on vendor provided burner heat input.

[c] Emission factors for small boilers (<100 MMBtu/hr) are obtained from Table 1.4.1 and Table 1.4.2, AP-42 Chapter 1.4, Natural Gas Combustion. Here it assumes that these emissions are not affected by the type of gas fired (natural gas or biogas). Note that the annual SO_2 emissions listed in this table only represents natural gas combustion at the estimated annual natural gas usage listed here.

[d] Emission factors for NO_X and CO are obtained from emission limits of 30 ppm and 50 ppm corrected to 3% oxygen, respectively. The emission factors are converted from ppm to lb/MMscf using EPA Method 19 using the equations below. A conversion fuel factor of 8,710 dscf/MMBtu is used to determine the emission factor in lb/MMBtu.

NO_X EF (lb/MMscf) = NO_X concentration (ppm) × 1.194×10^{-7} (lb/scf)/(ppm-NO_X) × 20.9%/(20.9%-3%) × 10^6

CO EF (lb/MMscf) = CO concentration (ppm) × 1.660×10^{-7} (lb/scf)/(ppm-SO_2) × 28.0101 (g/mol SO_2) / 64.066 (g/mol CO) × 20.9%/(20.9%-3%) × 10^6

[e] The emission factors for each GHG are obtained from 40 CFR 98 Subpart C, Tables C-1 and C-2 for natural gas combustion, and converted to values in lb/MMBtu. The GHGs emissions are calculated based on the Global Warming Potentials (GWP) provided in Table A-1 of 40 CFR 98.

CO_2	1
N_2O	298
CH_4	25

Table C-2b. Potential Emissions from the New Boiler 3 - Biogas and Natural Gas Combustion

Maximum Heat Input Capacity	97.6	MMBtu/hr
	854,976	MMBtu/yr
Biogas consumption [a]	0.051	MMscf/hr
	325	MMscf/yr
Estimated Heat Input by Biogas [a]	32.44	MMBtu/hr
	206,674	MMBtu/yr

Pollutant		H_2S Content (molar fraction)	Destruction Efficiency	Emission Rate (lb/hr)	Emission Rate (tpy)
SO_2 from Biogas	[b]	0.02%	98%	1.78	5.68
H_2S	[b]	0.02%	98%	0.02	0.06

Pollutant		Biogas Emission Factor (lb/MMBtu)	Natural Gas Emission Factor (lb/MMBtu)	Emission Rate (lb/hr)	Emission Rate (tpy)
PM_{10}	[c]	7.45E-03	7.45E-03	0.73	3.19
$PM_{2.5}$	[c]	7.45E-03	7.45E-03	0.73	3.19
SO_2 from Natural Gas			5.88E-04	0.04	0.19
NO_X	[c]	0.04	0.04	3.56	15.57
VOC	[c]	5.39E-03	5.39E-03	0.53	2.31
CO	[c]	0.04	0.04	3.60	15.78
CO_2e	[d]			11,373.20	49,880.95
CO_2	[d]	114.79	116.98	11,346.18	49,780.80
N_2O	[d]	1.39E-03	2.20E-04	0.06	0.21
CH_4	[d]	7.05E-03	2.20E-03	0.37	1.44

[a] Biogas consumption rate is from permit No. 19AQ-E056. Here assumes that the new Boiler 3 can fire up to 100% of biogas generated. Hourly biogas consumption is based on McCain's design, which is 850 scfm. Biogas heating value is based on McCain's design information.

Biogas heating value: 636 Btu/scf

[b] H_2S content is based on McCain's design information, consistently with other sites operating a wastewater treatment plant. Based on the sulfothane scrubber quote, the outlet H_2S concentration will be less than 200 ppm. It assumes that 98% of the H_2S will be combusted to SO_2. The following parameters are used to convert the sulfur content from H_2S to SO_2:

gas constant, J/K-mol: 8.314

Standard air temperature, K: 273.15

Standard pressure, Pa: 101325

MW of SO_2, g/mol: 64

MW of H_2S, g/mol: 34.1

[c] The same emission factors for natural gas combustion are used here for biogas combustion.

[d] The emission factors for each GHG are obtained from 40 CFR 98 Subpart C, Tables C-1 and C-2 for other biomass gaseous fuels, and converted to values in lb/MMBtu. The GHGs emissions are calculated based on the Global Warming Potentials (GWP) provided in Table A-1 of 40 CFR 98.

Table C-2c. Potential Emissions from the New Boiler 3

Pollutant	Hourly Emission Rate (lb/hr)	Annual Emission Rate (tpy)
PM_{10}	0.73	3.19
$PM_{2.5}$	0.73	3.19
SO_2 [a]	1.82	5.87
NO_X	3.56	15.57
VOC	0.53	2.31
CO	3.60	15.78
H_2S [b]	0.02	0.06
HAPs	9.42E-03	0.04
CO_2e	11,429	50,058

[a] Emissions are the worst of combustion of natural gas only or dual fuel.

[b] H_2S emissions are from uncombusted biogas.

Table C-2d. HAP Emissions from the New Boiler 3

Maximum Operating Hours	8760	hr/yr
Estimated Heat Input by Natural Gas [a]	854,976	MMBtu/yr
Estimated Annual Heat Input by Biogas [b]	206,674	MMBtu/yr
Estimated Hourly Heat Input by Biogas [b]	32	MMBtu/hr

Pollutant	HAP?	Emission Factor (lb/MMscf)	Natural Gas (lb/MMBtu)	Emission Rate (lb/hr)	Emission Rate (tpy)	Biogas (lb/MMBtu)	Dual Fuel Emission Rate (lb/hr)	Dual Fuel Emission Rate (tpy)
Benzene [c]	Yes	0.0058	5.69E-06	5.55E-04	2.43E-03	9.12E-06	6.66E-04	2.79E-03
Formaldehyde [c]	Yes	0.0123	1.21E-05	1.18E-03	5.16E-03	1.93E-05	1.41E-03	5.91E-03
PAH's (including Naphthalene) [c]	Yes	0.0004	3.92E-07	3.83E-05	1.68E-04	6.29E-07	4.60E-05	1.92E-04
Naphthalene [c]	Yes - included above	0.0003	2.94E-07	2.87E-05	1.26E-04	4.72E-07	3.45E-05	1.44E-04
Acetaldehyde [c]	Yes	0.0031	3.04E-06	2.97E-04	1.30E-03	4.87E-06	3.56E-04	1.49E-03
Acrolein [c]	Yes	0.0027	2.65E-06	2.58E-04	1.13E-03	4.25E-06	3.10E-04	1.30E-03
Propylene [c]	No	0.5300	5.20E-04	0.05	0.22	8.33E-04	0.06	0.25
Toluene [c]	Yes	0.0265	2.60E-05	2.54E-03	1.11E-02	4.17E-05	3.04E-03	1.27E-02
Xylenes [c]	Yes	0.0197	1.93E-05	1.89E-03	8.26E-03	3.10E-05	2.26E-03	9.46E-03
Ethyl Benzene [c]	Yes	0.0069	6.76E-06	6.60E-04	2.89E-03	1.08E-05	7.93E-04	3.31E-03
Hexane [c]	Yes	0.0046	4.51E-06	4.40E-04	1.93E-03	7.23E-06	5.28E-04	2.21E-03

