Potential to Emit: Grand Totals
Island Launch Range
Permit #40909

Source Classes	PM-primary	PM-10 primary	SO2	NOx	VOC	TRS	non-VOC/non-PM HAP	CO-optional	PM filterable	PM-10 filterable	PM condensable	Pb	HAPs - Cr	HAPs - Co	HAPs - cumene	HAPs - dicholoromethane
LPG Boilers (SCC 10201002)	3.12	3.12	0.05	53.52	2.82	0.00	0.00	9.01	1.69	1.69	1.48	0.00				
LPG Space Heaters (SCC 10500110)	0.08	0.08	0.00	1.43	0.04	0.00	0.00	0.24	0.04	0.04	0.04	0.00				
LPG Generators (SCC 20200202)	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
#2 Fuel Boilers and Furnaces (SCC 10300501)	0.07	0.04	0.01	0.73	0.01	0.00	0.00	0.18	0.07	0.04	0.05	0.00				
#2 Generators < 600 HP	0.26	0.26	0.75	11.38	0.93	0.00	0.00	2.45	0.26	0.26	0.00	0.00				
#2 Generators > 600 HP	27.20	27.20	77.14	1173.59	95.79	0.00	0.00	252.59	27.20	27.20	0.00	0.00				
Paint Booths	1.99	1.99	0.00	0.00	1.06	0.00	1.99	0.00	1.99	1.99	1.99	0	0.01	0.02	1.39	0.50
Welding	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Sand Blasting	418.51	59.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Composite Motors	0.28	0.28	0.00	0.23	0.00	0.00	0.56	0.44	0.28	0.28	0.28					
Double Base Motors	0.02	0.02	0.00	0.22	0.00	0.00	0.38	0.73	0.02	0.02	0.02	0.02				
Ampules	0.051863747	0.051863747	0.052	0.051863747	0.05186375	0.051863747	0.051863747	0.051863747	0.051863747	0.051863747	0.051863747	0.05				
LPG Tanks (VOC as 1% total 2019 throughput)					11.60											
Total	**451.59**	**92.84**	**78.00**	**1241.18**	**112.30**	**0.05**	**2.99**	**265.71**	**31.62**	**31.59**	**3.91**	**0.08**	**0.01**	**0.02**	**1.39**	**0.50**

Potential to Emit: Grand Totals
Island Launch Range
Permit #40909

HAPs - ethylbenzene	HAPs - ethylene glycol	HAPs - fine mineral fibers	HAPs - formaldehyde	HAPs - glycol ether	HAPs - hexamethane diisocyanate	HAPs - hydrochloric acid	HAPs - MIK	HAPs - methanol	HAPs - naphthalene	HAPs - phenol	HAPs - styrene polymer	HAPs - TCE
0.12	1.49	0.60	0.99	1.99	0.10	0.95	0.60	0.01	0.99	1.99	0.50	1.59
						0.56						
						0.38						
						0.05						
0.12	**1.49**	**0.60**	**0.99**	**1.99**	**0.10**	**1.95**	**0.60**	**0.01**	**0.99**	**1.99**	**0.50**	**1.59**

Potential to Emit: Grand Totals
Island Launch Range
Permit #40909

HAPs - toluene	HAPs - xylene	HAPs - Manganese	Hydrazine
		0.00	
0.00	0.00	0.00	0.00

Potential to Emit: Propane Boilers (EXEMPT?)
Permit #40909
Webfire Code: 10201002

