US ARMY JOINT BASE LEWIS-McChord

FACILITY 21277

2022
Potential to Emit
Revision 4

Revision made to:
Scale Factor Calculation in Sections 4 & 8

TABLE OF CONTENTS

1 Summary

Joint Base Lewis-McChord formed in 2011 when the US Army Fort Lewis joined with McChord Field Air Force Base. Prior to Joint Basing, Fort Lewis was a synthetic minor air emission source regulated under Notice of Construction (NOC) General Regulatory Order No. 9185 while McChord Field was regulated under NOC No. 9364. Prior to joining with Fort Lewis, McChord Field's emission inventory calculated Oxides of Nitrogen (NOx), Oxides of Sulfur (SOx) and Carbon Monoxide (CO) generated from fuel oil and natural gas combustion, even though other permitted emission sources, such as aerospace coating and fueling, were present. Fort Lewis, a much larger and more complex facility that was once regulated as a Title V emission source, generated NOx, SOx, and CO, as well as Lead, Hazardous Air Pollutants (HAPs), Toxic Air Pollutants (TAPs) and Volatile Organic Compounds (VOCs) from external and internal combustion, fueling, abrasive blasting, coating operations, aerospace, landfills, and solvent usage. After Joint Basing all source types at McChord Field were included under JBLMs air emissions inventories in accordance with the conditions of NOC 11247. Sections 4-12 provide physical inventories and the associated Potential to Emit (PTE) for each source type. Basewide totals are provided in Section 3.

2 Potential to Emit Criteria

JBLMs PTE provided in Tables 3-1 and 3-2, was performed in accordance the Air Force Potential to Emit (PTE) Guide, December 2014. JBLM calculated the PTE for emission sources using one or more of the following criteria. Details are provided in the applicable sections for each source.

- Standard Criteria: The standard criteria of 8670 hours was used for boilers, and 500-hours for emergency diesel generators.

- Historical Data. The September 6, 1995 Environmental Protection Agency (EPA) guidance entitled "Calculating Potential to Emit (PTE) for Emergency Generators," U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards," otherwise known as "Seitz 1995b" authorizes source owners to use historical data-driven PTE estimates. Data from 2016-2020 was used with the Mission Multiplier described below, to calculate the PTE for abrasive blasting, wood working, solvent usage, degreasing, and surface coating.

- Mission Multiplier: JBLM's emissions from abrasive blasting, wood working, solvent usage, degreasing, and surface coating from 2016-2020 were generated during a 2080-hour work year. The maximum PTE for these sources was calculated using historical data, with a scale factor to estimate maximum emissions for the 8670-hour work year, i.e. the current emissions generated under a 40-hour work week are scaled up to a 24-hour, 7-days a week, 365-days per year, operation.

- Permit Limits: Permit limits directed by Notices of Construction.

- Maximum Process Capacity Rate/Time. The Maximum Process Capacity Rate is the maximum throughput or capability under a sources physical and/or operational design such as that described in the application for the Engineering Test Stand, permitted in 2019. This criteria is also used to estimate emissions from Fuel Cell Maintenance and Fuel Dispensing.

3 Basewide Potential to Emit

JBLMs basewide Potential to Emit for Criteria Pollutants by Source is provided in Table 3-1. Basewide emissions for TAPs and HAPs is provided in Table 3-2. The HAPs are shown in red. The basewide PTE for HAPs is 4.08 tpy. Toluene has the greatest PTE for HAPs.

Table 3-1 PTE Criteria Pollutants by Source, tons per year

Source	CO	NOx	SOx	VOC	Lead	PM
External Combustion Equipment	285.02	250.89	2.18	18.64	0.01	26.08
Fuel Cell Maintenance	0.00	0.00	0.00	1.36	0.00	0.00
Generators, Diesel	28.00	73.09	0.042	5.02	0	4.12
Fuel Dispensing	0.00	0.00	0.00	39.73	0.00	0.00
Fire Training	0.23	0.086	.0003	0.1425	0.00	0.36
Degreasing and General Solvent Use	0.00	0.00	0.00	45.64	0.00	0.00
Jet Engine Testing	0.79	1.61	0.16	0.10	0.00	0.29
Landfill (Closed)	0.37	0.00	0.00	0.00	0.00	0.00
Surface Coating Operations	0.00	0.00	0.00	7.37	0.00	1.25
Woodworking and Abrasive Blasting	0.00	0.00	0.00	0.00	0.00	12.76
Total	**314.41**	**325.68**	**2.38**	**118.02**	**0.01**	**46.86**

Table 3-2 PTE Toxic Air Pollutants, tons per year (HAPs in red)

CAS #	Pollutant Name	ABCL	CELL	ECOM	FDSP	FIRE	DEGR	ICOM	JET	LAND	SURF	Total
75343	1,1-Dichloroethane									0.021739		**0.021739**
106990	1,3-Butadiene			0.012273	0.000426			0.000474				**0.013173**
540841	2,2,4-Trimethylpentane		0.000028		0.787722							**0.78775**
56495	3-Methylcholanthrene			0.000001								**0.000001**
75070	Acetaldehyde			0.302747				0.009481	0.000129			**0.312357**
107028	Acrolein			0.299039				0.001198	0.00017			**0.300407**
107131	Acrylonitrile									0.031337		**0.031337**
7440382	Arsenic			0.001962								**0.001962**
56553	Benz(A)Anthracene			0.000013				0.000008				**0.000021**
57976	Benz[A]Anthracene, 7,12-Dimethyl-			0.000019								**0.000019**
71432	Benzene		0.021114	0.025422	0.427541			0.019383	0.000685	0.080886		**0.5750305**
50328	Benzo[A]Pyrene			0.000008				0.000001				**0.000009**
205992	Benzo[B]Fluoranthene			0.000001				0.000011				**0.000012**
207089	Benzo[K]Fluoranthene			0.000001				0.000001				**0.000002**
7440417	Beryllium			0.000016								**0.000016**
7440439	Cadmium			0.004894								**0.004894**
75150	Carbon Disulfide									0.004118		**0.0041181**
56235	Carbon Tetrachloride									5.74E-05		**0.0000574**
108907	Chlorobenzene			0.000166						0.002625		**0.0027911**
67663	Chloroform									0.000334		**0.0003339**
7440473	Chromium			0.005168							0.003866	**0.009034**
18540299	Chromium Hexavalent Ion			0.000082								**0.000082**
218019	Chrysene			0.000012				0.000017				**0.000029**
7440484	Cobalt			0.000206								**0.000206**
4170303	Crotonaldehyde								0.000069			**0.000069**
98828	Cumene		0.00519		0.078867						0.01079	**0.094847**
53703	Dibenz[A,H]Anthracene			0.000005				0.000002				**0.000007**
84742	Dibutyl Phthalate										0.000086	**0.000086**
78875	Dichloropropane									0.001895		**0.001895**
112345	Diethylene Glycol Monobutyl Ether										0.000686	**0.000686**
75003	Ethyl Chloride									0.007523		**0.0075225**
100414	Ethylbenzene		0.009754	0.026069	0.226896		0.012838		0.00004	0.045693	0.085846	**0.4071359**
106934	Ethylene Dibromide									1.76E-05		**1.76E-05**
107062	Ethylene Dichloride									0.00379		**0.00379**

Table 3-2 PTE Toxic Air Pollutants, tons per year (HAPs in red)

CAS #	Pollutant Name	ABCL	CELL	ECOM	FDSP	FIRE	DEGR	ICOM	JET	LAND	SURF	Total
107211	Ethylene Glycol						0.009726					**0.009726**
50000	Formaldehyde			0.418771		0.0105		0.015037	0.000909			**0.445217**
822060	Hexamethylene-1,6-Diisocyanate										0.047635	**0.047635**
7647010	Hydrochloric Acid			0.154251								**0.154251**
7783064	Hydrogen Sulfide									0.113207		**0.113207**
193395	Indeno[1,2,3-Cd]Pyrene			0.000005				0.000002				**0.000007**
67630	Isopropyl Alcohol (Isopropanol)									0.281377		**0.2813768**
7439921	Lead			0.010216								**0.010216**
18454121	Lead Chromate(VI) Oxide										0.000014	**0.000014**
7439965	Manganese			0.003834								**0.003834**
7439976	Mercury			0.002532						5.45E-06		**0.00253745**
67561	Methanol										0.000833	**0.000833**
74873	Methyl Chloride									0.005701		**0.0057014**
78933	Methyl Ethyl Ketone								0.000039	0.047744		**0.0477828**
108101	Methyl Isobutyl Ketone						0.065533			0.017473	0.160017	**0.2430232**
75092	Methylene Chloride									0.113207		**0.113207**
108383	M-Xylene										0.003584	**0.003584**
91203	Naphthalene		0.000436	0.005378	0.026867			0.002382	0.000228		0.000201	**0.035492**
110543	N-Hexane			0.020021	0.289561					0.05283		**0.3624119**
7440020	Nickel			0.010259								**0.010259**
SOX	Oxides Of Sulfur			2.184913		0.0003		0.042621	0.161112			**2.388946**
106467	P-Dichlorobenzene			0.004049								**0.004049**
108952	Phenol								0.000024			**0.000024**
107982	Propylene Glycol Monomethyl Ether						0.077168				0.030209	**0.107377**
106423	P-Xylene										0.015034	**0.015034**
7782492	Selenium			0.001856								**0.001856**
7789062	Strontium Chromate										0.01718	**0.01718**
100425	Styrene								0.000066		0.000913	**0.000979**
79345	Tetrachloroethane									0.017391		**0.0173912**
127184	Tetrachloroethylene									0.057752		**0.057752**
108883	*Toluene*		*0.038552*	*0.103233*	*1.249248*		*0.12524*	*0.007873*	*0.000191*	*1.419189*	*0.183393*	***3.1269187***
79016	Trichloroethylene									0.034536		**0.0345363**

Table 3-2 PTE Toxic Air Pollutants, tons per year (HAPs in red)

CAS #	Pollutant Name	ABCL	CELL	ECOM	FDSP	FIRE	DEGR	ICOM	JET	LAND	SURF	Total
121448	Triethylamine										0.000242	**0.000242**
75014	Vinyl Chloride									0.042822		**0.0428217**
1330207	Xylene		0.06389	0.001326	1.136635		0.032488	0.005469	0.000146	0.11977	0.46107	**1.8207937**
	Totals		0.138964	3.598748	4.223763	0.0108	0.322993	0.10396	0.163808	2.523018	1.021599	12.1076531

4. ABCL & WOOD: Abrasive Blasting and Woodworking

JBLM has two abrasive blasting operations and seven wood working operations controlled by baghouses or cyclones listed in Table 4-1. The total combined usage from 2016-2020 for sources regulated under Condition 4.f. of JBLM's current Regulatory Order is provided in Table 4-2.

Table 4-1 Source Inventory

Bldg.	NOC	Pollution Control Equipment
1401	12145	Vibraclean Sternvent Model DKPD48015-2 4800 cfm
2044	8530	Sternvent Model DKRD 72025-4 6287 cfm
1325	9566[2]	Murphy Rogers Inc Model MRSE-20-6D 10600 cfm
3098	7057	Pauli Griffin, RAM 21-2C Dry Stripping Machine
4076	12102	Vibraclean Sternvent Model DK360 3600 cfm
9630	Submitted	Sternvent Model DKRD 36010-2 2200-3600 cfm
9985	8424	Sternvent Model DKRD 48020-2 5750 cfm
J00545[1]	Exempt	Cyclone
J00745	7723[2]	Pauli Griffin RAM 15220 Single Stage Dry Filter Media Blast Booth
J01422[1]	Exempt	Sternvent Baghouse

1. Equipment does not fall under Condition 4.f. of JBLM's current Regulatory Order but is included in the PTW based on usage from 2021.
2. Equipment regulated under NOC 4306 is unused.