[a] The natural gas heating value below is used to convert the AP-42 emission factors in lb/MMscf to lb/MMBtu, in accordance with footnotes in Chapter 1.4. The boiler can fire all of the biogas generated and supplement the remaining heat input by natural gas, or fire 100% natural gas.

Natural gas heating value 1,020 Btu/scf

[b] Biogas consumption rate is based on McCain's estimates on annual basis. Here assumes that the new alpha boiler can fire up to 100% of biogas generated. Hourly biogas consumption assumes the 30% combustion is contributed by biogas based on vendor info. Biogas heating value is based on McCain's design information.

Biogas heating value: 636 Btu/scf

[c] Emissions factors for HAPs are taken from the Ventura County Air Pollution Control District AB 2588 Combustion Emission Factors. http://www.aqmd.gov/docs/default-source/permitting/toxics-emission-factors-from-combustion-process-.pdf. The emission factors provided are in the unit of lb/MMscf for natural gas external combustion sources in the size of 10-100 MMBtu/hr. The emission factor document does not specify the heating value to convert the factors from lb/MMscf to lb/MMBtu. For biogas it is assumed that the natural gas external combustion factors are representative, even though the heating value of biogas is much lower than that of natural gas. In this case, the lb/MMscf natural gas factors were applied to biogas combustion rate in scfm directly, which is conservative in estimating speciated HAP/TAP emissions from biogas combustion.

Table C-3a. Potential Emissions from the Flare - Pilot Gas

Maximum Operating Hours	8,760	hr/year
Propane Usage [a]	8,400	gal/yr
Estimated Heat Input[a]	768.60	MMBtu/yr

Pollutant	Propane Emission Factor [b] (lb/1000 gal)	Propane Emission Factor [c] (lb/MMBtu)	Emission Rate (lb/hr)	Emission Rate (tpy)
PM_{10}	0.7	--	6.71E-04	2.94E-03
$PM_{2.5}$	0.7	--	6.71E-04	2.94E-03
SO_2	0.054	--	5.18E-05	2.27E-04
NO_X	13	--	1.25E-02	0.05
VOC	1	--	9.59E-04	4.20E-03
CO	7.5	--	7.19E-03	0.03
CO_2e [c]		--	12.21	53.48
CO_2 [c]	--	138.60	12.16	53.27
N_2O [c]	--	1.32E-03	1.16E-04	5.08E-04
CH_4 [c]	--	6.61E-03	5.80E-04	2.54E-03

[a] Propane usage is estimated based on limited plant operations data from November 2021 to now, and adding a safety factor for conservatism. Propane heating value from AP-42 Chapter 1.5 is used to determine the heat input.

Propane heating value	91.5	MMBtu/1000 gal

[b] Emission factors for propane combustion are obtained from Table 1.5-1, AP-42 Chapter 1.5. According to an EPA study (https://www3.epa.gov/ttnchie1/conference/ei12/area/haneke.pdf), a national average sulfur content in LPG is 0.54 gr/1000 gal, which is used to determine the SO2 emission factor.

[c] The emission factors for each GHG are obtained from 40 CFR 98 Subpart C, Tables C-1 and C-2 for propane combustion, and converted to values in lb/MMBtu. The GHGs emissions are calculated based on the Global Warming Potentials (GWP) provided in Table A-1 of 40 CFR 98.

CO_2	1
N_2O	298
CH_4	25

Table C-3b. Potential Emissions from the Flare - Biogas Combustion

Biogas consumption [a]	5.10E-02	MMscf/hr	
	325	MMscf/yr	
Estimated Heat Input by Biogas [a]	206,674	MMBtu/yr	

Pollutant		H_2S Content (molar fraction)	Destruction Efficiency	Emission Rate (lb/hr)	Emission Rate (tpy)
SO_2	[b]	0.02%	98%	1.78	5.68
H_2S	[b]	0.02%	98%	0.02	0.06
Pollutant		**Emission Factor**		**Emission Rate (lb/hr)**	**Emission Rate (tpy)**
PM_{10}	[c]	1.48E-02	lb/MMBtu	0.48	1.53
$PM_{2.5}$	[c]	1.48E-02	lb/MMBtu	0.48	1.53
NO_X	[c]	0.039	lb/MMBtu	1.25	3.99
CO	[c]	0.045	lb/MMBtu	1.48	4.70
VOC	[d]	5.39E-03	lb/MMBtu	0.17	0.56
CO_2e	[e]			3,742.63	11,923.51
CO_2	[e]	114.79	lb/MMBtu	3,723.48	11,862.51
N_2O	[e]	1.39E-03	lb/MMBtu	0.05	0.14
CH_4	[e]	7.05E-03	lb/MMBtu	0.23	0.73

[a] Biogas consumption rate is based on permit No. 19AQ-E056. The maximum hourly biogas generation rate is expected to be 850 scfm. Biogas heating value is based on McCain's design information.

Biogas heating value: 636 Btu/scf

[b] H_2S content is based on McCain's design information, consistently with other sites operating a wastewater treatment plant. The outlet H_2S concentration is based on permit limit of 200 ppm. It assumes that 98% of the H_2S will be combusted to SO_2. The following parameters are used to convert the sulfur content from H_2S to SO_2:

gas constant, J/K-mol: 8.314

Standard air temperature, K: 273.15

Standard pressure, Pa: 101325

MW of SO_2, g/mol: 64

MW of H_2S, g/mol: 34.1

[c] The PM_{10}, $PM_{2.5}$, NO_X and CO emission factors are obtained from AP-42 Chapter 2.4 (Draft version, October 2008). The factors for landfill flares are assumed to be representative of biogas combustion, because the landfill gas' heating value is close to biogas' heating value (about half of natural gas' heating value). Additionally, these factors are on the per scf CH_4 burned, which should provide a representative estimate for biogas combustion using biogas' heating value. The lb/million dscf CH_4 factor is converted to lb/MMBtu using CH_4's HHV of 1011 Btu/scf.