Source Name	Rated capacity	Gallon conversion	Rated throughput	Max throughput conversion	Max throughput
B-031-01	299,000 btu/hr	1.0911E-05 gal/btu	3.262 gal/hr	8760 hr/yr	28579.47 gal/yr
B-031-02	299,000 btu/hr	1.0911E-05 gal/btu	3.262 gal/hr	8760 hr/yr	28579.47 gal/yr
B-129-01	1,000,000 btu/hr	1.0911E-05 gal/btu	10.911 gal/hr	8760 hr/yr	95583.52 gal/yr
D-001N-01	2,000,000 btu/hr	1.0911E-05 gal/btu	21.823 gal/hr	8760 hr/yr	191167.04 gal/yr
D-001N-02	2,000,000 btu/hr	1.0911E-05 gal/btu	21.823 gal/hr	8760 hr/yr	191167.04 gal/yr
D-001S-01	2,000,000 btu/hr	1.0911E-05 gal/btu	21.823 gal/hr	8760 hr/yr	191167.04 gal/yr
D-001S-02	2,000,000 btu/hr	1.0911E-05 gal/btu	21.823 gal/hr	8760 hr/yr	191167.04 gal/yr
D-010-01	500,000 btu/hr	1.0911E-05 gal/btu	5.456 gal/hr	8760 hr/yr	47791.76 gal/yr
D-010-02	500,000 btu/hr	1.0911E-05 gal/btu	5.456 gal/hr	8760 hr/yr	47791.76 gal/yr
D-010-03	399,900 btu/hr	1.0911E-05 gal/btu	4.363 gal/hr	8760 hr/yr	38223.85 gal/yr
E-002-01	1,400,000 btu/hr	1.0911E-05 gal/btu	15.276 gal/hr	8760 hr/yr	133816.92 gal/yr
E-002-02	1,400,000 btu/hr	1.0911E-05 gal/btu	15.276 gal/hr	8760 hr/yr	133816.92 gal/yr
E-002-03	399,900 btu/hr	1.0911E-05 gal/btu	4.363 gal/hr	8760 hr/yr	38223.85 gal/yr
E-007-01	299,000 btu/hr	1.0911E-05 gal/btu	3.262 gal/hr	8760 hr/yr	28579.47 gal/yr
E-007-02	299,000 btu/hr	1.0911E-05 gal/btu	3.262 gal/hr	8760 hr/yr	28579.47 gal/yr
E-104-01	2,000,000 btu/hr	1.0911E-05 gal/btu	21.823 gal/hr	8760 hr/yr	191167.04 gal/yr
E-104-02	2,000,000 btu/hr	1.0911E-05 gal/btu	21.823 gal/hr	8760 hr/yr	191167.04 gal/yr
E-104-03	2,000,000 btu/hr	1.0911E-05 gal/btu	21.823 gal/hr	8760 hr/yr	191167.04 gal/yr
E-104-04	2,000,000 btu/hr	1.0911E-05 gal/btu	21.823 gal/hr	8760 hr/yr	191167.04 gal/yr
E-134-01	750,000 btu/hr	1.0911E-05 gal/btu	8.184 gal/hr	8760 hr/yr	71687.64 gal/yr
F-020-01	500,000 btu/hr	1.0911E-05 gal/btu	5.456 gal/hr	8760 hr/yr	47791.76 gal/yr
F-020-02	500,000 btu/hr	1.0911E-05 gal/btu	5.456 gal/hr	8760 hr/yr	47791.76 gal/yr
F-001-01	230,000 btu/hr	1.0911E-05 gal/btu	2.510 gal/hr	8760 hr/yr	21984.21 gal/yr
F-001-02	230,000 btu/hr	1.0911E-05 gal/btu	2.510 gal/hr	8760 hr/yr	21984.21 gal/yr
F-002-01	230,000 btu/hr	1.0911E-05 gal/btu	2.510 gal/hr	8760 hr/yr	21984.21 gal/yr
F-002-02	230,000 btu/hr	1.0911E-05 gal/btu	2.510 gal/hr	8760 hr/yr	21984.21 gal/yr
F-003-01	400,000 btu/hr	1.0911E-05 gal/btu	4.365 gal/hr	8760 hr/yr	38233.41 gal/yr
F-003-02	180,000 btu/hr	1.0911E-05 gal/btu	1.964 gal/hr	8760 hr/yr	17205.03 gal/yr
F-003-03		1.0911E-05 gal/btu	0.000 gal/hr	8760 hr/yr	0.00 gal/yr
F-007-01	2,000,000 btu/hr	1.0911E-05 gal/btu	21.823 gal/hr	8760 hr/yr	191167.04 gal/yr
F-007-02	2,000,000 btu/hr	1.0911E-05 gal/btu	21.823 gal/hr	8760 hr/yr	191167.04 gal/yr
F-010-01	2,000,000 btu/hr	1.0911E-05 gal/btu	21.823 gal/hr	8760 hr/yr	191167.04 gal/yr
F-010-02	2,000,000 btu/hr	1.0911E-05 gal/btu	21.823 gal/hr	8760 hr/yr	191167.04 gal/yr
F-010-05	2,000,000 btu/hr	1.0911E-05 gal/btu	21.823 gal/hr	8760 hr/yr	191167.04 gal/yr
F-016-02	1,000,000 btu/hr	1.0911E-05 gal/btu	10.911 gal/hr	8760 hr/yr	95583.52 gal/yr
F-016-04	1,000,000 btu/hr	1.0911E-05 gal/btu	10.911 gal/hr	8760 hr/yr	95583.52 gal/yr
F-019-01	1,000,000 btu/hr	1.0911E-05 gal/btu	10.911 gal/hr	8760 hr/yr	95583.52 gal/yr
F-019-02	1,000,000 btu/hr	1.0911E-05 gal/btu	10.911 gal/hr	8760 hr/yr	95583.52 gal/yr
F-024-01	299,000 btu/hr	1.0911E-05 gal/btu	3.262 gal/hr	8760 hr/yr	28579.47 gal/yr
F-160-01	750,000 btu/hr	1.0911E-05 gal/btu	8.184 gal/hr	8760 hr/yr	71687.64 gal/yr
F-160-02	750,000 btu/hr	1.0911E-05 gal/btu	8.184 gal/hr	8760 hr/yr	71687.64 gal/yr
H-100-01	1,400,000 btu/hr	1.0911E-05 gal/btu	15.276 gal/hr	8760 hr/yr	133816.92 gal/yr
H-100-02	1,400,000 btu/hr	1.0911E-05 gal/btu	15.276 gal/hr	8760 hr/yr	133816.92 gal/yr
M-017-01	750,000 btu/hr	1.0911E-05 gal/btu	8.184 gal/hr	8760 hr/yr	71687.64 gal/yr
M-017-02	750,000 btu/hr	1.0911E-05 gal/btu	8.184 gal/hr	8760 hr/yr	71687.64 gal/yr
M-019-01	750,000 btu/hr	1.0911E-05 gal/btu	8.184 gal/hr	8760 hr/yr	71687.64 gal/yr
M-019-02	750,000 btu/hr	1.0911E-05 gal/btu	8.184 gal/hr	8760 hr/yr	71687.64 gal/yr
M-021-01	500,000 btu/hr	1.0911E-05 gal/btu	5.456 gal/hr	8760 hr/yr	47791.76 gal/yr
M-021-02	500,000 btu/hr	1.0911E-05 gal/btu	5.456 gal/hr	8760 hr/yr	47791.76 gal/yr
M-022A-01	300,000 btu/hr	1.0911E-05 gal/btu	3.273 gal/hr	8760 hr/yr	28675.06 gal/yr
N-116-01	500,000 btu/hr	1.0911E-05 gal/btu	5.456 gal/hr	8760 hr/yr	47791.76 gal/yr
N-159-01	2,000,000 btu/hr	1.0911E-05 gal/btu	21.823 gal/hr	8760 hr/yr	191167.04 gal/yr
N-159-02	2,000,000 btu/hr	1.0911E-05 gal/btu	21.823 gal/hr	8760 hr/yr	191167.04 gal/yr
N-159-03	2,000,000 btu/hr	1.0911E-05 gal/btu	21.823 gal/hr	8760 hr/yr	191167.04 gal/yr
N-161-01	1,000,000 btu/hr	1.0911E-05 gal/btu	10.911 gal/hr	8760 hr/yr	95583.52 gal/yr
N-161-02	1,000,000 btu/hr	1.0911E-05 gal/btu	10.911 gal/hr	8760 hr/yr	95583.52 gal/yr
N-162-01	750,000 btu/hr	1.0911E-05 gal/btu	8.184 gal/hr	8760 hr/yr	71687.64 gal/yr
N-162-01	750,000 btu/hr	1.0911E-05 gal/btu	8.184 gal/hr	8760 hr/yr	71687.64 gal/yr
Total	58,944,800 btu/hr				5634151.34 gal/yr