Table 4-2 Combined Usage for Operating Years 2016-2020 (hours per year)

	2016	2017	2018	2019	2020
Hours	790	598	584	904	1,369

The maximum process rate for the potential to emit was derived from individual source's highest annual usage from 2016 – 2020. For example, the number of hours logged for the baghouse at Building 1401 was the highest in 2020 at 133 hours during a 2080-hour work year. These data points, provided in Table 4-3, were used for the maximum process rate, because they capture the complexities and variations of work performed at JBLM, to include limiting factors related to staffing, mission, and hours of operation. During one week at JBLM, a source may be used to blast an entire helicopter body, and the next week used to blast the helicopters four rotor blades. Both processes entail one team dismantling the equipment, moving the equipment into a booth, donning protective clothing, performing blasting operations, cleaning up, doffing protective gear, and reassembling the equipment. The blast booth would not be used during this entire process. JBLM is not a business and does not perform tasks to a sources maximum process capacity. These processes are performed on tactical equipment inventories limited to JBLM's mission scope to mitigate equipment wear and tear and/or perform regularly scheduled maintenance. The rational for this approach is articulated in Section 3 of the Air Force Potential to Emit Guide, December 2014 which references the June 13, 1989, EPA memorandum titled "Guidance on Limiting Potential to Emit in New Source Permitting Seitz 1989"

To summarize, the PTE uses highest historic usage from the years of 2016-2020, under the 2080-hour work year as the maximum process rate. To meet PSCAAs request to calculate the PTE using 8760 hours per year, the maximum process rate for each source was scaled up from a 2080 work year to 8760 hours using the following scale factor equation.

$$Scale\ Factor = \frac{8760\ hours}{2080\ hours} = 4.21$$

For example, in 2018 the baghouse at Bldg. 4076 was used 297 hours, the highest usage of any year between 2017 and 2021. The maximum capacity rate used in the PTE for Building 4076 for an 8760 hour year is:

$$Calculated\ Maximum\ Capacity\ Rate\ (Bldg\ 4076) = 4.21\ x\ 297 = 1250.37\ hours$$

Table 4-3 Maximum Capacity Rates for Abrasive Blasting and Woodworking

Bldg.	Equipment	Highest annual usage from 2016-2020 (hours)	JBLM Scaled Maximum Process Capacity (hours)
1401	Vibraclean Sternvent Model DKPD48015-2 4800 cfm	133	559.93
2044	Sternvent Model DKRD 72025-4 6287 cfm	3	12.63
3098	Pauli Griffin, RAM Baghouses, 18000 cfm	77.3[1]	325.43
4076	Vibraclean Sternvent Model DK360 3600 cfm	297	1250.37
9566	Murphy Rogers Inc Model MRSE-20-6D	0[2]	0
9630	Sternvent DKRD 36010-2 2200 – 3600 cfm	618	2601.78
9985	Sternvent Model DKRD 48020-2 5750 cfm	20	84.20
J00545	Cyclone	6	25.26
J00745	Pauli Griffin PRAM 15220 Single Stage Dry Filter Media Blast Booth System	4.75	20.00
J01422	Sternvent Baghouse	53	223.13
	Total	1206.05	5102.73

1. This facility was not used under normal conditions from 2016-2020. Highest usage was taken from 2021 when operations returned to normal operating conditions.
2. Equipment has not been used since 2009.

The associated PTE using the total scaled-up hours from Table 4-3, and the emission factor of 5 pounds per hour, taken from the AP-42, Fourth Edition, Feb 1980, TABLE 10.4.1 is:

$$Calculated\ Potential\ Emissions = 5102.73\ hours\ x\ \frac{5lbs}{hour} = \frac{25513.65}{2000} = 12.76\ tpy$$

5. ECOM: Natural Gas and Fuel Oil Combustion

JBLM has 668 pieces of external combustion equipment using natural gas (NG) or natural gas with fuel oil for back up, and 45 pieces using ultra low sulfur diesel fuel, listed by type and size in Table 5-1. The total combined consumption from 2016-2020 for sources listed in Table 5-1 is provided in Table 5-2.

Table 5-1 External Combustion Equipment

	Burner Type	Quantity	Emission Factor Table
<10mmbtu NG Boiler	Ultra Low NOx	68	5-4
	Low NOx	333	5-5
	Standard	37	5-6
10-100mmbtu NG Boiler	Low NOx	5	5-7
>100mmbtu NG Boiler	Low NOx	1	5-8
<10mmbtu/hr NG Infrared Heaters	Standard	9	5-6
<10mmbtu NG Domestic Water Heater	Standard	23	5-6
<10mmbtu/hr Furnace	Low NOx	1	5-5
	Standard	191	5-6
<10mmbtu/hr Fuel Oil Boiler	Standard	1	5-9
<1mmbtu/hr Fuel Oil Furnace	Standard	42	5-10
<1mmbtu Fuel oil Boiler	Standard	2	5-10

Table 5-2 Fuel Oil and Natural Gas Consumption from 2016-2020

	2016	2017	2018	2019	2020
Ultra Low Sulfur Diesel (gallons)	99,382	115,395	77,433	90,531	67,665
Natural Gas (Therms in thousands)	10,385	11,041	10,637	10,681	10,274

Two calculated PTEs are provided in Table 5-3. The first PTE is calculated using JBLM's current permit limit of 15,000,000 therms. The second is calculated using 8670 hours annual usage for each piece of equipment.

$$Emissions = Consumption\ (15{,}000{,}000\ therms)\ x\ EF$$

$$Emissions = 8670\ hours\ x\ \frac{Rated\ Capacity}{Heat\ Content} x\ EF$$

Table 5-3 PTE for External Combustion Equipment

CAS	Chemical Name	Emissions (tpy) 15,000,000 therms	Emissions (tpy) 8670 hours
10024972	Nitrous Oxide	0.26261	0.907302
100414	Ethylbenzene	0.005896	0.026069
106467	P-Dichlorobenzene	0.000893	0.004049
106990	1,3-Butadiene	0.007554	0.012273
107028	Acrolein	0.18094	0.299039
108883	Toluene	0.024555	0.103233
108907	Chlorobenzene	0.000101	0.000166
110543	N-Hexane	0.005603	0.020021
120127	Anthracene	0.000012	0.00002
124389	Carbon Dioxide	101345.7895	419966.2268
129000	Pyrene	0.000022	0.000042
1330207	Xylene	0.000817	0.001326
18540299	Chromium Hexavalent Ion	0.000052	0.000082
191242	Benzo[Ghi]Perylene	0.000003	0.000009
192972	Benzo[E]Pyrene	0.000007	0.000012
193395	Indeno[1,2,3-Cd]Pyrene	0.000003	0.000005
198550	Perylene	0.000014	0.000023
205992	Benzo[B]Fluoranthene	0	0.000001
206440	Fluoranthene	0.000018	0.000029
207089	Benzo[K]Fluoranthene	0	0.000001
208968	Acenaphthylene	0.000033	0.000056
218019	Chrysene	0.000007	0.000012
50000	Formaldehyde	0.20777	0.418771
50328	Benzo[A]Pyrene	0.000003	0.000008
53703	Dibenz[A,H]Anthracene	0.000003	0.000005
56495	3-Methylcholanthrene	0	0.000001
56553	Benz(A)Anthracene	0.000007	0.000013
57976	Benz[A]Anthracene, 7,12-Dimethyl-	0.000002	0.000019
630080	Carbon Monoxide	65.444465	285.016055
71432	Benzene	0.007114	0.025422
71556	1,1,1-Trichloroethane	0.000121	0.000196
7439921	Lead	0.005763	0.010216
7439965	Manganese	0.001792	0.003834
7439976	Mercury	0.001135	0.002532
7440020	Nickel	0.003537	0.010259
7440382	Arsenic	0.000888	0.001962
7440417	Beryllium	0.000002	0.000016
7440439	Cadmium	0.001608	0.004894
7440473	Chromium	0.001337	0.005168
7440484	Cobalt	0.000025	0.000206
74828	Methane	2.159614	8.320542
75070	Acetaldehyde	0.181763	0.302747
7647010	Hydrochloric Acid	0.09494	0.154251
7782492	Selenium	0.00113	0.001856
83329	Acenaphthene	0.000108	0.000175
85018	Phenanthrene	0.000193	0.000328
86737	Fluorene	0.000059	0.000099
91203	Naphthalene	0.002846	0.005378
91576	Naphthalene, 2-Methyl-	0.000078	0.000148
NOX	Oxides of Nitrogen	62.673138	250.886374
PM	Particulate Matter (PM)	6.190794	26.081209
PM10	PM10	6.237731	26.290823
PM2.5	PM2.5	6.086654	25.97869
SOX	Oxides of Sulfur	0.55936	2.184913
VOC	Volatile Organic Compounds	4.284913	18.642838

Table 5-4 Emission Factors Natural Gas <10 Million BTU/HR Wall-Fired Ultra-Lo NOx

CAS	Chemical Name	EF (lbs/10^6ft^3)
10024972	Nitrous Oxide	0.226[1]
100414	Ethylbenzene	0.0095[2]
106467	P-Dichlorobenzene	0.0012[2]
107028	Acrolein	0.0027[2]
108883	Toluene	0.0366[2]
110543	N-Hexane	0.0063[2]
120127	Anthracene	0.0000024[2]
124389	Carbon Dioxide	120019[1]
129000	Pyrene	0.000005[2]
191242	Benzo[Ghi]Perylene	0.0000016[2]
193395	Indeno[1,2,3-Cd]Pyrene	0.0000018[2]
205992	Benzo[B]Fluoranthene	0.0000018[2]
206440	Fluoranthene	0.000003[2]
207089	Benzo[K]Fluoranthene	0.0000018[2]
208968	Acenaphthylene	0.0000018[2]
218019	Chrysene	0.0000018[2]
50000	Formaldehyde	0.017[2]
50328	Benzo[A]Pyrene	0.0000016[2]
53703	Dibenz[A,H]Anthracene	0.0000016[2]
56495	3-Methylcholanthrene	0.0000018[2]
56553	Benz(A)Anthracene	0.0000018[2]
57976	Benz[A]Anthracene, 7,12-Dimethyl-	0.000016[2]
630080	Carbon Monoxide	84[3]
71432	Benzene	0.008[2]
7439921	Lead	0.0005[2]
7439965	Manganese	0.00038[2]
7439976	Mercury	0.00026[2]
7440020	Nickel	0.0021[2]
7440382	Arsenic	0.0002[2]
7440417	Beryllium	0.000012[2]
7440439	Cadmium	0.0011[2]
7440473	Chromium	0.0014[2]
7440484	Cobalt	0.000084[2]
74828	Methane	2.262[1]
75070	Acetaldehyde	0.0043[2]
7782492	Selenium	0.000024[2]
83329	Acenaphthene	0.0000018[2]
85018	Phenanthrene	0.000017[2]
86737	Fluorene	0.0000028[2]
91203	Naphthalene	0.0003[2]
91576	Naphthalene, 2-Methyl-	0.000024[2]
NOX	Oxides of Nitrogen	0.3[4]
PM	Particulate Matter (PM)	7.6[3]
PM10	PM10	7.6[3]
PM2.5	PM2.5	7.6[3]
SOX	Oxides of Sulfur	0.6[3]
VOC	Volatile Organic Compounds	5.5[3]

1. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 2-4, All Sizes, SCC, and Firing Configurations
2. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 2-5, Natural Gas Boiler, <10 MMBTU/HR
3. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 2-3, <100 MMBTU Wall Fired, Low NOx Burner
4. SCAQMD RULE 1109

Table 5-5 Emission Factors Natural Gas, <10 Million BTU/HR Wall-Fired Lo NOx

CAS	Chemical Name	EF (lbs/10^6ft^3)
10024972	Nitrous Oxide	0.226[1]
100414	Ethylbenzene	0.0095[2]
106467	P-Dichlorobenzene	0.0012[2]
107028	Acrolein	0.0027[2]
108883	Toluene	0.0366[2]
110543	N-Hexane	0.0063[2]
120127	Anthracene	0.0000024[2]
124389	Carbon Dioxide	120019[1]
129000	Pyrene	0.000005[2]
191242	Benzo[Ghi]Perylene	0.0000016[2]
193395	Indeno[1,2,3-Cd]Pyrene	0.0000018[2]
205992	Benzo[B]Fluoranthene	0.0000018[2]
206440	Fluoranthene	0.000003[2]
207089	Benzo[K]Fluoranthene	0.0000018[2]
208968	Acenaphthylene	0.0000018[2]
218019	Chrysene	0.0000018[2]
50000	Formaldehyde	0.017[2]
50328	Benzo[A]Pyrene	0.0000016[2]
53703	Dibenz[A,H]Anthracene	0.0000016[2]
56495	3-Methylcholanthrene	0.0000018[2]
56553	Benz(A)Anthracene	0.0000018[2]
57976	Benz[A]Anthracene, 7,12-Dimethyl-	0.000016[2]
630080	Carbon Monoxide	84[3]
71432	Benzene	0.008[2]
7439921	Lead	0.0005[2]
7439965	Manganese	0.00038[2]
7439976	Mercury	0.00026[2]
7440020	Nickel	0.0021[2]
7440382	Arsenic	0.0002[2]
7440417	Beryllium	0.000012[2]
7440439	Cadmium	0.0011[2]
7440473	Chromium	0.0014[2]
7440484	Cobalt	0.000084[2]
74828	Methane	2.262[1]
75070	Acetaldehyde	0.0043[2]
7782492	Selenium	0.000024[2]
83329	Acenaphthene	0.0000018[2]
85018	Phenanthrene	0.000017[2]
86737	Fluorene	0.0000028[2]
91203	Naphthalene	0.0003[2]
91576	Naphthalene, 2-Methyl-	0.000024[2]
NOX	Oxides of Nitrogen	50[3]
PM	Particulate Matter (PM)	7.6[3]
PM10	PM10	7.6[3]
PM2.5	PM2.5	7.6[3]
SOX	Oxides of Sulfur	0.6[3]
VOC	Volatile Organic Compounds	5.5[3]

1. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 2-4, All Sizes, SCC, and Firing Configurations
2. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 2-5, Natural Gas Boiler, <10 MMBTU/HR
3. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 2-3, <100 MMBTU Wall Fired, Low NOx Burner

Table 5-6 Emission Factors Natural Gas, <10mmbtu/HR / Wall-Fired (Standard Furnaces and Boilers