[d] The biogas stream contains mainly methane and other inert gases, which does contain small amount of VOC. The VOCs are usually destroyed during combustion. The same VOC emission factor for natural gas combustion is conservatively used here for biogas combustion (AP-42 Chapter 1.4 factors in lb/MMscf converted to lb/MMBtu using the default natural gas heating value of 1,020 Btu/scf).

[e] The emission factors for each GHG are obtained from 40 CFR 98 Subpart C, Tables C-1 and C-2 for other biomass gaseous fuels, and converted to values in lb/MMBtu. The GHGs emissions are calculated based on the Global Warming Potentials (GWP) provided in Table A-1 of 40 CFR 98.

Table C-3c. Potential Emissions from the Flare

Pollutant		Hourly Emission Rate (lb/hr)	Annual Emission Rate (tpy)
PM_{10}		0.48	1.54
$PM_{2.5}$		0.48	1.54
SO_2	[a]	1.78	5.68
NO_X		1.26	4.04
VOC		0.18	0.56
CO		1.48	4.73
H_2S	[b]	0.02	0.06
HAPs		0.15	0.48
CO_2e		3,755	11,977

[a] Emissions are the sum from pilot gas combustion and biogas combustion.

[b] H_2S emissions are from uncombusted biogas.

Table C-3d. HAP Emissions - Flare

Maximum Operating Hours	8760	hr/yr
Estimated Heat Input by Propane[a]	769	MMBtu/yr
Estimated Heat Input by Biogas [b]	206,674	MMBtu/yr
Estimated Hourly Heat Input by Biogas [b]	32	MMBtu/hr

Pollutant	HAP?	Emission Factor (lb/MMscf)	Propane (lb/MMBtu)	Biogas (lb/MMBtu)	Total Emission Rate (lb/hr)	(tpy)
Benzene [c]	Yes	0.159	6.33E-05	2.50E-04	8.11E-03	0.03
Formaldehyde [c]	Yes	1.169	4.65E-04	1.84E-03	0.06	0.19
PAH's (including Naphthalene) [c]	Yes	0.014	5.57E-06	2.20E-05	7.14E-04	2.28E-03
Naphthalene [c]	Yes - included above	0.011	4.38E-06	1.73E-05	5.61E-04	1.79E-03
Acetaldehyde [c]	Yes	0.043	1.71E-05	6.76E-05	2.19E-03	6.99E-03
Acrolein [c]	Yes	0.010	3.98E-06	1.57E-05	5.10E-04	1.63E-03
Propylene [c]	No	2.440	9.71E-04	3.84E-03	0.12	0.40
Toluene [c]	Yes	0.058	2.31E-05	9.12E-05	2.96E-03	9.43E-03
Xylenes [c]	Yes	0.029	1.15E-05	4.56E-05	1.48E-03	4.72E-03
Ethyl Benzene [c]	Yes	1.444	5.74E-04	2.27E-03	0.07	0.23
Hexane [c]	Yes	0.029	1.15E-05	4.56E-05	1.48E-03	4.72E-03

[a] Propane usage is estimated based on a similar plant's actual usage, and scaled to the maximum amount usage for PTE purposes. Propane heating value from AP-42 Chapter 1.5 is used to determine the heat input.

Propane heating value	91.5	MMBtu/1000 gal
Propane liquid to gas	36.4	cf/gal

[b] Biogas consumption rate is based on McCain's estimates on annual basis. Here assumes that the new alpha boiler can fire up to 100% of biogas generated. Hourly biogas consumption assumes the heat input capacity is reached by biogas combustion. Biogas heating value is based on

Biogas heating value: 636 Btu/scf

[c] Emissions factors for HAPs are taken from the Ventura County Air Pollution Control District AB 2588 Combustion Emission Factors. http://www.aqmd.gov/docs/default-source/permitting/toxics-emission-factors-from-combustion-process-.pdf. The emission factors provided are in the unit of lb/MMscf for natural gas external combustion sources in the size of 10-100 MMBtu/hr. The emission factor document does not specify the heating value to convert the factors from lb/MMscf to lb/MMBtu. For biogas it is assumed that the natural gas external combustion factors are representative, even though the heating value of biogas is much lower than that of natural gas. In this case, the lb/MMscf natural gas factors were applied to biogas combustion rate in scfm directly, which is conservative in estimating speciated HAP/TAP emissions from biogas combustion.

Table C-4a. Potential Emissions from Line 4

Operating Hours	8,760	hr/year
Line 4 Capacity	59,270	lb finished product/hr

	Emission Factors (lb/finished ton)		Emission Rate (lb/hr)		Emission Rate (tpy)	
Stage	**PM_{10}/ $PM_{2.5}$**	**VOC**	**PM_{10}/ $PM_{2.5}$**	**VOC**	**PM_{10}/ $PM_{2.5}$**	**VOC**
Line 4 Dryer and Two-Stage Fryer - Wet ESP [a]	0.065	0.413	1.92	12.23	8.41	53.59
TOTAL Line 4			**1.92**	**12.23**	**8.41**	**53.59**

[a] Line 4 dryer/fryer will be steam heated. Emissions from Line 4 dryer/fryer will be controlled by a new wet ESP. The PM emissions are based on vendor guarantee. VOC emissions from the wet ESP are based on recent McCain's Burley, ID plant source test results for a production line with a dryer and a two-stage fryer, accouting for a safety factor of 20%. The emission factor from the test report in lb/hr is converted to a lb/finished ton value using the production rate during the test. It is conservatively assumed all THC is VOC.