				REGULATED POLLUTANTS										
Total Emissions	1000 gal.		PM-primary	PM-10 primary	SO2	NOx	VOC	TRS	non-VOC/non-PM HAP	CO-optional	PM filterable	PM-10 filterable	PM condensable	Pb

Potential to Emit: Propane Space Heaters (EXEMPT)
Permit #40909
Webfire Code: 10500110

Source Name	Rated capacity	Gallon conversion	Rated throughput	Max throughput conversion	Max throughput
V-027-03	125,000 btu/hr	1.0911E-05 gal/btu	1.364 gal/hr	8760 hr/yr	11947.94 gal/yr
V-027-04	125,000 btu/hr	1.0911E-05 gal/btu	1.364 gal/hr	8760 hr/yr	11947.94 gal/yr
V-027-05	125,000 btu/hr	1.0911E-05 gal/btu	1.364 gal/hr	8760 hr/yr	11947.94 gal/yr
V-027-06	125,000 btu/hr	1.0911E-05 gal/btu	1.364 gal/hr	8760 hr/yr	11947.94 gal/yr
X-015-01	250,000 btu/hr	1.0911E-05 gal/btu	2.728 gal/hr	8760 hr/yr	23895.88 gal/yr
X-015-02	250,000 btu/hr	1.0911E-05 gal/btu	2.728 gal/hr	8760 hr/yr	23895.88 gal/yr
X-015-03	250,000 btu/hr	1.0911E-05 gal/btu	2.728 gal/hr	8760 hr/yr	23895.88 gal/yr
X-015-04	250,000 btu/hr	1.0911E-05 gal/btu	2.728 gal/hr	8760 hr/yr	23895.88 gal/yr
Total					143375.28 gal/yr

				REGULATED POLLUTANTS										
Total Emissions	1000 gal.		PM-primary	PM-10 primary	SO2	NOx	VOC	TRS	non-VOC/non-PM HAP	CO-optional	PM filterable	PM-10 filterable	PM condensable	Pb