CAS	Chemical Name	EF (lbs/$10^6$$ft^3$)
10024972	Nitrous Oxide	0.226[1]
100414	Ethylbenzene	0.0095[2]
106467	P-Dichlorobenzene	0.0012[2]
107028	Acrolein	0.0027[2]
108883	Toluene	0.0366[2]
110543	N-Hexane	0.0063[2]
120127	Anthracene	0.0000024[2]
124389	Carbon Dioxide	120019[1]
129000	Pyrene	0.000005[2]
191242	Benzo[Ghi]Perylene	0.0000016[2]
193395	Indeno[1,2,3-Cd]Pyrene	0.0000018[2]
205992	Benzo[B]Fluoranthene	0.0000018[2]
206440	Fluoranthene	0.000003[2]
207089	Benzo[K]Fluoranthene	0.0000018[2]
208968	Acenaphthylene	0.0000018[2]
218019	Chrysene	0.0000018[2]
50000	Formaldehyde	0.017[2]
50328	Benzo[A]Pyrene	0.0000016[2]
53703	Dibenz[A,H]Anthracene	0.0000016[2]
56495	3-Methylcholanthrene	0.0000018[2]
56553	Benz(A)Anthracene	0.0000018[2]
57976	Benz[A]Anthracene, 7,12-Dimethyl-	0.000016[2]
630080	Carbon Monoxide	84[3]
71432	Benzene	0.008[2]
7439921	Lead	0.0005[2]
7439965	Manganese	0.00038[2]
7439976	Mercury	0.00026[2]
7440020	Nickel	0.0021[2]
7440382	Arsenic	0.0002[2]
7440417	Beryllium	0.000012[2]
7440439	Cadmium	0.0011[2]
7440473	Chromium	0.0014[2]
7440484	Cobalt	0.000084[2]
74828	Methane	2.262[1]
75070	Acetaldehyde	0.0043[2]
7782492	Selenium	0.000024[2]
83329	Acenaphthene	0.0000018[2]
85018	Phenanthrene	0.000017[2]
86737	Fluorene	0.0000028[2]
91203	Naphthalene	0.0003[2]
91576	Naphthalene, 2-Methyl-	0.000024[2]
NOX	Oxides of Nitrogen	100[3]
PM	Particulate Matter (PM)	7.6[3]
PM10	PM10	7.6[3]
PM2.5	PM2.5	7.6[3]
SOX	Oxides of Sulfur	0.6[3]
VOC	Volatile Organic Compounds	5.5[3]

1. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 2-4, All Sizes, SCC, and Firing Configurations
2. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 2-5, Natural Gas Boiler, <10MMBTU/HR
3. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 2-3, <100 MMBTU Wall Fired, Uncontrolled

Table 5-7 Emission Factors Natural Gas, 10-100mmbtu Lo NOx Boiler

CAS	Chemical Name	EF (lbs/$10^6$$ft^3$)
10024972	Nitrous Oxide	0.226[1]
100414	Ethylbenzene	0.0069[2]
106467	P-Dichlorobenzene	0.0012[2]
107028	Acrolein	0.0027[2]
108883	Toluene	0.0265[2]
110543	N-Hexane	0.0046[2]
120127	Anthracene	0.0000024[2]
124389	Carbon Dioxide	120019[1]
129000	Pyrene	0.000005[2]
191242	Benzo[Ghi]Perylene	0.0000016[2]
193395	Indeno[1,2,3-Cd]Pyrene	0.0000018[2]
205992	Benzo[B]Fluoranthene	0.0000018[2]
206440	Fluoranthene	0.000003[2]
207089	Benzo[K]Fluoranthene	0.0000018[2]
208968	Acenaphthylene	0.0000018[2]
218019	Chrysene	0.0000018[2]
50000	Formaldehyde	0.075[2]
50328	Benzo[A]Pyrene	0.0000016[2]
53703	Dibenz[A,H]Anthracene	0.0000016[2]
56495	3-Methylcholanthrene	0.0000018[2]
56553	Benz(A)Anthracene	0.0000018[2]
57976	Benz[A]Anthracene, 7,12-Dimethyl-	0.000016[2]
630080	Carbon Monoxide	84[3]
71432	Benzene	0.0058[2]
7439921	Lead	0.0005[2]
7439965	Manganese	0.00038[2]
7439976	Mercury	0.00026[2]
7440020	Nickel	0.0021[2]
7440382	Arsenic	0.0002[2]
7440417	Beryllium	0.000012[2]
7440439	Cadmium	0.0011[2]
7440473	Chromium	0.0014[2]
7440484	Cobalt	0.000084[2]
74828	Methane	2.262[1]
75070	Acetaldehyde	0.0031[2]
7782492	Selenium	0.000024[2]
83329	Acenaphthene	0.0000018[2]
85018	Phenanthrene	0.000017[2]
86737	Fluorene	0.0000028[2]
91203	Naphthalene	0.0003[2]
91576	Naphthalene, 2-Methyl-	0.000024[2]
NOX	Oxides of Nitrogen	50[3]
PM	Particulate Matter (PM)	7.6[3]
PM10	PM10	7.6[3]
PM2.5	PM2.5	7.6[3]
SOX	Oxides of Sulfur	0.6[3]
VOC	Volatile Organic Compounds	5.5[3]

1. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 2-4, All Sizes, SCC, and Firing Configurations
2. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 2-5, Natural Gas Boiler, 10-100 MMBTU/HR
3. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 2-3, <100 MMBTU Wall Fired, Lo NOx Boiler

Table 5-8 Emission Factors Natural Gas, ≥100 Million BTU/HR – Lo NOx

CAS	Chemical Name	EF (lbs/$10^6 ft^3$)
10024972	Nitrous Oxide	0.226
100414	Ethylbenzene	0.002
106467	P-Dichlorobenzene	0.0012
107028	Acrolein	0.0008
108883	Toluene	0.0078
110543	N-Hexane	0.0013
120127	Anthracene	0.0000024
124389	Carbon Dioxide	120019
129000	Pyrene	0.000005
191242	Benzo[Ghi]Perylene	0.0000016
193395	Indeno[1,2,3-Cd]Pyrene	0.0000018
205992	Benzo[B]Fluoranthene	0.0000018
206440	Fluoranthene	0.000003
207089	Benzo[K]Fluoranthene	0.0000018
208968	Acenaphthylene	0.0000018
218019	Chrysene	0.0000018
50000	Formaldehyde	0.075
50328	Benzo[A]Pyrene	0.0000016
53703	Dibenz[A,H]Anthracene	0.0000016
56495	3-Methylcholanthrene	0.0000018
56553	Benz(A)Anthracene	0.0000018
57976	Benz[A]Anthracene, 7,12-Dimethyl-	0.000016
630080	Carbon Monoxide	84
71432	Benzene	0.0017
7439921	Lead	0.0005
7439965	Manganese	0.00038
7439976	Mercury	0.00026
7440020	Nickel	0.0021
7440382	Arsenic	0.0002
7440417	Beryllium	0.000012
7440439	Cadmium	0.0011
7440473	Chromium	0.0014
7440484	Cobalt	0.000084
74828	Methane	2.262
75070	Acetaldehyde	0.0009
7782492	Selenium	0.000024
83329	Acenaphthene	0.0000018
85018	Phenanthrene	0.000017
86737	Fluorene	0.0000028
91203	Naphthalene	0.0003
91576	Naphthalene, 2-Methyl-	0.000024
NOX	Oxides of Nitrogen	140
PM	Particulate Matter (PM)	7.6
PM10	PM10	7.6
PM2.5	PM2.5	7.6
SOX	Oxides of Sulfur	0.6
VOC	Volatile Organic Compounds	5.5

1. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 2-4, All Sizes, SCC, and Firing Configurations
2. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 2-5, Natural Gas Boiler, >100 MMBTU/HR
3. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 2-3, >100 MMBTU Wall Fired, Post NSPS Lo NOx Boiler

Table 5- 9 Fuel Oil / Industrial / Distillate N0. 1 and No. 2 Oil >100 mmbtu/hr

CAS	Chemical Name	EF (lbs/MGAL)
10024972	Nitrous Oxide	0.183[1]
100414	Ethylbenzene	0.0002[2]
106990	1,3-Butadiene	0.0148[2]
107028	Acrolein	0.351[2]
108883	Toluene	0.0044[2]
108907	Chlorobenzene	0.0002[2]
110543	N-Hexane	0.0035[2]
120127	Anthracene	0.0000239[2]
124389	Carbon Dioxide	22501.4[1]
129000	Pyrene	0.0000408[2]
1330207	Xylene	0.0016[2]
18540299	Chromium Hexavalent Ion	0.0001[2]
191242	Benzo[Ghi]Perylene	0.0000085[2]
192972	Benzo[E]Pyrene	0.000014[2]
193395	Indeno[1,2,3-Cd]Pyrene	0.00000664[2]
198550	Perylene	0.0000271[2]
205992	Benzo[B]Fluoranthene	0.00000148[2]
206440	Fluoranthene	0.0000332[2]
208968	Acenaphthylene	0.000065[2]
218019	Chrysene	0.0000128[2]
50000	Formaldehyde	0.351[2]
50328	Benzo[A]Pyrene	0.00000755[2]
53703	Dibenz[A,H]Anthracene	0.00000649[2]
56553	Benz(A)Anthracene	0.0000135[2]
630080	Carbon Monoxide	5[3]
71432	Benzene	0.0044[2]
71556	1,1,1-Trichloroethane	0.000236[2]
7439921	Lead	0.00124[3]
7439965	Manganese	0.0031[2]
7439976	Mercury	0.002[2]
7440020	Nickel	0.0039[2]
7440382	Arsenic	0.0016[2]
7440439	Cadmium	0.0015[2]
7440473	Chromium	0.0006[2]
74828	Methane	0.913[1]
75070	Acetaldehyde	0.351[2]
7647010	Hydrochloric Acid	0.186[2]
7782492	Selenium	0.0022[2]
83329	Acenaphthene	0.000211[2]
85018	Phenanthrene	0.000372[2]
86737	Fluorene	0.000117[2]
91203	Naphthalene	0.0053[2]
91576	Naphthalene, 2-Methyl-	0.00014[2]
NOX	Oxides of Nitrogen	24[3]
PM	Particulate Matter (PM)	1[3]
PM10	PM10	1[3]
PM2.5	PM2.5	0.25[3]
SOX	Oxides of Sulfur	144[3]
VOC	Volatile Organic Compounds	0.2[3]

1. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 2-7, Distillate
2. Air Emissions Guide For Air Force Stationary Sources, June 2020, Table 2-8, Distillate Fuel Oil
3. Air Emissions Guide For Air Force Stationary Sources, June 2020, 2-6, Industrial Boilers, Distillate

Table 5- 10 Fuel Oil / Industrial / Distillate No. 1 and No. 2 Oil, >100 mmbtu/hr

CAS	Chemical Name	EF (lbs/MGAL)
10024972	Nitrous Oxide	0.183[1]
100414	Ethylbenzene	0.0002[2]
106990	1,3-Butadiene	0.0148[2]
107028	Acrolein	0.351[2]
108883	Toluene	0.0044[2]
108907	Chlorobenzene	0.0002[2]
110543	N-Hexane	0.0035[2]
120127	Anthracene	0.0000239[2]
124389	Carbon Dioxide	22501.4[1]
129000	Pyrene	0.0000408[2]
1330207	Xylene	0.0016[2]
18540299	Chromium Hexavalent Ion	0.0001[2]
191242	Benzo[Ghi]Perylene	0.0000085[2]
192972	Benzo[E]Pyrene	0.000014[2]
193395	Indeno[1,2,3-Cd]Pyrene	0.00000664[2]
198550	Perylene	0.0000271[2]
205992	Benzo[B]Fluoranthene	0.00000148[2]
206440	Fluoranthene	0.0000332[2]
208968	Acenaphthylene	0.000065[2]
218019	Chrysene	0.0000128[2]
50000	Formaldehyde	0.351[2]
50328	Benzo[A]Pyrene	0.00000755[2]
53703	Dibenz[A,H]Anthracene	0.00000649[2]
56553	Benz(A)Anthracene	0.0000135[2]
630080	Carbon Monoxide	5[3]
71432	Benzene	0.0044[2]
71556	1,1,1-Trichloroethane	0.000236[2]
7439921	Lead	0.0011[3]
7439965	Manganese	0.0031[2]
7439976	Mercury	0.002[2]
7440020	Nickel	0.0039[2]
7440382	Arsenic	0.0016[2]
7440439	Cadmium	0.0015[2]
7440473	Chromium	0.0006[2]
74828	Methane	0.913[1]
75070	Acetaldehyde	0.351[2]
7647010	Hydrochloric Acid	0.186[2]
7782492	Selenium	0.0022[2]
83329	Acenaphthene	0.000211[2]
85018	Phenanthrene	0.000372[2]
86737	Fluorene	0.000117[2]
91203	Naphthalene	0.0053[2]
91576	Naphthalene, 2-Methyl-	0.00014[2]
NOX	Oxides of Nitrogen	20[3]
PM	Particulate Matter (PM)	1.08[3]
PM10	PM10	1.08[3]
PM2.5	PM2.5	0.83[3]
SOX	Oxides of Sulfur	144[3]
VOC	Volatile Organic Compounds	0.34[3]

1. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 2-7, Distillate
2. Air Emissions Guide For Air Force Stationary Sources, June 2020, Table 2-8, Distillate Fuel Oil
3. Air Emissions Guide For Air Force Stationary Sources, June 2020, 2-6, Commercial/Industrial Boilers, Distillate

6. ICOM: Internal Combustion Emergency Generators

JBLM has 127 emergency generators with a rated capacity <450 kilowatt hours (kWh) and 20 that are ≥450 kWh listed under the Inventory" column 9in Tables 6-3 to 6-15 along with the associated emission factors. The total combined hours of operation from 2016-2020 for the JBLM's generators is provided in Table 6-1.