Table C-5a. Potential Emissions from the Existing Boilers 1, 2 and Lines 1-3 HVACs - Natural Gas

Natural Gas Heating Value [a]	1,020	Btu/scf
Maximum Heat Input Capacity [b]	210.40	MMBtu/hr
Maximum Annual Heat Input [b]	1,319,541.6	MMBtu/yr

Pollutant		Natural Gas Emission Factor (lb/MMscf)	Emission Factor (lb/MMBtu)	Emission Rate (lb/hr)	Emission Rate (tpy)
PM_{10}	[c]	7.6	7.45E-03	1.57	4.92
$PM_{2.5}$	[c]	7.6	7.45E-03	1.57	4.92
SO_2	[c]	0.6	5.88E-04	0.12	0.39
NO_X	[c]	100	0.10	20.63	64.68
VOC	[c]	5.5	5.39E-03	1.13	3.56
CO	[c]	84	8.24E-02	17.33	54.33
CO_2e	[d]		--	24,636.82	77,257.81
CO_2	[e]	--	116.98	24,611.40	77,178.10
N_2O	[e]	--	2.20E-04	0.05	0.15
CH_4	[e]	--	2.20E-03	0.46	1.45

[a] The natural gas heating value uses a typical heating value from AP-42.

[b] The maximum heat input capacity is based on vendor provided emission data at 100% firing rate for the two boilers, and as-built specifications for HVACs located at Lines 1-3. The maximum annual heat input is based on the natural gas usage limit from Approval Order 19AQ-E056, minus the maximum usage from Line 3 burner.

[c] Emission factors for small boilers (<100 MMBtu/hr) are obtained from Table 1.4.1 and Table 1.4.2, AP-42 Chapter 1.4, Natural Gas Combustion.

[d] The GHGs emissions are calculated based on the Global Warming Potentials (GWP) provided in Table A-1 of 40 CFR 98.

CO_2	1
N_2O	298
CH_4	25

[e] The emission factors are obtained from 40 CFR 98 Subpart C, Tables C-1 and C-2, and converted to values in lb/MMBtu.

Table C-5b. HAP Emissions - Boilers 1, 2 and Lines 1-3 HVACs

Estimated Heat Input by Natural Gas [a]		1,319,542	MMBtu/yr		
Pollutant	**HAP?**	**Emission Factor [b] (lb/MMscf)**	**Natural Gas (lb/MMBtu)**	**Emission Rate (lb/hr)**	**(tpy)**
Benzene	Yes	0.0058	5.69E-06	1.20E-03	3.75E-03
Formaldehyde	Yes	0.0123	1.21E-05	2.54E-03	7.96E-03
PAH's (including Naphthalene)	Yes	0.0004	3.92E-07	8.25E-05	2.59E-04
Naphthalene	Yes - included above	0.0003	2.94E-07	6.19E-05	1.94E-04
Acetaldehyde	Yes	0.0031	3.04E-06	6.39E-04	2.01E-03
Acrolein	Yes	0.0027	2.65E-06	5.57E-04	1.75E-03
Propylene	No	0.5300	5.20E-04	0.11	0.34
Toluene	Yes	0.0265	2.60E-05	5.47E-03	0.02
Xylenes	Yes	0.0197	1.93E-05	4.06E-03	1.27E-02
Ethyl Benzene	Yes	0.0069	6.76E-06	1.42E-03	4.46E-03
Hexane	Yes	0.0046	4.51E-06	9.49E-04	2.98E-03
TOTAL HAPs				0.02	0.05

[a] The natural gas heating value below is used to convert the AP-42 emission factors in lb/MMscf to lb/MMBtu, in accordance with footnotes in Chapter 1.4. The boiler can fire all of the biogas generated and supplement the remaining heat input by natural gas, or fire 100% natural gas.

Natural gas heating value 1,020 Btu/scf

[b] Emissions factors for HAPs are taken from the Ventura County Air Pollution Control District AB 2588 Combustion Emission Factors. http://www.aqmd.gov/docs/default-source/permitting/toxics-emission-factors-from-combustion-process-.pdf. The emission factors provided are in the unit of lb/MMscf for natural gas external combustion sources in the size of 10-100 MMBtu/hr. The emission factor document does not specify the heating value to convert the factors from lb/MMscf to lb/MMBtu. For biogas it is assumed that the natural gas external combustion factors are representative, even though the heating value of biogas is much lower than that of natural gas. In this case, the lb/MMscf natural gas factors were applied to biogas combustion rate in scfm directly, which is conservative in estimating speciated HAP/TAP emissions from biogas combustion.

Table C-6a. Potential Emissions from Line 1

Operating Hours	8,760	hr/year	
Line 1 Capacity	39,000	lb finished product/hr	

	Emission Factors (lb/finished ton)		Emission Rate (lb/hr)		Emission Rate (tpy)	
Stage	**PM_{10}/ $PM_{2.5}$**	**VOC**	**PM_{10}/ $PM_{2.5}$**	**VOC**	**PM_{10}/ $PM_{2.5}$**	**VOC**
Line 1 Dryer [a]	0.25	--	4.88	--	21.35	--
Line 1 Fryer Stage A - Batter [b]	0.107	0.092	2.08	1.80	9.12	7.88
Line 1 Fryer Stage B - Batter [c]	0.0564	0.092	1.10	1.80	4.82	7.88
Line 1 Fryer Stage B - Conventional [c]	0.1087	0.092	2.12	1.80	9.29	7.88
TOTAL Line 1 [d]			**8.06**	**3.60**	**35.29**	**15.76**

[a] Line 1 dryer is steam heated. The PM emissions are based on Othello's dryer emission factor.

[b] Line 1 fryer stage A is for battered products only, and is controlled by the existing Wet ESP. PM emission factor is based on Wet ESP permit limit of 0.0262 gr/dscf per NOC No. DE 98AQ-E121, but scaled to a lb/finished ton factor using 2011 test result. VOC emissions are based on Othello's emission factor for fryers (test data applying 20% safety factor).

[c] Line 1 fryer stage B is for battered products and conventional products, and is controlled by the existing air washer. PM emission factor is based on source test based on air washer outlet for the corresponding product type (batter or conventional), accounting for 20% safety factor. VOC emissions are based on Othello's emission factor for fryers.

[d] Line 1 total emissions include dryer and fryer emissions. Fryer emissions are based on the batter products emissions for conservatism, because emissions are higher for manufacturing batter products than conventional products.

Table C-6b. Potential Emissions from Line 2

Operating Hours	8,760	hr/year	
Line 2 Capacity	39,000	lb finished product/hr	

	Emission Factors (lb/finished ton)		Emission Rate (lb/hr)		Emission Rate (tpy)	
Stage	**PM_{10}/ $PM_{2.5}$**	**VOC**	**PM_{10}/ $PM_{2.5}$**	**VOC**	**PM_{10}/ $PM_{2.5}$**	**VOC**
Line 2 Dryer [a]	0.25	--	4.88	--	21.35	--
Line 2 Fryer - Conventional [b]	0.1087	0.092	2.12	1.80	9.29	7.88
TOTAL Line 2			**7.00**	**1.80**	**30.64**	**7.88**

[a] Line 2 dryer is steam heated. The PM emissions are based on Othello's dryer emission factor.