Potential to Emit: Propane Generators (EXEMPT)
Permit #40909
Webfire Code: 20200202

Source Name	Rated capacity	Gallon conversion	Rated throughput	Max throughput conversion	Max throughput
U-025-01	212,500 btu/hr	1.0911E-05 gal/btu	2.319 gal/hr	8760 hr/yr	20311.50 gal/yr
V-066-01	524,000 btu/hr	1.0911E-05 gal/btu	5.718 gal/hr	8760 hr/yr	50085.76 gal/yr
Total					70397.26 gal/yr

				REGULATED POLLUTANTS										
Total Emissions	1000 gal.		PM-primary	PM-10 primary	SO2	NOx	VOC	TRS	non-VOC/non-PM HAP	CO-optional	PM filterable	PM-10 filterable	PM condensable	Pb

Potential to Emit: #2 Fuel Oil Boilers and Furnaces (EXEMPT)
Permit #40909
Webfire Code: 10300501

Source Name	Rated capacity	Gallon conversion	Rated throughput	Max throughput conversion	Max throughput
U-30-01	661,000 btu/hr	7.2103E-06 gal/btu	4.766 gal/hr	8760 hr/yr	41750.38 gal/yr
W-20-01	490,000 btu/hr	7.2103E-06 gal/btu	3.533 gal/hr	8760 hr/yr	30949.60 gal/yr
Total					72699.98 gal/yr

				REGULATED POLLUTANTS										
Total Emissions	1000 gal.		PM-primary	PM-10 primary	SO2	NOx	VOC	TRS	non-VOC/non-PM HAP	CO-optional	PM filterable	PM-10 filterable	PM condensable	Pb

Potential to Emit: #2 Generators <600 HP (EXEMPT)
Permit #40909
Webfire Code: 20100102

Source Name	Rated capacity	Gallon conversion	Rated throughput	Max throughput conversion	Max throughput
U-048-01	350,000 btu/hr	7.2103E-06 gal/btu	2.524 gal/hr	8760 hr/yr	22106.86 gal/yr
V-062-01	52,886 btu/hr	7.2103E-06 gal/btu	0.381 gal/hr	8760 hr/yr	3340.41 gal/yr
Z-62-01	52,886 btu/hr	7.2103E-06 gal/btu	0.381 gal/hr	8760 hr/yr	3340.41 gal/yr
W-020-02	141,000 btu/hr	7.2103E-06 gal/btu	1.017 gal/hr	8760 hr/yr	8905.91 gal/yr
Total					37693.58 gal/yr

				REGULATED POLLUTANTS										
Total Emissions	1000 gal.		PM-primary	PM-10 primary	SO2	NOx	VOC	TRS	non-VOC/non-PM HAP	CO-optional	PM filterable	PM-10 filterable	PM condensable	Pb

Potential to Emit: #2 Generators >600 HP
Permit #40909
Webfire Code: 20100102

Source Name	Rated capacity	Gallon conversion	Rated throughput	Max throughput conversion	Max throughput
U-012-01		7.2103E-06 gal/btu	214.200 gal/hr	8760 hr/yr	1876392.00 gal/yr
U-012-02		7.2103E-06 gal/btu	214.200 gal/hr	8760 hr/yr	1876392.00 gal/yr
U-065	2,110,000 btu/hr	7.2103E-06 gal/btu	15.214 gal/hr	8760 hr/yr	133272.77 gal/yr
Total					3886056.77 gal/yr

				REGULATED POLLUTANTS										
Total Emissions	1000 gal.		PM-primary	PM-10 primary	SO2	NOx	VOC	TRS	non-VOC/non-PM HAP	CO-optional	PM filterable	PM-10 filterable	PM condensable	Pb

Potential to Emit: Paint Booth
Permit #40909
Webfire Code: 40200410

				REGULATED POLLUTANTS									
Total Emissions	lbs	5	PM-primary	PM-10 primary	SO2	NOx	VOC	TRS	HAP non-VOC non-PM10	CO-optional	PM filterable	PM-10 filterable	PM condensable
SCC No. =	40200410	ORIGIN OF Emission Factor	SDS	SDS			WebFIRE		SDS (max)		SDS	SDS	SDS
		Emission Factor	1.00 lb/lb	1.00 lb/lb			6.100 lb/gal		1.00 lb/lb		1.00 lb/lb	1.00 lb/lb	1.00 lb/lb
		E.F. multiplier (%ash or %S)											
Annual Thruput=	3979 lbs	AVG. Control Efficiency (%)											
Ozone Season Thruput=	1003 lbs	EMISSIONS (tons/yr)	1.99	1.99	0.00	0.00	1.06	0.00	1.99	0.00	1.99	1.99	1.99
Ozone Operating Days=	92	Emissions (Lb/Ozone day)	x	x	x	0.00	531.99	x	x	x	x	x	x