Table 6-1 Combined Generator Usage for Operating Years 2016-2020 (tons per year)

Rated Capacity	2016	2017	2018	2019	2020
<450	86,700.5	98,888.7	182,829.65	213,089.46	191,279
≥450	316050	436,145	525,885	591500	521,026

The equation below is used to calculate the PTE in Table 6-2, using the emissions factors in Tables 6-3 to 6-15 and the standard 500-hours per generator.

$$Emissions = Horsepower\ hours\ x \frac{EF}{1000}$$

Table 6-2 PTE: Emergency Generators

CAS	Chemical Name	Emissions (tpy) 500 hours
10024972	Nitrous Oxide	0.03624
106990	1,3-Butadiene	0.000474
107028	Acrolein	0.001198
108883	Toluene	0.007873
120127	Anthracene	0.000018
124389	Carbon Dioxide	4454
129000	Pyrene	0.000086
1330207	Xylene	0.005469
191242	Benzo[Ghi]Perylene	0.000004
193395	Indeno[1,2,3-Cd]Pyrene	0.000002
205992	Benzo[B]Fluoranthene	0.000011
206440	Fluoranthene	0.000123
207089	Benzo[K]Fluoranthene	0.000001
208968	Acenaphthylene	0.000144
218019	Chrysene	0.000017
50000	Formaldehyde	0.01504
50328	Benzo[A]Pyrene	0.000001
53703	Dibenz[A,H]Anthracene	0.000002
56553	Benz(A)Anthracene	0.000008
630080	Carbon Monoxide	27.9964
71432	Benzene	0.01938
74828	Methane	0.18114
75070	Acetaldehyde	0.00948
83329	Acenaphthene	0.000054
85018	Phenanthrene	0.000781
86737	Fluorene	0.00048
91203	Naphthalene	0.002382
NOx	Oxides Of Nitrogen	73.0866
PM	Particulate Matter	4.1240
PM10	PM10	4.1240
PM2.5	(PM)2.5	4.1240
SOx	Oxides of Sulfur	0.04262
VOC	Volatile Organic Compounds	5.01967

Table 6-3 Emission Factors - Non NSPS, ≤600 HP, <10L/Cyl

Inventory	CAS	Chemical Name	EF (lbs/maximum horse power)
Total – 78: 1 x 15 kW 1 x 17.5 kW 2 x 20 kW 1 x 25 kW 2 x 30 kW 1 x 37 kW 9 x 40 kW 12 x 50 kW 5 x 60 kW 5 x 80 kW 10 x 100 kW 1 x 117 kW 2 x 125 kW 2 x 150 kW 4 x 166 kW 1 x 175 kW 4 x 200 kW 2 x 230 kW 5 x 283 kW 2 x 300 kW 4 x 350 kW 1 x 400 kW 1 x 550 kW	10024972	Nitrous Oxide	0.0107[1]
	106990	1,3-Butadiene	0.000316[2]
	107028	Acrolein	0.000748[2]
	108883	Toluene	0.00331[2]
	120127	Anthracene	0.0000151[2]
	124389	Carbon Dioxide	1320[1]
	129000	Pyrene	0.0000387[2]
	1330207	Xylene	0.00231[2]
	191242	Benzo[Ghi]Perylene	0.00000396[2]
	193395	Indeno[1,2,3-Cd]Pyrene	0.00000303[2]
	205992	Benzo[B]Fluoranthene	0.000000802[2]
	206440	Fluoranthene	0.0000616[2]
	207089	Benzo[K]Fluoranthene	0.00000125[2]
	208968	Acenaphthylene	0.0000409[2]
	218019	Chrysene	0.00000286[2]
	50000	Formaldehyde	0.00955[2]
	50328	Benzo[A]Pyrene	0.00000152[2]
	53703	Dibenz[A,H]Anthracene	0.00000472[2]
	56553	Benz(A)Anthracene	0.0000136[2]
	630080	Carbon Monoxide	7.68[3]
	71432	Benzene	0.00755[2]
	74828	Methane	0.0535[1]
	75070	Acetaldehyde	0.0062[2]
	83329	Acenaphthene	0.0000115[2]
	85018	Phenanthrene	0.000238[2]
	86737	Fluorene	0.000236[2]
	91203	Naphthalene	0.000686[2]
	NOx	Oxides Of Nitrogen	35.7[3]
	PM	Particulate Matter	2.51[3]
	PM10	PM10	2.51[3]
	PM2.5	(PM)2.5	2.51[3]
	SOx	Oxides Of Sulfur	0.0126[3]
	VOC	Volatile Organic Compounds	2.79[3]

1. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 3-6 GHG Emission Factors For Stationary Compression Ignition ICOM Engines All Stationary CI ICOM – Hours
2. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 3-7 HAP Emission Factors for Stationary Compression Ignition ICOM Engines Non-NSPS Emergency Fire Pump and Non-Emergency ≤600 HP – Hours
3. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 3-4 Criteria Pollutant Emission Factors For Stationary Emergency Non-Fire Pump Compression Ignition ICOM Engines Diesel<10 L/CYL<=600 HP Non-NSPS All Model Yrs - Hours

Table 6-4 Emissions Factors - Non NSPS, >600 HP, <10L/Cyl

Inventory	CAS	Chemical Name	EF (lbs/maximum horse power)
Total – 10: 2 x 450 kW 1 x 500 kW 1 x 550 kW 6 x 1000 kW	10024972	Nitrous Oxide	0.0107[1]
	107028	Acrolein	0.0000637[2]
	108883	Toluene	0.00227[2]
	120127	Anthracene	0.00000995[2]
	124389	Carbon Dioxide	1320[1]
	129000	Pyrene	0.00003[2]
	1330207	Xylene	0.00156[2]
	191242	Benzo[Ghi]Perylene	0.0000045[2]
	193395	Indeno[1,2,3-Cd]Pyrene	0.00000335[2]
	205992	Benzo[B]Fluoranthene	0.00000898[2]
	206440	Fluoranthene	0.0000326[2]
	207089	Benzo[K]Fluoranthene	0.00000176[2]
	208968	Acenaphthylene	0.0000747[2]
	218019	Chrysene	0.0000124[2]
	50000	Formaldehyde	0.000638[2]
	50328	Benzo[A]Pyrene	0.00000208[2]
	53703	Dibenz[A,H]Anthracene	0.0000028[2]
	56553	Benz(A)Anthracene	0.00000503[2]
	630080	Carbon Monoxide	6.88[3]
	71432	Benzene	0.00628[2]
	74828	Methane	0.0535[1]
	75070	Acetaldehyde	0.000204[2]
	83329	Acenaphthene	0.0000379[2]
	85018	Phenanthrene	0.00033[2]
	86737	Fluorene	0.000104[2]
	91203	Naphthalene	0.00105[2]
	NOX	Oxides Of Nitrogen	25.9[3]
	PM	Particulate Matter	0.809[3]
	PM10	PM10	0.809[3]
	PM2.5	PM2.5	0.809[3]
	SOX	Oxides Of Sulfur	0.0126[3]
	VOC	Volatile Organic Compounds	0.716[3]

1. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 3-6 GHG Emission Factors For Stationary Compression Ignition ICOM Engines All Stationary CI ICOM – Hours
2. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 3-7 HAP Emission Factors for Stationary Compression Ignition ICOM Engines Non-NSPS Emergency Fire Pump and Non-Emergency >600 HP – Hours
3. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 3-4 Criteria Pollutant Emission Factors For Stationary Emergency Non-Fire Pump Compression Ignition ICOM Engines Diesel<10 L/CYL, >600 HP Non-NSPS All Model Yrs - Hours

Table 6-5 Emissions Factors - Model Year 2008 NSPS, ≤600kW HP-Hours

Inventory	CAS	Chemical Name	EF (lbs/maximum horse power)
Total – 2:	10024972	Nitrous Oxide	0.0107[1]
	106990	1,3-Butadiene	0.000149[2]
1 x 15 kW	107028	Acrolein	0.000352[2]
1 x 18 kW	108883	Toluene	0.00156[2]
	120127	Anthracene	0.00000712[2]
	124389	Carbon Dioxide	1320[1]
	129000	Pyrene	0.0000182[2]
	1330207	Xylene	0.00109[2]
	191242	Benzo[Ghi]Perylene	0.00000186[2]
	193395	Indeno[1,2,3-Cd]Pyrene	0.00000143[2]
	205992	Benzo[B]Fluoranthene	0.000000378[2]
	206440	Fluoranthene	0.000029[2]
	207089	Benzo[K]Fluoranthene	0.00000059[2]
	208968	Acenaphthylene	0.0000193[2]
	218019	Chrysene	0.00000134[2]
	50000	Formaldehyde	0.0045[2]
	50328	Benzo[A]Pyrene	0.000000716[2]
	53703	Dibenz[A,H]Anthracene	0.00000222[2]
	56553	Benz(A)Anthracene	0.0000064[2]
	630080	Carbon Monoxide	10.8[3]
	71432	Benzene	0.00355[1]
	74828	Methane	0.0535[2]
	75070	Acetaldehyde	0.00292[2]
	83329	Acenaphthene	0.00000541[2]
	85018	Phenanthrene	0.000112[2]
	86737	Fluorene	0.000111[2]
	91203	Naphthalene	0.000323[2]
	NOX	Oxides of Nitrogen	11.5[3]
	PM	Particulate Matter (PM)	0.661[3]
	PM10	PM10	0.661[3]
	PM2.5	PM2.5	0.661[3]
	SOX	Oxides of Sulfur	0.0126[3]
	VOC	Volatile Organic Compounds	0.899[3]

1. Air Emissions Guide For Air Force Stationary Sources, Jun 2020, Table 3-6, GHG Emission Factors For Stationary Compression Ignition ICOM Engines, All Stationary CI ICOM – Hours
2. Air Emissions Guide For Air Force Stationary Sources, June 2020, Table 3-7, HAP Emission Factors For Stationary Compression Ignition ICOM Engines, NSPS, Non-Emergency And Non-Fire Pump Emergency, ≤600 HP, Model Yr 2007-Present – Hours
3. Air Emissions Guide For Air Force Stationary Sources, Jun 2020, Table 3-4, Criteria Pollutant Emission Factors For Stationary Emergency Non-Fire Pump Compression Ignition ICOM Engines, Diesel, <10 L/CYL, 11-25 HP, NSPS, Model Yr 2008 - Hours

Table 6-6 Emissions Factors - Model Year 2007 ≤600kW NSPS, <10 L/CYL, 100-175 HP

Inventory	CAS	Chemical Name	EF (lbs/maximum horse power)
Total – 7: 1 x 50 kW 1 x 100 kW 4 x 125 kW 1 x 250 kW	10024972	Nitrous Oxide	0.0107[1]
	106990	1,3-Butadiene	0.000149[2]
	107028	Acrolein	0.000352[2]
	108883	Toluene	0.00156[2]
	120127	Anthracene	0.00000712[2]
	124389	Carbon Dioxide	1320[1]
	129000	Pyrene	0.0000182[2]
	1330207	Xylene	0.00109[2]
	191242	Benzo[Ghi]Perylene	0.00000186[2]
	193395	Indeno[1,2,3-Cd]Pyrene	0.00000143[2]
	205992	Benzo[B]Fluoranthene	0.000000378[2]
	206440	Fluoranthene	0.000029[2]
	207089	Benzo[K]Fluoranthene	0.00000059[2]
	208968	Acenaphthylene	0.0000193[2]
	218019	Chrysene	0.00000134[2]
	50000	Formaldehyde	0.0045[2]
	50328	Benzo[A]Pyrene	0.000000716[2]
	53703	Dibenz[A,H]Anthracene	0.00000222[2]
	56553	Benz(A)Anthracene	0.0000064[2]
	630080	Carbon Monoxide	8.16[3]
	71432	Benzene	0.00355[2]
	74828	Methane	0.0535[1]
	75070	Acetaldehyde	0.00292[2]
	83329	Acenaphthene	0.00000541[2]
	85018	Phenanthrene	0.000112[2]
	86737	Fluorene	0.000111[2]
	91203	Naphthalene	0.000323[2]
	NOX	Oxides of Nitrogen	6.16[3]
	PM	Particulate Matter (PM	0.485[3]
	PM10	PM10	0.485[3]
	PM2.5	PM2.5	0.485[3]
	SOX	Oxides of Sulfur	0.0126[3]
	VOC	Volatile Organic Compounds	0.481[3]

1. Air Emissions Guide For Air Force Stationary Sources, Jun 2020, Table 3-6, GHG Emission Factors for Stationary Compression Ignition ICOM Engines, All Stationary CI ICOM – HOURS
2. Air Emissions Guide For Air Force Stationary Sources, June 2020, Table 3-7, HAP Emission Factors for Stationary Compression Ignition ICOM Engines, NSPS, Non-Emergency and Non-Fire Pump Emergency, ≤600 HP, Model YR 2007-Present – Hours
3. Air Emissions Guide For Air Force Stationary Sources, Jun 2020, Table 3-4, Criteria Pollutant Emission Factors for Stationary Emergency Non-Fire Pump Compression Ignition ICOM Engines, Diesel, <10 L/CYL, 100-175 HP, NSPS, Model Year 2007 - Hours