[b] Line 2 fryer is only for conventional products, and is controlled by the existing air washer. PM emission factor is based on source test based on air washer outlet for the corresponding product. VOC emissions are based on Othello's emission factor for fryers.

Table C-7a. Potential Emissions from the Line 3 Dryer

Operating Hours	8,760	hr/year	
Line 3 Capacity	10,000	lb finished product/hr	
Natural Gas Heating Value [a]	1,020	Btu/scf	
Maximum Heat Input Capacity [b]	2.40	MMBtu/hr	

Pollutant	Natural Gas Emission Factor (lb/MMscf)	Exhaust Gas Emission Factor (lb/MMBtu)	Emission Rate (lb/hr)	Emission Rate (tpy)
SO_2 [c]	0.6	5.88E-04	1.41E-03	6.18E-03
NO_X [c]	153	0.15	0.36	1.58
VOC [c]	5.5	0.01	1.29E-02	0.06
CO [c]	373	0.37	0.88	3.84
CO_2e [d]			281.04	1,230.93
CO_2 [d]	--	116.98	280.75	1,229.66
N_2O [d]	--	2.20E-04	5.29E-04	2.32E-03
CH_4 [d]	--	2.20E-03	5.29E-03	0.02
PM_{10}/ $PM_{2.5}$ [e]	0.25	lb/ton finished product	1.25	5.48

[a] The natural gas heating value below is used to convert the AP-42 emission factors in lb/MMscf to lb/MMBtu, in accordance with footnotes in Chapter 1.4.

[b] Line 3 dryer is a direct-fired dryer. The burner was retrofitted in 2011 with two 1.2 MMBtu/hr burners.

[c] Emission factors from natural gas combustion are obtained from Table 1.4.1 and Table 1.4.2, AP-42 Chapter 1.4, Natural Gas Combustion. NO_X and CO emission factors are based on April 1994 Ore-Ida source test for Ontario, OR facility, which are the best available source of factors from a direct-fired dryer using natural gas.

[d] The emission factors for each GHG are obtained from 40 CFR 98 Subpart C, Tables C-1 and C-2 for natural gas combustion, and converted to values in lb/MMBtu. The GHGs emissions are calculated based on the Global Warming Potentials (GWP) provided in Table A-1 of 40 CFR 98.

CO_2	1
N_2O	298
CH_4	25

[e] PM emissions are determined based on Othello's dryer emission factor.

Table C-7b. Potential Emissions from Line 3 Fryer

Operating Hours	8,760	hr/year	
Line 3 Capacity	10,000	lb finished product/hr	

Stage	Emission Factors (lb/finished ton)		Emission Rate (lb/hr)		Emission Rate (tpy)	
	PM_{10}/ $PM_{2.5}$	VOC	PM_{10}/ $PM_{2.5}$	VOC	PM_{10}/ $PM_{2.5}$	VOC
Line 3 Fryer - Co-product [a]	0.107	0.092	0.53	0.46	2.34	2.02

[a] Line 3 fryer is only for co-product only, and is controlled by the existing wet ESP. PM emission factor is based on Wet ESP permit limit of 0.0262 gr/dscf per NOC No. DE 98AQ-E121, but scaled to a lb/finished ton factor using 2011 test result. VOC emissions are based on Othello's emission factor for fryers.

Table C-7c. Potential Emissions from Line 3

Pollutant	Hourly Emission Rate (lb/hr)	Annual Emission Rate (tpy)
PM_{10}	1.78	7.81
$PM_{2.5}$	1.78	7.81
SO_2	1.41E-03	6.18E-03
NO_X	0.36	1.58
VOC	0.47	2.08
CO	0.88	3.84
HAPs	1.93E-04	8.45E-04
CO_2e	281	1,231

Table C-7d. HAP Emissions - Line 3

Maximum Operating Hours	8760	hr/yr	
Estimated Heat Input by Natural Gas [a]	21,024	MMBtu/yr	

Pollutant	HAP?	Factor [b] (lb/MMscf)	Natural Gas (lb/MMBtu)	Emission Rate (lb/hr)	Emission Rate (tpy)
Benzene	Yes	0.0058	5.69E-06	1.36E-05	5.98E-05
Formaldehyde	Yes	0.0123	1.21E-05	2.89E-05	1.27E-04
PAH's (including Naphthalene)	Yes	0.0004	3.92E-07	9.41E-07	4.12E-06
Naphthalene	Yes - included above	0.0003	2.94E-07	7.06E-07	3.09E-06
Acetaldehyde	Yes	0.0031	3.04E-06	7.29E-06	3.19E-05
Acrolein	Yes	0.0027	2.65E-06	6.35E-06	2.78E-05
Propylene	No	0.5300	5.20E-04	1.25E-03	5.46E-03
Toluene	Yes	0.0265	2.60E-05	6.24E-05	2.73E-04
Xylenes	Yes	0.0197	1.93E-05	4.64E-05	2.03E-04
Ethyl Benzene	Yes	0.0069	6.76E-06	1.62E-05	7.11E-05
Hexane	Yes	0.0046	4.51E-06	1.08E-05	4.74E-05

[a] The natural gas heating value below is used to convert the AP-42 emission factors in lb/MMscf to lb/MMBtu, in accordance with footnotes in Chapter 1.4. The boiler can fire all of the biogas generated and supplement the remaining heat input by

Natural gas heating value 1,020 Btu/scf

[b] Emissions factors for HAPs are taken from the Ventura County Air Pollution Control District AB 2588 Combustion Emission Factors. http://www.aqmd.gov/docs/default-source/permitting/toxics-emission-factors-from-combustion-process-.pdf

Table C-8a. Potential Emissions from Line 4 HVAC Systems

Natural Gas Heating Value [a]	1,020	Btu/scf
Line 4 HVAC Units Heat Input Capacity [b]	65.35	MMBtu/hr
Annual Heat Input [b]	96,900	MMBtu/yr

Pollutant		Natural Gas Emission Factor (lb/MMscf)	Emission Factor (lb/MMBtu)	Emission Rate (lb/hr)	Emission Rate (tpy)
PM_{10}	[c]	7.6	7.45E-03	0.49	0.36
$PM_{2.5}$	[c]	7.6	7.45E-03	0.49	0.36
SO_2	[c]	0.6	5.88E-04	0.04	0.03
NO_X	[c]	100	0.10	6.41	4.75
VOC	[c]	5.5	5.39E-03	0.35	0.26
CO	[c]	84	8.24E-02	5.38	3.99
CO_2e	[d]		--	7,652.84	5,673.40
CO_2	[e]	--	116.98	7,644.94	5,667.54
N_2O	[e]	--	2.20E-04	1.44E-02	1.07E-02
CH_4	[e]	--	2.20E-03	0.14	0.11

[a] The natural gas heating value uses a typical heating value from AP-42.