Potential to Emit: Paint Booth
Permit #40909
Webfire Code: 40200410

Total Emissions	lbs	5		HAPs - Cr	HAPs - Co	HAPs - cumene	HAPs - dicholoromethane	HAPs - ethylbenzene	HAPs - ethylene glycol	HAPs - fine mineral fibers	HAPs - formaldehyde	HAPs - glycol ether	HAPs - hexamethane diisocyanate
SCC No. =	40200410	ORIGIN OF Emission Factor		SDS	SDS	SDS	SDS	SDS	SDS	SDS	SDS	SDS	SDS
		Emission Factor		0.20 lb/lb	0.01 lb/lb	0.01 lb/lb	0.70 lb/lb	0.25 lb/lb	0.06 lb/lb	0.75 lb/lb	0.30 lb/lb	0.50 lb/lb	1.00 lb/lb
		E.F. multiplier (%ash or %S)											
Annual Thruput=	3979 lbs	AVG. Control Efficiency (%)											
Ozone Season Thruput=	1003 lbs	EMISSIONS (tons/yr)		0.40	0.01	0.02	1.39	0.50	0.12	1.49	0.60	0.99	1.99
Ozone Operating Days=	92	Emissions (Lb/Ozone day)											

Potential to Emit: Paint Booth
Permit #40909
Webfire Code: 40200410

Total Emissions	lbs	5	HAPs - hydrochloric acid	HAPs - MIK	HAPs - methanol	HAPs - naphthalene	HAPs - phenol	HAPs - styrene polymer	HAPs - TCE	HAPs - toluene	HAPs - xylene
SCC No. =	40200410	ORIGIN OF Emission Factor	SDS	SDS	SDS	SDS	SDS	SDS	SDS	SDS	SDS
		Emission Factor	0.05 lb/lb	0.48 lb/lb	0.30 lb/lb	0.01 lb/lb	0.50 lb/lb	1.00 lb/lb	0.25 lb/lb	0.80 lb/lb	0.75 lb/lb
		E.F. multiplier (%ash or %S)									
Annual Thruput=	3979 lbs	AVG. Control Efficiency (%)									
Ozone Season Thruput=	1003 lbs	EMISSIONS (tons/yr)	0.10	0.95	0.60	0.01	0.99	1.99	0.50	1.59	1.49
Ozone Operating Days=	92	Emissions (Lb/Ozone day)									

Potential to Emit: Welding - EXEMPT
Permit #40909
Webfire Code: 30905152

				REGULATED POLLUTANTS									
Total Emissions	1000 lbs	5	PM-primary	PM-10 primary	SO2	NOx	VOC	TRS	HAP non-VOC non-PM10	CO-optional	PM filterable	PM-10 filterable	PM condensable
SCC No. =	30905152	ORIGIN OF Emission Factor	WebFIRE	WebFIRE							WebFIRE	WebFIRE	WebFIRE
		Emission Factor	18.00 lb/Klbs	18.00 lb/Klbs							18.00 lb/Klbs	18.00 lb/Klbs	18.00 lb/Klbs
		E.F. multiplier (%ash or %S)											
Annual Thruput=	0.020 Klbs	AVG. Control Efficiency (%)											
Ozone Season Thruput=	0 lbs/day	EMISSIONS (tons/yr)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ozone Operating Days=	92	Emissions (Lb/Ozone day)	x	x	x	0.00	0.00	x	x	x	x	x	x

Potential to Emit: Welding - EXEMPT
Permit #40909
Webfire Code: 30905152

Total Emissions	1000 lbs	5		HAPs - Cr
SCC No. =	30905152	ORIGIN OF Emission Factor		WebFIRE
		Emission Factor		0.013 lb/Klbs
		E.F. multiplier (%ash or %S)		
Annual Thruput=	0.020 Klbs	AVG. Control Efficiency (%)		
Ozone Season Thruput=	0 lbs/day	EMISSIONS (tons/yr)		0.00
Ozone Operating Days=	92	Emissions (Lb/Ozone day)		

Potential to Emit: Sand Blasting
Permit #40909
Webfire Code: 30900202

Source Name	Rated capacity	Pound conversion	Rated throughput	Max throughput conversion	Max throughput
X-30-02	1,050 lbs/hr		1,050 lbs/hr	8760 hr/yr	9198000 lbs/yr
Total					9198000 lbs/yr

				REGULATED POLLUTANTS										
Total Emissions	1000 lbs		PM-primary	PM-10 primary	SO2	NOx	VOC	TRS	non-VOC/non-PM HAP	CO-optional	PM filterable	PM-10 filterable	PM condensable	Pb

Hydrazine Emissions Vented to Air during Initial Venting Operation of Spacecraft Veh