Table 6-7 Emissions Factors - Model Year 2007, ≤600kW, <10 L/Cyl, 175-600 HP

Inventory	CAS	Chemical Name	EF (lbs/maximum horse power)
Total – 28: 2 x 125 kW 1 x 135 kW 1 x 150 kW 2 x 180 kW 6 x 200 kW 4 x 250 kW 1 x 280 kW 2 x 300 kW 3 x 350 kW 4 x 400 kW 2 x 440 kW	10024972	Nitrous Oxide	0.0107[1]
	106990	1,3-Butadiene	0.000149[2]
	107028	Acrolein	0.000352[2]
	108883	Toluene	0.00156[2]
	120127	Anthracene	0.00000712[2]
	124389	Carbon Dioxide	1320[1]
	129000	Pyrene	0.0000182[2]
	1330207	Xylene	0.00109[2]
	191242	Benzo[Ghi]Perylene	0.00000186[2]
	193395	Indeno[1,2,3-Cd]Pyrene	0.00000143[2]
	205992	Benzo[B]Fluoranthene	0.000000378[2]
	206440	Fluoranthene	0.000029[2]
	207089	Benzo[K]Fluoranthene	0.00000059[2]
	208968	Acenaphthylene	0.0000193[2]
	218019	Chrysene	0.00000134[2]
	50000	Formaldehyde	0.0045[2]
	50328	Benzo[A]Pyrene	0.000000716[2]
	53703	Dibenz[A,H]Anthracene	0.00000222[2]
	56553	Benz(A)Anthracene	0.0000064[2]
	630080	Carbon Monoxide	5.73[3]
	71432	Benzene	0.00355[2]
	74828	Methane	0.0535[1]
	75070	Acetaldehyde	0.00292[2]
	83329	Acenaphthene	0.00000541[2]
	85018	Phenanthrene	0.000112[2]
	86737	Fluorene	0.000111[2]
	91203	Naphthalene	0.000323[2]
	NOX	Oxides of Nitrogen	6.16[3]
	PM	Particulate Matter (PM	0.331[3]
	PM10	PM10	0.331[3]
	PM2.5	PM2.5	0.331[3]
	SOX	Oxides of Sulfur	0.0126[3]
	VOC	Volatile Organic Compounds	0.481[3]

1. Air Emissions Guide For Air Force Stationary Sources, Jun 2020, Table 3-6, GHG Emission Factors for Stationary Compression Ignition ICOM Engines, All Stationary CI ICOM – Hours
2. Air Emissions Guide For Air Force Stationary Sources, June 2020, Table 3-7, HAP Emission Factors for Stationary Compression Ignition ICOM Engines, NSPS, Non-Emergency and Non-Fire Pump Emergency, <=600 HP, Model Yr 2007-Present – Hours
3. Air Emissions Guide ror Air Force Stationary Sources, June 2020, Table 3-4, Criteria Pollutant Emission Factors For Stationary Emergency Non-Fire Pump Compression Ignition ICOM Engines, Diesel, <10 L/CYL, 175-600 HP, NSPS, MODEL YR 2007 - Hours

Table 6-8 Emissions Factors - Model Year 2007, ≤600kW, <10 L/Cyl, 25-50 Horsepower

Inventory	CAS	Chemical Name	EF (lbs/maximum horse power)
Total – 1:	10024972	Nitrous Oxide	0.0107[1]
	106990	1,3-Butadiene	0.000149[2]
1 x 35 kW	107028	Acrolein	0.000352[2]
	108883	Toluene	0.00156[2]
	120127	Anthracene	0.00000712[2]
	124389	Carbon Dioxide	1320[1]
	129000	Pyrene	0.0000182[2]
	1330207	Xylene	0.00109[2]
	191242	Benzo[Ghi]Perylene	0.00000186[2]
	193395	Indeno[1,2,3-Cd]Pyrene	0.00000143[2]
	205992	Benzo[B]Fluoranthene	0.000000378[2]
	206440	Fluoranthene	0.000029[2]
	207089	Benzo[K]Fluoranthene	0.00000059[2]
	208968	Acenaphthylene	0.0000193[2]
	218019	Chrysene	0.00000134[2]
	50000	Formaldehyde	0.0045[2]
	50328	Benzo[A]Pyrene	0.000000716[2]
	53703	Dibenz[A,H]Anthracene	0.00000222[2]
	56553	Benz(A)Anthracene	0.0000064[2]
	630080	Carbon Monoxide	9.04
	71432	Benzene	0.00355[2]
	74828	Methane	0.0535[1]
	75070	Acetaldehyde	0.00292[2]
	83329	Acenaphthene	0.00000541[2]
	85018	Phenanthrene	0.000112[2]
	86737	Fluorene	0.000111[2]
	91203	Naphthalene	0.000323[2]
	NOX	Oxides of Nitrogen	11.5[3]
	PM	Particulate Matter (PM)	0.992[3]
	PM10	PM10	0.992[3]
	PM2.5	PM2.5	0.992[3]
	SOX	Oxides of Sulfur	0.0126[3]
	VOC	Volatile Organic Compounds	0.899[3]

1. Air Emissions Guide For Air Force Stationary Sources, Jun 2020, Table 3-6, GHG Emission Factors for Stationary Compression Ignition ICOM Engines, All Stationary CI ICOM – Hours
2. Air Emissions Guide For Air Force Stationary Sources, June 2020, Table 3-7, HAP Emission Factors for Stationary Compression Ignition ICOM Engines, NSPS, Non-Emergency and Non-Fire Pump Emergency, ≤600 HP, Model Yr 2007-Present – Hours
3. Air Emissions Guide For Air Force Stationary Sources, June 2020, Table 3-4, Criteria Pollutant Emission Factors For Stationary Emergency Non-Fire Pump Compression Ignition ICOM Engines, Diesel, <10 L/CYL, 25-50 HP, NSPS, ModeL Yr 2007 – Hours

Table 6-9 Emissions Factors - Model Year 2008, ≤600kW, <10 L/Cyl, 25-50 Horsepower

Inventory	CAS	Chemical Name	EF (lbs/maximum horse power)
Total – 3: 1 x 20 kW 1 x 25 kW 1 x 30 kW	10024972	Nitrous Oxide	0.0107[1]
	106990	1,3-Butadiene	0.000149[2]
	107028	Acrolein	0.000352[2]
	108883	Toluene	0.00156[2]
	120127	Anthracene	0.00000712[2]
	124389	Carbon Dioxide	1320[1]
	129000	Pyrene	0.0000182[2]
	1330207	Xylene	0.00109[2]
	191242	Benzo[Ghi]Perylene	0.00000186[2]
	193395	Indeno[1,2,3-Cd]Pyrene	0.00000143[2]
	205992	Benzo[B]Fluoranthene	0.000000378[2]
	206440	Fluoranthene	0.000029[2]
	207089	Benzo[K]Fluoranthene	0.00000059[2]
	208968	Acenaphthylene	0.0000193[2]
	218019	Chrysene	0.00000134[2]
	50000	Formaldehyde	0.0045[2]
	50328	Benzo[A]Pyrene	0.000000716[2]
	53703	Dibenz[A,H]Anthracene	0.00000222[2]
	56553	Benz(A)Anthracene	0.0000064[2]
	630080	Carbon Monoxide	9.04
	71432	Benzene	0.00355[2]
	74828	Methane	0.0535[1]
	75070	Acetaldehyde	0.00292[2]
	83329	Acenaphthene	0.00000541[2]
	85018	Phenanthrene	0.000112[2]
	86737	Fluorene	0.000111[2]
	91203	Naphthalene	0.000323[2]
	NOX	Oxides of Nitrogen	11.5[3]
	PM	Particulate Matter (PM)	0.485[3]
	PM10	PM10	0.485[3]
	PM2.5	PM2.5	0.485[3]
	SOX	Oxides of Sulfur	0.0126[3]
	VOC	Volatile Organic Compounds	0.899[3]

1. Air Emissions Guide For Air Force Stationary Sources, Jun 2020, Table 3-6, GHG Emission Factors for Stationary Compression Ignition ICOM Engines, All Stationary CI ICOM – Hours
2. Air Emissions Guide For Air Force Stationary Sources, June 2020, Table 3-7, HAP Emission Factors for Stationary Compression Ignition ICOM Engines, NSPS, Non-Emergency and Non-Fire Pump Emergency, ≤600 HP, Model Yr 2007-Present – Hours
3. Air Emissions Guide For Air Force Stationary Sources, June 2020, Table 3-4, Criteria Pollutant Emission Factors For Stationary Emergency Non-Fire Pump Compression Ignition ICOM Engines, Diesel, <10 L/CYL, 25-50 HP, NSPS, Model Yr 2008 – Hours

Table 6-10 Emissions Factors - NSPS Model Year Pre 2007, ≤600kW, <10 L/Cyl, 50-100 HP

Inventory	CAS	Chemical Name	EF (lbs/maximum horse power)
Total – 1:	10024972	Nitrous Oxide	0.0107[1]
	106990	1,3-Butadiene	0.000316[2]
1 x 60kW	107028	Acrolein	0.000748[2]
	108883	Toluene	0.00331[2]
	120127	Anthracene	0.0000151[2]
	124389	Carbon Dioxide	1320[1]
	129000	Pyrene	0.0000387[2]
	1330207	Xylene	0.00231[2]
	191242	Benzo[Ghi]Perylene	0.00000396[2]
	193395	Indeno[1,2,3-Cd]Pyrene	0.00000303[2]
	205992	Benzo[B]Fluoranthene	0.000000802[2]
	206440	Fluoranthene	0.0000616[2]
	207089	Benzo[K]Fluoranthene	0.00000125[2]
	208968	Acenaphthylene	0.0000409[2]
	218019	Chrysene	0.00000286[2]
	50000	Formaldehyde	0.00955[2]
	50328	Benzo[A]Pyrene	0.00000152[2]
	53703	Dibenz[A,H]Anthracene	0.00000472[2]
	56553	Benz(A)Anthracene	0.0000136[2]
	630080	Carbon Monoxide	7.68[3]
	71432	Benzene	0.00755[2]
	74828	Methane	0.0535[1]
	75070	Acetaldehyde	0.0062[2]
	83329	Acenaphthene	0.0000115[2]
	85018	Phenanthrene	0.000238[2]
	86737	Fluorene	0.000236[2]
	91203	Naphthalene	0.000686[2]
	NOx	Oxides Of Nitrogen	15.2[3]
	PM	Particulate Matter	2.51[3]
	PM10	PM10	2.51[3]
	PM2.5	(PM)2.5	2.51[3]
	SOx	Oxides Of Sulfur	0.0126[3]
	VOC	Volatile Organic Compounds	2.79[3]

1. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 3-6 GHG Emission Factors For Stationary Compression Ignition ICOM Engines All Stationary CI ICOM – Hours
2. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 3-7 HAP Emission Factors for Stationary Compression Ignition ICOM Engines Non-NSPS Emergency Fire Pump and Non-Emergency ≤600 HP – Hours
3. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 3-4 Criteria Pollutant Emission Factors For Stationary Emergency Non-Fire Pump Compression Ignition ICOM Engines Diesel <10 L/CYL, 50-100 HP, NSPS, Model Yr Pre-2007 - Hours

Table 6-11 Emissions Factors - Model Year 2007, ≤600kW, <10 L/Cyl, 50-100 HP

Inventory	CAS	Chemical Name	EF (lbs/maximum horse power)
Total – 2:	10024972	Nitrous Oxide	0.0107[1]
	106990	1,3-Butadiene	0.000149[2]
2 x 60 kW	107028	Acrolein	0.000352[2]
	108883	Toluene	0.00156[2]
	120127	Anthracene	0.00000712[2]
	124389	Carbon Dioxide	1320[1]
	129000	Pyrene	0.0000182[2]
	1330207	Xylene	0.00109[2]
	191242	Benzo[Ghi]Perylene	0.00000186[2]
	193395	Indeno[1,2,3-Cd]Pyrene	0.00000143[2]
	205992	Benzo[B]Fluoranthene	0.000000378[2]
	206440	Fluoranthene	0.000029[2]
	207089	Benzo[K]Fluoranthene	0.00000059[2]
	208968	Acenaphthylene	0.0000193[2]
	218019	Chrysene	0.00000134[2]
	50000	Formaldehyde	0.0045[2]
	50328	Benzo[A]Pyrene	0.000000716[2]
	53703	Dibenz[A,H]Anthracene	0.00000222[2]
	56553	Benz(A)Anthracene	0.0000064[2]
	630080	Carbon Monoxide	8.16[3]
	71432	Benzene	0.00355[1]
	74828	Methane	0.0535[2]
	75070	Acetaldehyde	0.00292[2]
	83329	Acenaphthene	0.00000541[2]
	85018	Phenanthrene	0.000112[2]
	86737	Fluorene	0.000111[2]
	91203	Naphthalene	0.000323[2]
	NOX	Oxides of Nitrogen	11.5[3]
	PM	Particulate Matter (PM)	0.661[3]
	PM10	PM10	0.661[3]
	PM2.5	PM2.5	0.661[3]
	SOX	Oxides of Sulfur	0.0126[3]
	VOC	Volatile Organic Compounds	0.899[3]