[b] The maximum heat input is the sum of all Line 4 HVAC systems. Annual heat input is based on the proposed natural gas usage.

[c] Emission factors for small boilers (<100 MMBtu/hr) are obtained from Table 1.4.1 and Table 1.4.2, AP-42 Chapter 1.4, Natural Gas Combustion.

[d] The GHGs emissions are calculated based on the Global Warming Potentials (GWP) provided in Table A-1 of 40 CFR 98.

CO_2	1
N_2O	298
CH_4	25

[e] The emission factors are obtained from 40 CFR 98 Subpart C, Tables C-1 and C-2, and converted to values in lb/MMBtu.

Table C-8b. TAP and HAP Emissions - HVAC Systems

Estimated Heat Input by Natural Gas [a]	96,900	MMBtu/yr

Pollutant	HAP?	Emission Factor [b] (lb/MMscf)	Natural Gas (lb/MMBtu)	Emission Rate (lb/hr)	Emission Rate (tpy)
Benzene	Yes	0.0058	5.69E-06	3.72E-04	2.76E-04
Formaldehyde	Yes	0.0123	1.21E-05	7.88E-04	5.84E-04
PAH's (including Naphthalene)	Yes	0.0004	3.92E-07	2.56E-05	1.90E-05
Naphthalene	Yes - included above	0.0003	2.94E-07	1.92E-05	1.43E-05
Acetaldehyde	Yes	0.0031	3.04E-06	1.99E-04	1.47E-04
Acrolein	Yes	0.0027	2.65E-06	1.73E-04	1.28E-04
Propylene	No	0.5300	5.20E-04	0.03	0.03
Toluene	Yes	0.0265	2.60E-05	1.70E-03	1.26E-03
Xylenes	Yes	0.0197	1.93E-05	1.26E-03	9.36E-04
Ethyl Benzene	Yes	0.0069	6.76E-06	4.42E-04	3.28E-04
Hexane	Yes	0.0046	4.51E-06	2.95E-04	2.19E-04
TOTAL HAPs				5.25E-03	3.90E-03

[a] The natural gas heating value below is used to convert the AP-42 emission factors in lb/MMscf to lb/MMBtu, in accordance with footnotes in Chapter 1.4. The boiler can fire all of the biogas generated and supplement the remaining heat input by natural gas, or

Natural gas heating value 1,020 Btu/scf

[b] Emissions factors for HAPs are taken from the Ventura County Air Pollution Control District AB 2588 Combustion Emission Factors. http://www.aqmd.gov/docs/default-source/permitting/toxics-emission-factors-from-combustion-process-.pdf

Table C-9a. Emission Summary For Generator 1

Fuel:	Diesel	**Generator Manufacturer:**	Cummins Onan
Maximum Hours of Operation (hr/yr):	500	**Generator Model:**	300DFCB
Maximum Engine Rating (hp):	465	**Engine Manufacturer:**	Cummins
Estimated Fuel Use (gal/hr) [a]:	23.8	**Engine Model:**	NTA855-G2

Pollutant	Emissions (lb/hr)	Emissions (tpy)	Emission Factor	Emission Factor Units	Emission Factor Source [b]	Notes
Criteria:						
Particulate Matter (PM)	1.02	0.26	2.20E-03	lb/hp-hr	AP-42 Table 3.3-1	
Particulate Matter <10 microns (PM_{10})	1.02	0.26	2.20E-03	lb/hp-hr	AP-42 Table 3.3-1	Assumed equal to PM.
Particulate Matter < 2.5 microns ($PM_{2.5}$)	1.02	0.26	2.20E-03	lb/hp-hr	AP-42 Table 3.3-1	Assumed equal to PM.
Sulfur Dioxide (SO_2)	0.95	0.24	2.05E-03	lb/hp-hr	AP-42 Table 3.3-1	
Carbon Monoxide (CO)	3.11	0.78	6.68E-03	lb/hp-hr	AP-42 Table 3.3-1	
Nitrogen Oxides (NO_X)	14.42	3.60	0.031	lb/hp-hr	AP-42 Table 3.3-1	Assumed to be uncontrolled.
Volatile Organic Compounds (VOC)	1.17	0.29	2.51E-03	lb/hp-hr	AP-42 Table 3.3-1	Assume all Organic Compounds are VOC.
GHG:						
Carbon Dioxide (CO_2)	---	132.68	73.96	kg/MMBtu	40 CFR 98, Table C-1	
Methane (CH_4)	---	0.01	0.003	kg/MMBtu	40 CFR 98, Table C-2	
Nitrous Oxide (N_2O)	---	0.00	0.0006	kg/MMBtu	40 CFR 98, Table C-2	
Total Carbon Dioxide Equivalent (CO_2e) [a,c]		**133.14**				

[a] Esimated fuel use is converted based on the average brake-specific fuel consumption of 7,000 Btu/hp-hr and the diesel fuel heating value per AP-42 (Btu/gal) of 137000.

[b] promulgation.

[c] The Global Warming Potential for CO_2 is 1, CH_4 is 25 and N_2O is 298 per 40 CFR 98 Table A-1.