Ideal Gas Equation pV = nRT
Where:
P=pressure=vapor pressure of hydrazine at 298K = 0.0197 atm
V=volume=ullage
(the vapor containing volume of the 4BW container holding 32.9 gallons of liquid hydrazine) = 83.4 L
n=number of moles=number of moles of hydrazine = $\frac{\text{grams of hydrazine in vapor}}{\text{molecular wt. of hydrazine}}$
R=gas constant = 0.0826 L - atm/K-mol
T=temperature = 298K

Rearranging and Substituting:

$$m = \frac{Mw \times p \times V}{R \times T}$$

Where:
m= mass of hydrazine vapor
Mw= molecuar wt. of hydrazine = 32g/mol
Therefore in the intial venting 2.15 g of hydrzine will be vented to the atomosphere. This estimate is conservative, since venting will cease when the pressure inside the 4BW reaches ambient pressure so that some of the 2.15 g will remain inside the 4BW container.

Hydrazine vented to atmosphere from the 4BW container after spacecraft fueling ended

Using the same equations from the initial venting exercise

$$M = \frac{32\text{g/mole} \times 0.0197 \text{ atmosphere} \times 196.5\text{L}}{0.08206\text{L -atm/K-mol} \times 298 \text{ K}} = 5.065 \text{ g}$$

196.48 L will be the volume of the ullage in the 4BW after spacecraft fueling occurs
Approximately 12 L of liquid hydrazine will remain in the 4BW
Therefore 5.065 g of hydrazine will vent to the atmosphere after spacecraft fueling from the 4BW container. Again, this estimate is conservative.

Hydrazine vented to the atmosphere from vacuum dump bottles after fueling has ended.

Volume of the three bottles = 2.5 gallons x 3 x 3.785 L/gallon = 28.4 L
Ratio of Volume of vacuum dump bottles to 4BW container = 28.4 /196.5 = 0.145
0.145 x 5.065 g (amount of hydrazine vapor in 4BW) = 0.734 g
0.734 g hydrazine vented to atmosphere from the vacuum dump bottles after fueling has ended.

Total amount of Hydrazine vented to atmosphere per one fueling event:
2.15 g + 5.065 g + 0.734 g = 7.949 grams or 0.01752437 pounds

An average Hydrazine fueling event takes 2.75 hours to complete; therefore
the hourly Hydrazine emission rate would be 0.01752437 lbs/2.75 hours =

Max of 18 separate spacecraft Hydrazine fueling events (per Site-Wide PEIS)

0.01752437 lbs per fueling event x 18 fueling events = 0.08762185 lbs/2000 lbs/ton =

All Hydrazine fuel loading events would be performed inside the Payload Processing Facility building

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Hourly Hydrazine Emissions	Hydrazine Hourly Exempt Threshold	
0.00637 lbs/hr	0.00858 lbs/hr	Hourly emissions exempt

Annual Hydrazine Emissions	Hydrazine Annual Exempt Threshold

	0.00016 tons/yr	0.01885 tons/yr	Annual emissions exempt

under controlled conditions.

Potential to Emit: Composite Motor Testing at Pad 2
Permit #40909
Webfire Code: N/A

				REGULATED POLLUTANTS										
Total Emissions	lbs	5	PM-primary	PM-10 primary	SO2	NOx	VOC	TRS	HAP non-VOC non-PM10	CO-optional	PM filterable	PM-10 filterable	PM condensable
SCC No. =	N/A	ORIGIN OF Emission Factor	Motor spec	Motor spec		Motor spec			Motor spec	Motor spec	Motor spec	Motor spec	Motor spec
		Emission Factor	0.12 lb/lb	0.12 lb/lb		0.09 lb/lb			0.23 lb/lb	0.18 lb/lb	0.12 lb/lb	0.12 lb/lb	0.12 lb/lb
		E.F. multiplier (%ash or %S)											
Annual Thruput=	4903 lbs	AVG. Control Efficiency (%)											
Ozone Season Thruput=	1236 lbs	EMISSIONS (tons/yr)	0.28	0.28	0.00	0.23	0.00	0.00	0.56	0.44	0.28	0.28	0.28
Ozone Operating Days=	92	Emissions (Lb/Ozone day)	x	x	x	1.26	0.00	x	x	x	x	x	x

Potential to Emit: Composite Motor Testing at Pad 2
Permit #40909
Webfire Code: N/A

Total Emissions	lbs	5	HAPs - hydrochloric acid
SCC No. =	N/A	ORIGIN OF Emission Factor	Motor spec
		Emission Factor	0.23 lb/lb
		E.F. multiplier (%ash or %S)	
Annual Thruput=	4903 lbs	AVG. Control Efficiency (%)	
Ozone Season Thruput=	1236 lbs	EMISSIONS (tons/yr)	0.56
Ozone Operating Days=	92	Emissions (Lb/Ozone day)	