1. Air Emissions Guide For Air Force Stationary Sources, Jun 2020, Table 3-6, GHG Emission Factors For Stationary Compression Ignition ICOM Engines, All Stationary CI ICOM – Hours
2. Air Emissions Guide For Air Force Stationary Sources, June 2020, Table 3-7, HAP Emission Factors For Stationary Compression Ignition ICOM Engines, NSPS, Non-Emergency And Non-Fire Pump Emergency, ≤600 HP, Model YR 2007-Present – Hours
3. Air Emissions Guide For Air Force Stationary Sources, Jun 2020, Table 3-4, Criteria Pollutant Emission Factors For Stationary Emergency Non-Fire Pump Compression Ignition ICOM Engines, <10 L/CYL, 50-100 HP, NSPS, Model YR 2007 - Hours

Table 6-12 Emissions Factors - Model Year 2008, <10 L/CYL, 50-100 HP

Inventory	CAS	Chemical Name	EF (lbs/maximum horse power)
Total – 6:	10024972	Nitrous Oxide	0.0107[1]
	106990	1,3-Butadiene	0.000149[2]
1 x 40 kW	107028	Acrolein	0.000352[2]
4 x 50 kW	108883	Toluene	0.00156[2]
1 x 60 kW	120127	Anthracene	0.00000712[2]
	124389	Carbon Dioxide	1320[1]
	129000	Pyrene	0.0000182[2]
	1330207	Xylene	0.00109[2]
	191242	Benzo[Ghi]Perylene	0.00000186[2]
	193395	Indeno[1,2,3-Cd]Pyrene	0.00000143[2]
	205992	Benzo[B]Fluoranthene	0.000000378[2]
	206440	Fluoranthene	0.000029[2]
	207089	Benzo[K]Fluoranthene	0.00000059[2]
	208968	Acenaphthylene	0.0000193[2]
	218019	Chrysene	0.00000134[2]
	50000	Formaldehyde	0.0045[2]
	50328	Benzo[A]Pyrene	0.000000716[2]
	53703	Dibenz[A,H]Anthracene	0.00000222[2]
	56553	Benz(A)Anthracene	0.0000064[2]
	630080	Carbon Monoxide	8.16[3]
	71432	Benzene	0.00355[1]
	74828	Methane	0.0535[2]
	75070	Acetaldehyde	0.00292[2]
	83329	Acenaphthene	0.00000541[2]
	85018	Phenanthrene	0.000112[2]
	86737	Fluorene	0.000111[2]
	91203	Naphthalene	0.000323[2]
	NOX	Oxides of Nitrogen	7.19[3]
	PM	Particulate Matter (PM)	0.661[3]
	PM10	PM10	0.661[3]
	PM2.5	PM2.5	0.661[3]
	SOX	Oxides of Sulfur	0.0126[3]
	VOC	Volatile Organic Compounds	0.562[3]

1. Air Emissions Guide For Air Force Stationary Sources, Jun 2020, Table 3-6, GHG Emission Factors for Stationary Compression Ignition ICOM Engines, All Stationary CI ICOM – Hours
2. Air Emissions Guide For Air Force Stationary Sources, Jun 2020,, TABLE 3-7, HAP Emission Factors for Stationary Compression Ignition ICOM Engines, NSPS, Non-Emergency and Non-Fire Pump Emergency, ≤600 HP, Model Yr 2007-Present – Hours
3. Air Emissions Guide For Air Force Stationary Sources, Jun 2020, Table 3-4, Criteria Pollutant Emission Factors for Stationary Emergency Non-Fire Pump Compression Ignition ICOM Engines, Diesel, <10 L/CYL, 50-100 HP, NSPS, Model Yr 2008 – Hours

Table 6-13 Emissions Factors - Model Year 2007, ≤600kW, <10 L/Cyl, 600-700 HP

Inventory	CAS	Chemical Name	EF (lbs/maximum horse power)
Total – 1:	10024972	Nitrous Oxide	0.0107[1]
	107028	Acrolein	0.000021[2]
1 x 500 kW	108883	Toluene	0.000749[2]
	120127	Anthracene	0.00000328[2]
	124389	Carbon Dioxide	1320[1]
	129000	Pyrene	0.00000989[2]
	1330207	Xylene	0.000515[2]
	191242	Benzo[Ghi]Perylene	0.00000148[2]
	193395	Indeno[1,2,3-Cd]Pyrene	0.0000011[2]
	205992	Benzo[B]Fluoranthene	0.00000296[2]
	206440	Fluoranthene	0.0000107[2]
	207089	Benzo[K]Fluoranthene	0.000000581[2]
	208968	Acenaphthylene	0.0000246[2]
	218019	Chrysene	0.00000408[2]
	50000	Formaldehyde	0.00021[2]
	50328	Benzo[A]Pyrene	0.000000685[2]
	53703	Dibenz[A,H]Anthracene	0.000000922[2]
	56553	Benz(A)Anthracene	0.00000166[2]
	630080	Carbon Monoxide	5.73[3]
	71432	Benzene	0.00207[2]
	74828	Methane	0.0535[1]
	75070	Acetaldehyde	0.0000672[2]
	83329	Acenaphthene	0.0000125[2]
	85018	Phenanthrene	0.000109[2]
	86737	Fluorene	0.0000341[2]
	91203	Naphthalene	0.000347[2]
	NOX	Oxides of Nitrogen	6.45[3]
	PM	Particulate Matter (PM	0.331[3]
	PM10	PM10	0.331[3]
	PM2.5	PM2.5	0.331[3]
	SOX	Oxides of Sulfur	0.0126[3]
	VOC	Volatile Organic Compounds	0.178[3]

1. Air Emissions Guide For Air Force Stationary Sources, Jun 2020, Table 3-6, GHG Emission Factors for Stationary Compression Ignition ICOM Engines, All Stationary CI ICOM – Hours
2. Air Emissions Guide For Air Force Stationary Sources, Jun 2020, Table 3-7 HAP Emission Factors for Stationary Compression Ignition ICOM Engines, NSPS, Non-Emergency and Non-Fire Pump Emergency, >600 HP, Model Yr 2007-Present – Hours
3. Air Emissions Guide For Air Force Stationary Sources, Jun 2020, Table 3-4, Criteria Pollutant Emission Factors for Stationary Emergency Non-Fire Pump Compression Ignition ICOM Engines, Diesel, <10 L/CYL, 600-750 HP, NSPS, Model Yr 2007 - Hours

Table 6-14 Emissions Factors - Model Year 2007, ≤600kW, <10 L/Cyl, 175-600 HP

Inventory	CAS	Chemical Name	EF (lbs/maximum horse power)
Total – 6: 2 x 600 kW 2 x 750 kW 1 x 760 kW 1 x 2000 kW	10024972	Nitrous Oxide	0.0107[1]
	107028	Acrolein	0.000021[2]
	108883	Toluene	0.000749[2]
	120127	Anthracene	0.00000328[2]
	124389	Carbon Dioxide	1320[1]
	129000	Pyrene	0.00000989[2]
	1330207	Xylene	0.000515[2]
	191242	Benzo[Ghi]Perylene	0.00000148[2]
	193395	Indeno[1,2,3-Cd]Pyrene	0.0000011[2]
	205992	Benzo[B]Fluoranthene	0.00000296[2]
	206440	Fluoranthene	0.0000107[2]
	207089	Benzo[K]Fluoranthene	0.000000581[2]
	208968	Acenaphthylene	0.0000246[2]
	218019	Chrysene	0.00000408[2]
	50000	Formaldehyde	0.00021[2]
	50328	Benzo[A]Pyrene	0.000000685[2]
	53703	Dibenz[A,H]Anthracene	0.000000922[2]
	56553	Benz(A)Anthracene	0.00000166[2]
	630080	Carbon Monoxide	5.73[3]
	71432	Benzene	0.00207[2]
	74828	Methane	0.0535[1]
	75070	Acetaldehyde	0.0000672[2]
	83329	Acenaphthene	0.0000125[2]
	85018	Phenanthrene	0.000109[2]
	86737	Fluorene	0.0000341[2]
	91203	Naphthalene	0.000347[2]
	NOX	Oxides of Nitrogen	10.3[3]
	PM	Particulate Matter (PM	0.331[3]
	PM10	PM10	0.331[3]
	PM2.5	PM2.5	0.331[3]
	SOX	Oxides of Sulfur	0.0126[3]
	VOC	Volatile Organic Compounds	0.286[3]

1. Air Emissions Guide For Air Force Stationary Sources, Jun 2020, Table 3-6, GHG Emission Factors for Stationary Compression Ignition ICOM Engines, All Stationary CI ICOM – Hours
2. Air Emissions Guide For Air Force Stationary Sources, Jun 2020, Table 3-7 HAP Emission Factors for Stationary Compression Ignition ICOM Engines, NSPS, Non-Emergency and Non-Fire Pump Emergency, >600 HP, Model Yr 2007-Present – Hours
3. Air Emissions Guide for Air Force Stationary Sources, Jun 2020, Table 3-4, Criteria Pollutant Emission Factors for Stationary Emergency Non-Fire Pump Compression Ignition ICOM Engines, Diesel, <10 L/CYL, 750-3000 HP, NSPS, Model Yr 2007 - Hours

Table 6-15 Emissions Factors - Model Year Pre 2007, Non-NSPS, ≤600kW, <10 L/Cyl, 175-600 HP

Inventory	CAS	Chemical Name	EF (lbs/maximum horse power)
Total – 2:	10024972	Nitrous Oxide	0.0107[1]
	107028	Acrolein	0.0000637[2]
2 x 600 kW	108883	Toluene	0.00227[2]
	120127	Anthracene	0.00000995[2]
	124389	Carbon Dioxide	1150[1]
	129000	Pyrene	0.00003[2]
	1330207	Xylene	0.00156[2]
	191242	Benzo[Ghi]Perylene	0.0000045[2]
	193395	Indeno[1,2,3-Cd]Pyrene	0.00000335[2]
	205992	Benzo[B]Fluoranthene	0.00000898[2]
	206440	Fluoranthene	0.0000326[2]
	207089	Benzo[K]Fluoranthene	0.00000176[2]
	208968	Acenaphthylene	0.0000747[2]
	218019	Chrysene	0.0000124[2]
	50000	Formaldehyde	0.000638[2]
	50328	Benzo[A]Pyrene	0.00000208[2]
	53703	Dibenz[A,H]Anthracene	0.0000028[2]
	56553	Benz(A)Anthracene	0.00000503[2]
	630080	Carbon Monoxide	6.88[3]
	71432	Benzene	0.00628[2]
	74828	Methane	0.0535[1]
	75070	Acetaldehyde	0.000204[2]
	83329	Acenaphthene	0.0000379[2]
	85018	Phenanthrene	0.00033[2]
	86737	Fluorene	0.000104[2]
	91203	Naphthalene	0.00105[2]
	NOX	Oxides of Nitrogen	25.9[3]
	PM	Particulate Matter (PM	0.809[3]
	PM10	PM10	0.809[3]
	PM2.5	PM2.5	0.809[3]
	SOX	Oxides of Sulfur	0.0123[3]
	VOC	Volatile Organic Compounds	0.716[3]

1. American Petroleum Institute, Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Natural Gas Industry Section 4 - Combustion Emissions Estimation Methods, August 2009
2. Air Emissions Guide for Air Force Stationary Sources, Jun 2020, Table 3-7 HAP Emission Factors for Stationary Compression Ignition ICOM Engines, Non-NSPS, Emergency And Non-Emergency, >600 HP – Hours
3. Air Emissions Guide to Air Force Stationary Sources, JUL 2016, Table 3-3, Criteria Pollutant Emission Factors For Stationary Compression Ignition Internal Combustion Engines, Diesel, 600-3000 HP, <10 L Per Cylinder, Model Yr < 2007 and Fire Pumps - Hours

7. DEGR & GSOL: Solvent Cleaning and Solvent Tanks

JBLM operates degreasing tanks with the combined capacity of 6253 gallons, along with a wide variety of solvents used for cleaning parts at aerospace maintenance facilities at Gray Army Air Field and JBLM-McChord, and motor vehicle and mobile equipment coating operations base wide. Total combined usage from solvent tank degreasing and general solvent use from 2016-2020 is provided in Table 7-1.

JBLM maintains a robust authorization process for solvent use to screen for hazardous and toxic air pollutants and ensure solvents have low concentrations of VOCs, HAPs and TAPs.