Table C-9b. Emission Summary For Generator 2

Fuel:	Diesel	**Generator Manufacturer:**	Caterpillar
Maximum Hours of Operation (hr/yr):	500	**Generator Model:**	C9
Maximum Engine Rating (kW):	358		
Maximum Engine Rating (hp):	480		
Maximum Fuel Use (gal/hr):	22.4		
Maximum Fuel Use (gal/yr):	11,200		

Pollutant	**Emissions (lb/hr)**	**Emissions (tpy)**	**Emission Factor**	**Emission Factor Units**	**Emission Factor Source [b]**	**Notes**
Criteria:						
Particulate Matter (PM)	0.16	0.04	0.20	g/kW-hr	NSPS IIII	Tier III limit for PM
Particulate Matter <10 microns (PM_{10})	0.25	0.06	NA	lb/hr	Filterable PM + Condensable PM	Condensable PM is assumed to be the same as HC
Particulate Matter < 2.5 microns ($PM_{2.5}$)	0.25	0.06	NA	lb/hr		
Sulfur Dioxide (SO_2)	0.98	0.25	2.05E-03	lb/hp-hr	AP-42 Table 3.3-1	
Carbon Monoxide (CO)	2.76	0.69	3.50	g/kW-hr	NSPS IIII	Tier III limit for CO
Nitrogen Oxides (NO_X)	3.16	0.79	4.00	g/kW-hr	NSPS IIII	Tier III limit for NOX + HC
Volatile Organic Compounds (VOC)	0.09	0.02	0.09	lb/hr	Engine Emissions Data	Assume all hydrocarbons are VOC; highest of all five load points
GHG:						
Carbon Dioxide (CO_2)	---	125.09	73.96	kg/MMBtu	40 CFR 98, Table C-1	
Methane (CH_4)	---	0.01	0.003	kg/MMBtu	40 CFR 98, Table C-2	
Nitrous Oxide (N_2O)	---	0.00	0.0006	kg/MMBtu	40 CFR 98, Table C-2	
Total Carbon Dioxide Equivalent (CO_2e)		**125.52**				

[a] Diesel fuel heating value per AP-42 (Btu/gal) 137,000

[b] Emissions factors were obtained from AP-42, Section 3.3, 40 CFR 89 Subpart B, and 40 CFR 98 Subpart C, where manufacturer's data is not available.

[c] The Global Warming Potential for CO_2 is 1, CH_4 is 25 and N_2O is 298 per 40 CFR 98 Table A-1.

Table C-9c. Diesel Internal Combustion Engine HAP Emissions - For Both Generators

Pollutant	**CAS Number**	**HAP?**	**Diesel Fired Industrial Engines [1] (lb/MMBtu)**	**Emissions (lb/hr)**	**HAP Emissions [2] (tpy)**
Benzene	71-43-2	Yes	9.33E-04	5.90E-03	1.48E-03
Toluene	108-88-3	Yes	4.09E-04	2.59E-03	6.47E-04
Xylenes	1330-20-7	Yes	2.85E-04	1.80E-03	4.51E-04
1,3-Butadiene	106-99-0	Yes	3.91E-05	2.47E-04	6.18E-05
Formaldehyde	50-00-0	Yes	1.18E-03	7.46E-03	1.87E-03
Acetaldehyde	75-07-0	Yes	7.67E-04	4.85E-03	1.21E-03
Acrolein	107-02-8	Yes	9.25E-05	5.85E-04	1.46E-04
Total Polycyclic Aromatic Hydrocarbons (PAH)	--	Yes	1.68E-04	1.06E-03	2.66E-04
Total HAP				**0.02**	**6.12E-03**

[a] Emission factors are from Table 3.3-2-4 AP-42.

[b] List of HAP established by 42 U.S.C. 7412(b)(1).

APPENDIX D. EQUIPMENT SPECIFICATIONS

Data 160
11/7/04

Eclipse Combustion

AirHeat Burners

AH-MA Series

Version 2.20

Main Specifications

Parameter	Description
Input (Btu/hr./ft.)	1,200,000 maximum
Combustion Airstream Pressure Drop/Velocity	0.2" to 1.4"w.c.
Ignition	Direct spark ignition (6000VAC).
Pilot	Interruptible pilot for natural gas, propane or butane.
Integral Pilot Capacities	20,000 Btu/hr.
Burner Bodies	Standard Aluminum Low Pressure Aluminum* Standard Cast Iron Corrosion Resistant, EN Plated Cast Iron Low Pressure Cast Iron*
Burner Section Sizes	• 150mm (6") straight section • 300mm (12") straight section • 300mm (12") straight section with back inlet • 300mm (12") straight section with pilot • 150mm (6") by 300mm (12") tee section • 150mm (6") by 300mm (12") tee section with pilot • 300mm (12") by 300mm (12") cross section
Pipe Threads	N.P.T. or B.S.P.
Maximum Upstream Air Temp.	450°F (232°C)
Maximum Downstream Air Temp.	850°F (454°C)
Maximum Temperature Rise	750°F (400°C)
Minimum Inlet Air Oxygen (O2)	18%
Flame Detection**	Flame rod or scanner.
Fuels	Natural gas, propane or butane.

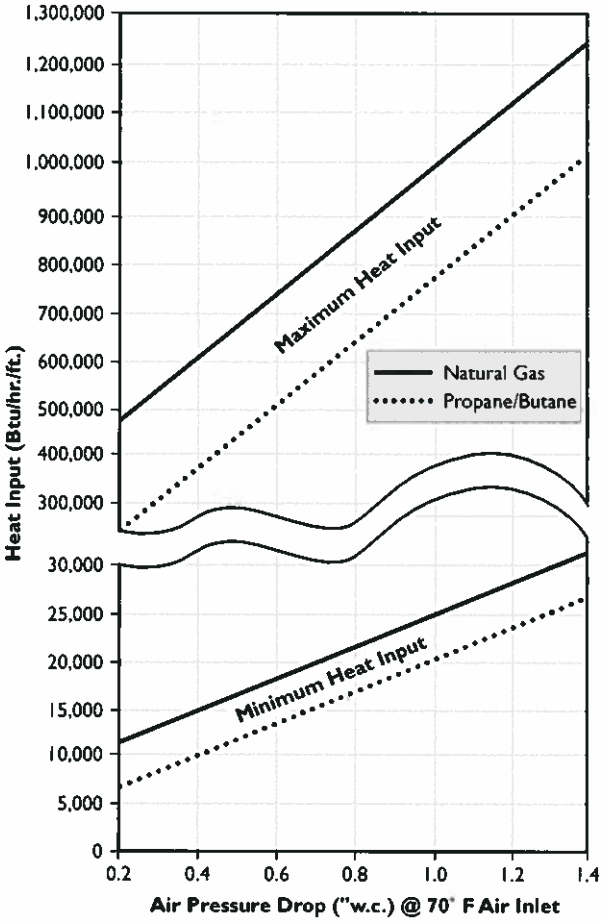
* For use with Natural Gas only.