Potential to Emit: Double Base Motor Testing at Pad 2
Permit #40909
Webfire Code: N/A

				REGULATED POLLUTANTS										
Total Emissions	lbs	5	PM-primary	PM-10 primary	SO2	NOx	VOC	TRS	HAP non-VOC non-PM10	CO-optional	PM filterable	PM-10 filterable	PM condensable
SCC No. =	N/A	ORIGIN OF Emission Factor	Motor spec	Motor spec		Motor spec			Motor spec	Motor spec	Motor spec	Motor spec	Motor spec
		Emission Factor	0.01 lb/lb	0.01 lb/lb		0.14 lb/lb			0.23 lb/lb	0.44 lb/lb	0.01 lb/lb	0.01 lb/lb	0.01 lb/lb
		E.F. multiplier (%ash or %S)											
Annual Thruput=	3325 lbs	AVG. Control Efficiency (%)											
Ozone Season Thruput=	838 lbs	EMISSIONS (tons/yr)	0.02	0.02	0.00	0.22	0.00	0.00	0.38	0.73	0.02	0.02	0.02
Ozone Operating Days=	92	Emissions (Lb/Ozone day)	x	x	x	1.23	0.00	x	x	x	x	x	x

Potential to Emit: Double Base Motor Testing at Pad 2
Permit #40909
Webfire Code: N/A

Total Emissions	lbs	5	HAPs - hydrochloric acid
SCC No. =	N/A	ORIGIN OF Emission Factor	Motor spec
		Emission Factor	0.23 lb/lb
		E.F. multiplier (%ash or %S)	
Annual Thruput=	3325 lbs	AVG. Control Efficiency (%)	
Ozone Season Thruput=	838 lbs	EMISSIONS (tons/yr)	0.38
Ozone Operating Days=	92	Emissions (Lb/Ozone day)	

Potential to Emit: Ampule Testing at Pad 2 - EXEMPT
Permit #40909
Webfire Code: N/A

				REGULATED POLLUTANTS										
Total Emissions	lbs	5	PM-primary	PM-10 primary	SO2	NOx	VOC	TRS	HAP non-VOC non-PM10	CO-optional	PM filterable	PM-10 filterable	PM condensable
SCC No. =	N/A	ORIGIN OF Emission Factor	Mass Balance	Mass Balance	Mass Balance	Mass Balance	Mass Balance	Mass Balance	Mass Balance	Mass Balance	Mass Balance	Mass Balance	Mass Balance
		Emission Factor	1.00 lb/lb	1.00 lb/lb	1.00 lb/lb	1.00 lb/lb	1.00 lb/lb	1.00 lb/lb	1.00 lb/lb	1.00 lb/lb	1.00 lb/lb	1.00 lb/lb	1.00 lb/lb
		E.F. multiplier (%ash or %S)											
Annual Thruput=	104 lbs	AVG. Control Efficiency (%)											
Ozone Season Thruput=	26 lbs	EMISSIONS (tons/yr)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Ozone Operating Days=	92	Emissions (Lb/Ozone day)	x	x	x	0.28	26.15	x	x	x	x	x	x

Potential to Emit: Ampule Testing at Pad 2 - EXEMPT
Permit #40909
Webfire Code: N/A

Total Emissions	lbs	5	HAPs - hydrochloric acid
SCC No. =	N/A	ORIGIN OF Emission Factor	Mass Balance
		Emission Factor	1.00 lb/lb
		E.F. multiplier (%ash or %S)	
Annual Thruput=	104 lbs	AVG. Control Efficiency (%)	
Ozone Season Thruput=	26 lbs	EMISSIONS (tons/yr)	0.05
Ozone Operating Days=	92	Emissions (Lb/Ozone day)	

Potential to Emit: Liquified Petroleum Gas Tanks
Permit #40217
Webfire Code: N/A

				REGULATED POLLUTANTS									
Total Emissions	lbs	5	PM-primary	PM-10 primary	SO2	NOx	VOC	TRS	HAP non-VOC non-PM10	CO-optional	PM filterable	PM-10 filterable	PM condensable
SCC No. =	N/A	ORIGIN OF Emission Factor					1% Mass Balance						
		Emission Factor					0.01 lb/lb						
		E.F. multiplier (%ash or %S)											
Annual Thruput=	2320009 lbs	AVG. Control Efficiency (%)											
Ozone Season Thruput=	584769 lbs	EMISSIONS (tons/yr)	0.00	0.00	0.00	0.00	11.60	0.00	0.00	0.00	0.00	0.00	0.00
Ozone Operating Days=	92	Emissions (Lb/Ozone day)	x	x	x	0.00	5847.69	x	x	x	x	x	x