Table 7-1 Combined Solvent Usage for Operating Years 2016-2020 (gallons per year)

	2016	2017	2018	2019	2020
Degreasing Tanks	575	85	385	5754	382
General Solvent Use	136	177	231	170	187

The PTE of 24.72 tons per year of VOCs from solvents used in degreasing tanks is calculated using the mass balance equation shown below, with a maximum annual consumption of 6253 gallons and VOC content from Safety Data Sheets (SDS).

$$Emissions = Consumption\ x\ VOC\ Content$$

The methodology used to calculate the PTE provided in Table 7.2, for all other solvents follows the same rationale used for the PTE for abrasive blasting and woodworking in Section 4. Consumption for the PTE calculation uses the highest annual usage for each individual solvent from the years of 2016-2020, under the 2080-hour work year. As was done with the baghouse, this maximum historic usage was scaled up from a 2080 work year to 8760 hour work year using the same scale factor shown below.

$$Scale\ Factor = \frac{8760\ hours}{2080\ hours} = 4.21$$

The PTE of VOCs from general solvent usage is calculated using the same equation as solvent tank degreasing. The PTE for HAPs emitted from general solvent use was calculated using the material mass balance equation below using SDSs to obtain each materials density and concentration.

$$Emissions = Consumption(gallons)x\ Density(\frac{lb}{gallon})\ x\ Ingredient\ Percent$$

Table 7-2 PTE for General Solvent Usage

CAS	Pollutant	Emission (tons per year)
107211	Ethylene Glycol	0.00972
100414	Ethylbenzene	0.012838
1330207	Xylene	0.032488
107982	Propylene Glycol Monomethyl Ether	0.077168
108101	Methyl Isobutyl Ketone	0.065533
108883	Toluene	0.12524
VOC	Volatile Organic Compounds	20.92433

8. SURF: Surface Coating

JBLM has eight active coating operations using high pressure low-volume paint sprayers, performed in the permitted paint booths listed in Table 8-1.

Table 8-1 Surface Coating Source Inventory

Bldg.	NOC	Pollution Control Equipment
1325	7780	DeVilbiss Proclean Model #PCL-886 Dry Filter Coating Booth rated at 125 cfm
3035	3240	Dry Filter System Spray Coating Booth rated at 87,500 cfm
3098	7057	Dry Filter System Spray Coating Booth rated at 14,000 cfm
4081	9954	Col-Met EZ-26 Side Downdraft Spray Booth, 12,600 cfm
9580	4074	Dry Filter System Spray Coating Booth rated at 3,000 cfm
	4074	Dry Filter System Spray Coating Booth rated at 8,300 cfm
	5810	Dry Filter System Spray Coating Booth rated at 39,600 cfm
J00745	7723	Dry Filter System Spray Coating Booth rated at 40,824 cfm
	8681	Spray Systems Inc. Cross Flow Spray Booth rated at 12,600 cfm
J01160	7184	Spray Coating Room rated at 400,000 cfm

The methodology used to calculate the PTE, provided in Table 8.2, follows the same rationale as abrasive blasting and woodworking in Section 4, and solvent usage in Section 7. Consumption for the PTE calculation uses the highest annual usage for each individual coating from the years of 2016-2020, under the 2080-hour work year, and scales this usage up to an 8760-hour work year using the same scale factor shown below.

$$Scale\ Factor = \frac{8760\ hours}{2080\ hours} = 4.21$$

The PTE for VOCs, HAPs and TAPs uses the following mass balance equations based on volumetric usage and pollutant content in lbs/gallon with data provided from safety data sheets.

$$Emissions\ (VOC) = \ Consumption\ \ x\ VOC\ Content$$

$$Emissions\ (Volatile\ HAPs\ and\ TAPs) = \ Consumption\ x\ Density\ x\ Ingredient\ Percent$$

$$Emissions\ (Particulate\ HAPS) = \ Consumption x\ Density\ x\ Ingredient\ Percent\ x \left(1 - \frac{Control\ Efficiency}{100}\right) x\ (1 - \frac{Transfer\ efficiency}{100}$$

Particulate matter was calculated using the following equation with an emission factor of 0.525 lbs/gallon.

$$Emissions\ (PM10) = \ Consumption\ \ x\ 0.525\ \frac{lbs}{gallon}$$

Table 8-2 PTE for Surface Coating Operations

CAS	Pollutant Name	Emissions (tons per year)
68186903	C. I. Pigment Brown 24	0.000016
8007189	C.I. Pigment Yellow 53	0.000008
7440473	Chromium	0.003866
1308389	Chromium(Iii) Oxide	0.000283
136527	Cobalt 2-Ethylhexanoate	0.000005
68187495	Cobalt Chromite Green Spinel	0.021757
61789513	Cobalt Naphthenate	0.000004
98828	Cumene	0.01079
84742	Dibutyl Phthalate	0.000086
112345	Diethylene Glycol Monobutyl Ether	0.000686
34590948	Dipropylene Glycol Monomethyl Ether	0.000491
100414	Ethylbenzene	0.085846
112072	Ethylene Glycol Monobutyl Ether Acetate	0.264541
65997184	Frits, Chemicals	0.000175
822060	Hexamethylene-1,6-Diisocyanate	0.047635
7439921	Lead	0
12656858	Lead Chromate Molybdate Sulfate	0.000003
18454121	Lead Chromate(Vi) Oxide	0.000014
67561	Methanol	0.000833
108101	Methyl Isobutyl Ketone	0.160017
108383	M-Xylene	0.003584
91203	Naphthalene	0.000201
27253312	Neodecanoic Acid, Cobalt Salt	0.000004
27253323	Neodecanoic Acid, Manganese Salt	0.000004
15780333	Nickel Uranium Oxide	0.000013
11103869	Potassium Zinc Chromate Hydroxide	0.000033
107982	Propylene Glycol Monomethyl Ether	0.030209
106423	P-Xylene	0.015034
7789062	Strontium Chromate	0.01718
100425	Styrene	0.000913
108883	Toluene	0.183393
121448	Triethylamine	0.000242
1330207	Xylene	0.46107
PM	Particulate Matter	1.25
VOC	Volatile Organic Compounds	7.3725

9. FIRE: Fire Training

Fire training under NOC 6130 takes place at McChord Field. Annual fuel consumption from 2016-2020 is provided in Table 9-1.

Table 9-1 Fuel Usage from 2016-2020

	2016	2017	2018	2019	2020
Propane (gallons)	2800	3520	6540	1000	5560

The annual limit of 30,000 gallons of propane is used as for the PTE provided in Table 9-2, using the equation below and the emissions factors listed in Table 9-3.

$$Emissions = \frac{Consumption}{2000} x\ EF$$

Table 9-2 PTE – Fire Training

CAS #	Pollutant Name	Emissions (tpy)
10024972	Nitrous Oxide	0.0018
124389	Carbon Dioxide	189.195
50000	Formaldehyde	0.0105
630080	Carbon Monoxide	0.231
74828	Methane	0.009
NOX	Oxides of Nitrogen	0.0855
PM	Particulate Matter (PM)	0.1425
PM10	PM10	0.1425
PM2.5	PM2.5	0.1425
SOX	Oxides of Sulfur	0.0003
VOC	Volatile Organic Compounds	0.36

Table 9-3 Emissions Factors[1] – Fire Training

CAS #	Pollutant Name	EF (lbs/gal)
10024972	Nitrous Oxide	0.00012
124389	Carbon Dioxide	12.613
50000	Formaldehyde	0.0007
630080	Carbon Monoxide	0.0154
74828	Methane	0.0006
NOX	Oxides of Nitrogen	0.0057
PM	Particulate Matter (PM)	0.0095
PM10	PM10	0.0095
PM2.5	PM2.5	0.0095
SOX	Oxides of Sulfur	0.00002
VOC	Volatile Organic Compounds	0.024

1. AFCEC Stationary, Jun 2020, Table 12-2, Propane

10. JET: Engine Test Stand

JBLM's Engine Test Stand, regulated under NOC 12012, will be used to test the T-55 and T-700 jet engines under the operating parameters provided in Table 10-1. The maximum number of annual tests based on fleet inventory, staffing and operating conditions are 234 tests of the T-700 engine, and 26 tests of the T-55 engine. Operations are expected to begin the summer of 2022.

Table 10-1 Maximum Test Duration (minutes per test)

Mode	T-700	T-55
Idle	8	20
Approach	8	20
Intermediate	79	10
Military	10	130
Total	105	180

The PTE, provided in Table 10-2, is calculated with the following equation, using the emission factors in Tables 10-3 and 10-4.

$$Emissions = EF\ x\ \frac{Minutes\ per\ mode}{60\ minutes}$$

Table 10-2 PTE for Engine Testing

CAS	Pollutant Name	Emissions (tons per year)
75070	Acetaldehyde	0.000129
107028	Acrolein	0.00017
71432	Benzene	0.000685
100414	Ethylbenzene	0.00004
50000	Formaldehyde	0.000909
78933	Methyl Ethyl Ketone	0.000039
91203	Napthalene	0.000228
108952	Phenol	0.000024
100425	Styrene	0.000066
108883	Toluene	0.000191
1330207	Xylene	0.000146
CO	Carbon Monoxide	0.79
NO_x	Oxides of Nitrogen	1.61
PM	PM	0.29
SO_x	Oxides of Sulfur	0.16
VOC	Volatile Organic Compounds	0.10

Table 10-3 Emissions Factors - T55 Model Engine

CAS Number	Pollutant	Idle lb/hr	Approach lb/hr	Intermediate lb/hr	Military lb/hr
75070	Acetaldehyde[1]	0.0151086	0.0011292	0.00	0.00
107028	Acrolein[1]	0.033972	0.00128917	0.00	0.00
71432	Benzene[1]	0.064368	0.0118566	0.006792	0.00717024
100414	Ethylbenzene[1]	0.0066752	0.000288887	0.00	0
50000	Formaldehyde[1]	0.021307	0.0110097	0.000539964	0.0053938
78933	Methyl Ethyl Ketone[1]	0.0088208	0.000219253	0.00	0.00
91203	Napthalene[1]	0.0162112	0.00143032	0.0000084221	0.00462
108952	Phenol[1]	0.00246148	0.00	0.00	0.00
100425	Styrene[1]	0.0122478	0.000481792	0.00	0.00
108883	Toluene[1]	0.030396	0.00271008	0.000225834	0.000234696
1330207	Xylene[1]	.0130524	.000642703	0.00	0.00
CO	Carbon Monoxide[1]	22.49961	5.79862	5.59922	4.99704
NO_x	Oxides of Nitrogen[2]	0.1995	4.79938	5.5007	6.39692
PM	PM[2]	0.09975	0.59803	0.79637	0.7974
SO_x	Oxides of Sulfur[2]	0.14231	0.80999	0.87847	0.94802
VOC	Volatile Organic Compounds[2]	14.83482	1.37774	3.10338	0.80626

1. Emission factors from Table 2-9 of the Air Force Civil Engineer Center Air Emissions Guide for Air Force Mobile Sources, June 2020 using surrogate engine Model T64-GE-100.
2. Emission factors from Table 2-8 of the Air Force Civil Engineer Center Air Emissions Guide for Air Force Mobile Sources, June 2020 using surrogate engine T-58 GE-5.

Table 10-4 Emissions Factors - T700 Model Engine

CAS Number	Polllutant	Idle lb/hr	Approach lb/hr	Intermediate lb/hr	Military lb/hr
75070	Acetaldehyde[1]	0.0024254	0.000142107	0.0001252	0.00
107028	Acrolein[1]	0.00096882	0.0000453992	0.000006886	0.00
71432	Benzene[1]	0.0065258	0.000139293	0.000195312	0.0002175
100414	Ethylbenzene[1]	0.0003015	0.000120533	0.00	0.000144275
50000	Formaldehyde[1]	0.029346	0.00191821	0.00130834	0.00348725
91203	Napthalene[1]	0.00098222	0.000073164	0.0000421298	0.0000210975
108952	Phenol[1]	.00083616	0.00	0.00	0.00
100425	Styrene[1]	.00069144	0.00	0.00	0.00
108883	Toluene[1]	0.0017152	0.00058156	0.00	0.0002117
1330207	Xylene[1]	0.00095676	0.000266861	0.000317382	0.000899
NO_x	NO_x[2]	0.45024	5.13555	7.43062	8.28675
CO	CO[1]	6.19616	2.40128	2.19726	2.03725
PM	PM[2]	0.19832	0.59094	1.38972	1.89225
SO_x	SO_2[2]	0.14338	0.50183	0.66982	0.77575
VOC	Volatile Organic Compounds[2]	0.067	0.00938	0.00626	0.00725

1. Emission factors from Table 4-2 of the Air Force Civil Engineer Center Air Emissions Guide for Air Force Mobile Sources, June 2020 for the T700-GE-700 engine
2. Table 4-1 of the Air Force Civil Engineer Center Air Emissions Guide for Air Force Mobile Sources, June 2020 for the T700-GE-700 engine

11. FDSP: Gasoline Dispensing

JBLM has eight gas stations with Stage I and Stage II equipment, and three uncontrolled gasoline dispensing operations used to fuel maintenance, forestry, and recreational equipment. Details are provided in Table 11-6. Fuel dispensing with solely Stage I equipment only is no longer in operation. The total combined throughput for fuel dispensing activities from 2016-2020 is provided in Table 11-1.

Table 11-1 Combined Throughput from 2016-2020 (gallons per year)

Station Type	2016	2017	2018	2019	2020
Controlled	16,056,367	14,143,960[1]	12,205,263[1]	11,414,497[1]	10,658,063
Uncontrolled	6,733	15,831	14,145	16,477[1]	15,119

1. These values differ from what was reported to PSCAA for these years. Corrections will be provided in the 2021 Air Emissions Inventory Report.