** Burners over 5 lineal feet include flame supervision at the far end. If pilot ignition is being used, two flame supervision units are required; one for the pilot and one for the far end. If using direct spark on the main flame, only flame supervision at the far end is required providing ignition can be accomplished within 15 seconds. (Reference NFPA Requirement 5-9.2.2)

- Eclipse reserves the right to change the construction and/or configurations of our products at any time without being obliged to adjust earlier supplies accordingly.
- All information is based on laboratory testing. Different chamber size and air flow conditions may affect the data.
- All information is based on standard conditions (70°F at sea level). Contact Eclipse for performance data above ambient temperature.
- All inputs based on gross caloric values.

ECLIPSE™ Innovative Thermal Solutions

Operating Range & Duct Pressure Measurement



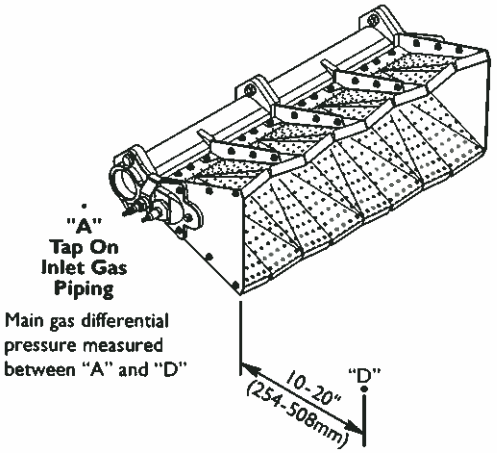
Inlet Air Temperature Correction

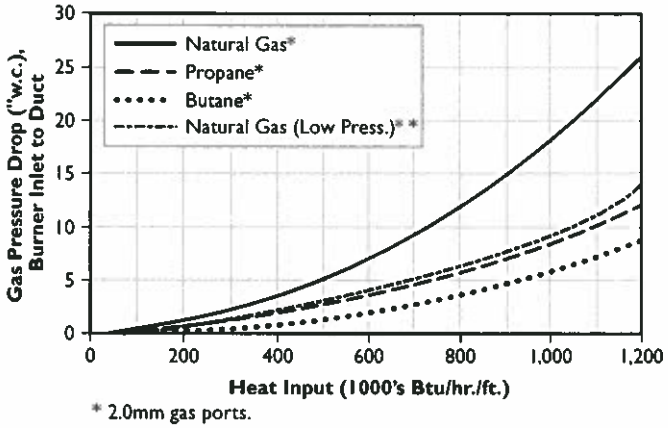
Air Press. Drop @ Air Temp. = Air Press. Drop from "Oper. Range" Chart x Correction Factor										
Air Inlet Temp. (°F)	**0**	**30**	**70**	**150**	**200**	**250**	**300**	**350**	**400**	**450**
Correction Factor	0.87	0.92	1.00	1.15	1.25	1.34	1.43	1.53	1.62	1.72

Air Velocity Calculation

$$\text{Air Velocity (fpm)} = 1096.2 \sqrt{\frac{\text{Air Pressure Drop ("w.c.)}}{\text{Air Density (lbs./cubic ft.)}}}$$

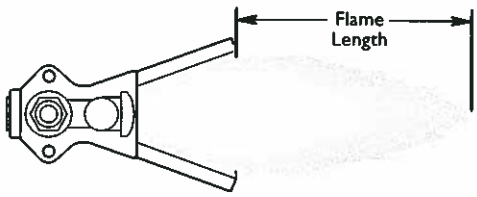
Differential Pressure Measurement & Burner Gas Pressure Drops



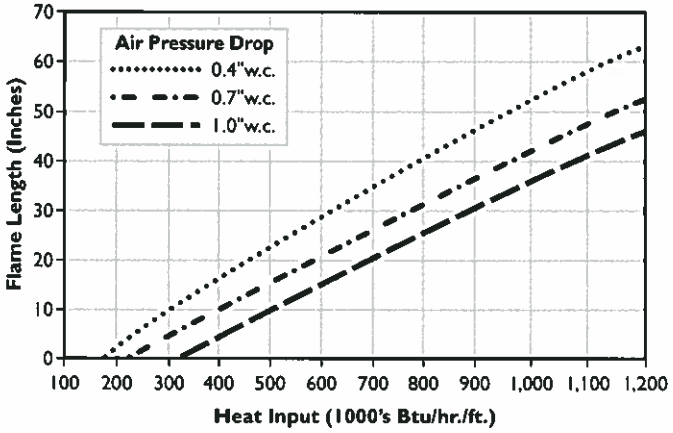


* 2.0mm gas ports.
** 2.4mm gas ports

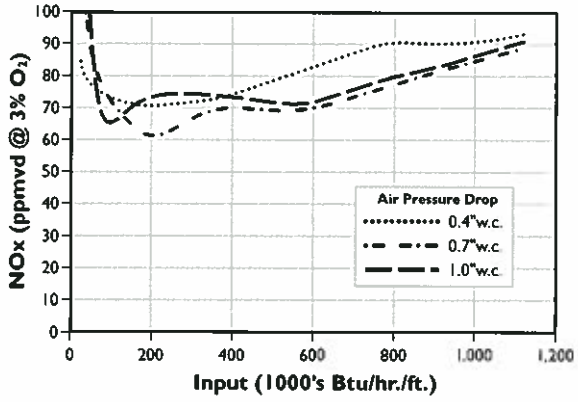
Flame Lengths

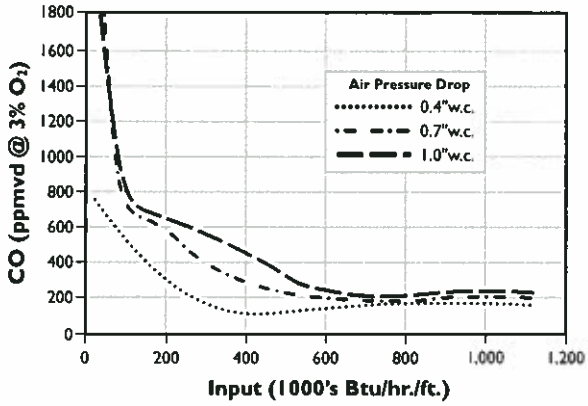


Note:
Flame length may vary slightly from these values depending on actual fuel, air handling system, duct configuratons and profile plates uses.



Emissions Data





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