ENERGY STAR Challenge for Industry - Quick Converter

Convert common energy units to Source BTUs

1. Enter the annual fuel use of your plant in the Amount column below.
2. The tool converts all energy units to BTUs and to Source Energy BTUs.
3. For the ENERGY STAR Challenge for Industry, use total source MMBTU - provided in the box to th

Fuel /Unit	Amount	*Conversion factor*	BTU
Electric (Purchased) - kWh	1	*3412*	3412
Electric (Purchased) - MWh	1	*3412142*	3412141.5
Electric (On Site Renewable) - kWh	1	*3412*	3412
Natural Gas - Therms	1	*100000*	100000
Natural Gas - SCF	1	*1029*	1029
Natural Gas - HCF /CCF	1	*102900*	102900
Natural Gas - MCF	1	*1029000*	1029000
Propane - Gallons	1	*91647.6*	91647.6
LPG - Gallons	1	*91647.6*	91647.6
Distillate Fuel Oil - Gallons	1	*138690*	138690
Residual Fuel Oil - Gallons	1	*149690*	149690
Heating Oil - Gallons	1	*138690*	138690
Diesel Fuel -Gallons	1	*138690*	138690
Motor Gasoline - Gallon	1	*124238*	124238
Kerosene - Gallon	1	*135000*	135000
Crude Oil - Barrels	1	*5800000*	5800000
Coal (anthracite) - Tons	1	*25090000*	25090000
Coal - (bituminous) - Tons	1	*24930000*	24930000
District Steam (150 psig) - Pounds	1	*1194*	1194
District Chilled Water - Ton Hours	1	*12000*	12000
District Hot Water - Therms	1	*100000*	100000
Wood - Tons	1	*15380000*	15380000
Biodiesel (100%) - Gallons	1	*127000*	127000
Ethanol (100%) - Gallons	1	*84262*	84262

Purchased Industrial Steam and Compressed Air

Purchased Industrial (non-district) Steam: If steam is transferred in from an external or third-party s in your plant's energy total, then your plant energy consumption must be adjusted to include it. The E calculated using actual boiler conversion efficiencies of the external or third-party producer, and inclu the Btu value of the fuel used to make the steam).

Industrial Steam Plant - Pounds	Amount	Btu/lb	Boiler Efficiency
(@ 150 psig)	1,000	1128	85%

Purchased Compressed Air: If compressed air is transferred in from an external or third-party site your plant's energy total, then your plant energy consumption must be adjusted to include it. The compressed air should be calculated using actual conversion efficiencies of the external or third-pa plant's energy total.

Purchased Compressed Air -SCFM*	Amount	kW/SCFM	Hours per Year
	1000	0.2	4800

*SCFM is Standard Cubic Feet of air per Minute

ıe left :

11026.96	Total Source MMBTU

Site Energy		Site - Source	Source Energy		
KBTU	MMBTU	Ratio	BTU	KBTU	MMBTU
3.41	0.003	3.340	11396	11.396	**0.011**
3412.14	3.412	3.340	11396553	11396.553	**11.397**
3.41	0.003	1.000	3412	3.412	**0.003**
100.00	0.100	1.047	104700	104.700	**0.105**
1.03	0.001	1.047	1077	1.077	**0.001**
102.90	0.103	1.047	107736	107.736	**0.108**
1029.00	1.029	1.047	1077363	1077.363	**1.077**
91.65	0.092	1.010	92564	92.564	**0.093**
91.65	0.092	1.010	92564	92.564	**0.093**
138.69	0.139	1.010	140077	140.077	**0.140**
149.69	0.150	1.010	151187	151.187	**0.151**
138.69	0.139	1.010	140077	140.077	**0.140**
138.69	0.139	1.010	140077	140.077	**0.140**
124.24	0.124	1.010	125480	125.480	**0.125**
135.00	0.135	1.010	136350	136.350	**0.136**
5800.00	5.800	1.010	5858000	5858.000	**5.858**
25090.00	25.090	1.000	25090000	25090.000	**25.090**
24930.00	24.930	1.000	24930000	24930.000	**24.930**
1.19	0.001	1.210	1445	1.445	**0.001**
12.00	0.012	1.050	12600	12.600	**0.013**
100.00	0.100	1.280	128000	128.000	**0.128**
15380.00	15.380	1.000	15380000	15380.000	**15.380**
127.00	0.127	1.010	128270	128.270	**0.128**
84.26	0.084	1.010	85105	85.105	**0.085**
			Total Source MMBTU		**85.33**

ɜite whose energy does not appear
3tu for producing steam should be
ıded to your plant's energy total (i.e.,

MMBTU	Source MMBTU
1	**1.39**

whose energy does not appear in
kW/SCFM for producing
rty producer, and included to your

kWh	**Source MMBTU**
960000	**10940.24**