The PTE shown in Table 11-2, were calculated using the equations below, the emissions factors provided in Table 11-5 and maximum potential throughput explained in the tables and descriptions below.

$$Uncontrolled\ \ emissions = \frac{\text{Consumption}}{1000}\ x\ EF$$

$$Controlled\ \ emissions = \frac{Consumption}{1000}\ x\ EF$$

Table 11-2 PTE for Fueling Operations

CAS #	Pollutant Name	Emissions (tpy)
100414	Ethylbenzene	0.226896
106990	1,3-Butadiene	0.000426
108883	Toluene	1.249248
110543	N-Hexane	0.289561
1330207	Xylene	1.136635
540841	2,2,4-Trimethylpentane	0.787722
71432	Benzene	0.427541
91203	Naphthalene	0.026867
98828	Cumene	0.078867
VOC	Volatile Organic Compounds	39.731616

Maximum annual throughput for controlled operations was determined using the EPA calculator available at: https://www.epa.gov/sites/production/files/2016-06/gasolinedispensingcalculator032315.xlsx using the parameters in Table 11-3.

Table 11-3 Maximum Fuel Throughput - Controlled

Criteria	Parameters
Number of Nozzles	152
Time between refueling events	0.25 hrs
GDF Operation per day	18
Days open per year	365
Gallons refueled per event	11
Total (gallons)	**43,940,160**

Maximum annual throughput for uncontrolled fueling is 44,160 gallons based on the following operations:

- Two golf courses fueling a maximum of 160 carts with 3 gallons of gas every 7 days, for a maximum of 24,960 gallons annually.
- Russell Landing Marina with 190 moorage slips, open from Memorial Day to Labor Day serving recreational boats having 5-20 gallons fuel capacity 8 hours a day, 7 days a week. Maximum fueling is 20 gallons, 4x per day for the 90-day season for a total of 7200 gallons annually.
- Seasonally, public works fuels grounds maintenance, snow removal and deicing, and forestry management equipment listed in Table 11-3. The maximum throughput, rounded to 12,000 gallons, is based on 8-hour workdays during the winter, spring and summer seasons using the current equipment inventory and staffing.

Table 11-4 Public Works Maximum Fuel Throughput

Division/Season	Equipment	Tank Capacity (gallons)	Frequency	Maximum (gallons)
Forestry/28 weeks	4 fire pumps	1	4x a week	448
	9 truck mounted pumps	4	4x a week	4032
	22 chainsaw/brush cutters	0.5	weekly	308
	4 Utility Terrain Vehicles	10	weekly	1120
	4 fuel trailers for drip torch	48	Every 2 weeks	2688
Deicing/12 weeks	10 truck mounted spreaders	3	Daily	2520
Grounds/28 weeks	20 hand tools and mowers	0.5	3x week	840
			Total (gallons)	**11956**

Table 11-5 Emission Factors for Fueling Operations[1]

CAS #	Pollutant Name	EF Lbs/1000 Gallons Uncontrolled	EF Lbs/1000 Gallons Controlled
100414	Ethylbenzene	0.005137	0.000514
106990	1,3-Butadiene	0.0001958	0.0000178
108883	Toluene	0.07359	0.00776
110543	N-Hexane	0.06028	0.00613
1330207	Xylene	0.02255	0.00267
540841	2,2,4-Trimethylpentane	0.005324	0.00782
71432	Benzene	0.0671	0.0068
91203	Naphthalene	0.00001694	0.00000169
98828	Cumene	0.0008569	0.0000857
VOC	Volatile Organic Compounds	11	1.1

1. Air Emissions Guide for Air Force Stationary Sources, June 2020, Table 6-5

Table 11-6 Gasoline Stations and Dispensing Operations

Station	Bldg	NOC	Tank ID	Tank Capacity	Fuel/ Tank Type	Dispensers	Stage 1 Control	Stage 2 Control
AAFES Liberty	6038	4753	02407-5-R	12,000	MOGAS/UST	16	Dual Point	EMCO Wheaton A4015 Vapor Balance
			02407-6-R	12,000	MOGAS/UST		Dual Point	EMCO Wheaton A4015 Vapor Balance
			02407-7-R	12,000	MOGAS/UST		Dual Point	EMCO Wheaton A4015 Vapor Balance
AAFES Madigan	9052	4753	09052-1-R	12,000	MOGAS/UST	12	Dual Point	EMCO Wheaton A4015 Vapor Balance
			09052-2-R	12,000	MOGAS/UST		Dual Point	EMCO Wheaton A4015 Vapor Balance
			09052-3-R	12,000	MOGAS/UST		Dual Point	EMCO Wheaton A4015 Vapor Balance
AAFES McChord	J00545	5733	41208-R	12,000	MOGAS/UST	10	Dual Point	Husky V Vapor Balance
			41209-R	12,000	MOGAS/UST		Dual Point	Husky V Vapor Balance
			41210-R	12,000	MOGAS/UST		Dual Point	Husky V Vapor Balance
AAFES North Fort	11566	226N	11566-1-R	20,000	MOGAS/UST	12	Dual Point	EMCO Wheaton A4015 Vapor Balance
			11566-2-R	15,000	MOGAS/UST		Dual Point	EMCO Wheaton A4015 Vapor Balance
AAFES Pendleton	3145	803N 823N	03155UST001	15000	MOGAS/UST	16	Dual Point	Healy Nozzle Wayne Vac Assist
			03155UST002	6000	MOGAS/UST		Dual Point	Healy Nozzle Wayne Vac Assist
			03155UST003	9000	MOGAS/UST		Dual Point	Healy Nozzle Wayne Vac Assist
			03155UST005	15000	E85/AST		Dual Point	None
			03155UST006	15000	E85/AST		Dual Point	None
AAFES Stryker	2407	385N	02407-5-R	12,000	MOGAS/UST	8	Dual Point	EMCO Wheaton A4015 Vapor Balance
			02407-6-R	12,000	MOGAS/UST		Dual Point	EMCO Wheaton A4015 Vapor Balance
			02407-7-R	12,000	MOGAS/UST		Dual Point	EMCO Wheaton A4015 Vapor Balance
Army Logistics	9635	6640	09635-5-R	12,000	MOGAS/UST	1	Dual Point	VST-EVR-NBBK Vapor Balance
			AST 9636-01	5000	E85	1	Dual Point	None
McChord Logistics	J00730	5733	41321	12,000	MOGAS/UST	1	Dual Point	EMCO Wheaton A4015 Vapor Balance
			41344	12,000	E85/UST	1	Dual Point	None
Eagles Pride Golf Course	1517	NA	01523AST001	2000	MOGAS/AST	1	Dual Point (unused)	None
Russell Landing	8051	NA	08981AST001	500	MOGAS/AST	1	Dual Point (unused)	None
Whispering Pines Golf Course	J00838	NA	838-3	1000	MOGAS/AST	1	None	None
Public Works	2051	6832[1]	2051AST001	2000	MOGAS	1	None	None

1. The 25,000 gallon tank was removed and this facility is used solely for grounds and forestry equipment.

12. CELL: Fuel Cell Maintenance

JBLM-McChord performs fuel cell maintenance on fuel tanks removed from C-17 aircraft. The tank sizes range of 6000 to 8500 gallons in volume. The maximum number of tanks that can be maintained under the current staffing and facility size is 10 per week or 520 per year. Each tank is purged twice prior to commencing maintenance activities.

The PTE provided in Table 8-2 is calculated using the following equation from the Air Emissions Factor Guide to Air Force Stationary Sources, June 2020, using a cell volume of 8,500 gallons, the emissions factors provided in Table 8-1 and the saturation vapor density of 0.0023 lb/ft^3 for JP-8 at 70° F, from Section 7.1.3.1 of AP-42.

$$Emissions = EF\ x\ 0.0023 \frac{Lb}{CuFt}\ x\ Cell\ Volume\ x\ 0.134 \frac{Gal}{CuFt}\ x\ Purge\ Number\ x\ Quantity$$

Table 12-1 Emission Factors for Fueling Cell Maintenance[1]

CAS #	Pollutant Name	EF LBS/LB
100414	Ethylbenzene	0.00716
108883	Toluene	0.0283
1330207	Xylene	0.0469
540841	2,2,4-Trimethylpentane	0.00002
71432	Benzene	0.0155
91203	Naphthalene	0.00032
98828	Cumene	0.00381
VOC	Volatile Organic Compounds	1

Table 12-2 PTE for Fuel Cell Maintenance

CAS	Pollutant Name	Emissions (tons per year)
100414	Ethylbenzene	0.009754
108883	Toluene	0.038552
1330207	Xylene	0.06389
540841	2,2,4-Trimethylpentane	0.000028
71432	Benzene	0.021114
91203	Naphthalene	0.000436
98828	Cumene	0.00519
VOC	Volatile Organic Compounds	1.362244

13. LAND: Landfills

JBLM's landfill, consisting of six cells with a total of 780,843 metric tons of municipal waste mixed with construction and demolition debris, was fully closed in 2004. The closure dates and waste volumes by each cell are provided in Table 13-1. The flare regulated under NOC was decommission in 2019.

The PTE is based on AP-42 Section 2.4.4.1 and LANDGEM using the emissions factors provided in Table 13-1. Since landfill emissions will decrease each year, the PTE consists of emissions calculated for the year 2020.

Table 13-1 Process Quantities from Landfill Operations

	2016	2017	2018	2019	2020
Landfill Process (Million Cubic Feet)	45.57	44	42.35	41	39

Table 13-2 Emission Factors for Landfill Operations

CAS	Chemical Name	EF (MFT^3/ Megagrams (MMGR)	CAS	Chemical Name	EF (MFT^3/ Megagrams (MMGR)
100414	Ethylbenzene	0.00557	74828	Methane	100
106934	Ethylene Dibromide	0.00000214	74873	Methyl Chloride	0.000695
106978	Butane	0.00333	74931	Methyl Mercaptan	0.00136
107062	Ethylene Dichloride	0.000462	74986	Propane	0.00557
107131	Acrylonitrile	0.00382	75003	Ethyl Chloride	0.000917
108101	Methyl Isobutyl Ketone	0.00213	75014	Vinyl Chloride	0.00522
108883	Toluene	0.173	75081	Ethyl Mercaptan	0.00161
108907	Chlorobenzene	0.00032	75092	Methylene Chloride	0.0138
109660	Pentane	0.0027	75150	Carbon Disulfide	0.000502
110543	N-Hexane	0.00644	75183	Dimethyl Sulfide	0.00553
127184	Tetrachloroethylene	0.00704	75244	Methane, Bromodichloro-	0.00583
1330207	Xylene	0.0146	75343	1,1-Dichloroethane	0.00265
540590	1,2-Dichloroethylene	0.00313	75354	Vinylidene Chloride	0.000221
56235	Carbon Tetrachloride	0.000007	75434	Dichlorofluoromethane	0.00307
630080	Carbon Monoxide	0.0449	75456	Hcfc-22	0.00128
64175	Ethanol	0.0143	75718	Dichlorodifluoromethane	0.0216
67630	2-Hydroxypropane	0.0343	7783064	Hydrogen Sulfide	0.0138
67641	Acetone	0.00463	78875	Dichloropropane	0.000231
67663	Chloroform	0.0000407	78933	Methyl Ethyl Ketone	0.00582
71432	Benzene	0.00986	79016	Trichloroethylene	0.00421
71556	1,1,1-Trichloroethane	0.000728	79345	Tetrachloroethane	0.00212
7439976	Mercury	0.000000666			

Table 13-3 PTE for Landfill Operations in tons per year

CAS	Chemical Name	Emissions	CAS	Chemical Name	Emissions
100414	Ethylbenzene	0.0456929	74873	Methyl Chloride	0.00570135
106934	Ethylene Dibromide	0.00001755	74931	Methyl Mercaptan	0.0111566
106978	Butane	0.02731735	74986	Propane	0.0456929
107062	Ethylene Dichloride	0.00378995	75003	Ethyl Chloride	0.0075225
107131	Acrylonitrile	0.031337	75014	Vinyl Chloride	0.0428217
108101	Methyl Isobutyl Ketone	0.0174732	75081	Ethyl Mercaptan	0.01320745
108883	Toluene	1.41918865	75092	Methylene Chloride	0.11320695
108907	Chlorobenzene	0.00262505	75150	Carbon Disulfide	0.0041181
109660	Pentane	0.0221492	75183	Dimethyl Sulfide	0.0478258
110543	N-Hexane	0.0528299	75244	Methane, Bromodichloro-	0.0478
127184	Tetrachloroethylene	0.05775195	75343	1,1-Dichloroethane	0.021739
1330207	Xylene	0.1197697	75354	Vinylidene Chloride	0.0018130.
540590	1,2-Dichloroethylene	0.00001755	75434	Dichlorofluoromethane	0251845
56235	Carbon Tetrachloride	0.0000574	75456	Hcfc-22	0.0105004
64175	Ethanol	0.00173	75718	Dichlorodifluoromethane	0.00570135
67630	2-Hydroxypropane	0.28137675	7783064	Hydrogen Sulfide	0.11320695
67641	Acetone	0.0379818	78875	Dichloropropane	0.001895
67663	Chloroform	0.0003339	78933	Methyl Ethyl Ketone	0.0477438
71432	Benzene	0.0808855	79016	Trichloroethylene	0.0345363
71556	1,1,1-Trichloroethane	0.0059721	79345	Tetrachloroethane	0.0173912
7439976	Mercury	0.00000545	VOC	Total VOC	7.3960
74828	Methane	820.34	CO	Carbon Monoxide	0.36833275