

Air Emission Calculation Summary

Air emissions will be generated from a variety of temporary portable sources including non-road engine sources and portable flare / heater sources. The sources include hydrocarbon powered equipment (diesel, & propane) used in the drilling, living quarters, trailer and construction activities associated with the project. A flare will be available for use throughout the process for safety related flaring of methane and any residual propane from the LPG recovery / storage process. The propane recovery process also involves a portable heating unit

The emission calculations for the project and are summarized in Table 1. The emission calculations are divided into drilling process emissions and completion process emissions. Storage tanks for each process are listed in Tables 4 and 5. The emission calculations performed for the various sources and for the various processes are further described below.

Drilling process for two wells (E1 & E1-A) including support equipment and drill flare.

For this activity the drill rig flare will be available for use only as a safety device if pockets of methane are encountered during drilling. The flare emission calculations include an estimate of potential methane which may be required to be flared during this activity. The emissions associated with the remaining construction activities for well drilling were calculated based upon the maximum estimated run times of the engines associated with individual pieces of equipment. Engine emissions were calculated in Table 6 using AP 42 emission factors for the appropriate engine rating. Flare emissions were also calculated using AP 42 emission factors as noted in the Table 3A and Table 3B Table 2 presents the actual air emission calculations for the portable drill rig flare and non-road sources. The PTE hourly emissions are presented in Table 2A. Tables 2B & 2C include the emission factors used in the calculations. See Table 6 for “Engine PTE hourly emissions” and the attached Table 7A & 7B for Engine Emission Factors from EPA.

Well Completion & Production Process

For this activity the trailer mounted portable flare will be used as a safety device, to combust process gases (methane & propane) associated with frac'ing, well completion, flowback / propane recovery and site demobilization after well shut-in. The flare emission calculations include an estimate of potential methane and propane which may be required to be flared during these activities. Flare flowrates have been very conservatively estimated using an Aspen HYSYS model of the propane recovery process. The emissions associated with the remaining construction activities for well completion and production were calculated based upon the maximum estimated run times of the engines associated with individual pieces of equipment. Engine emissions were calculated using AP 42 emission standards for the appropriate engine rating. Flare emissions were also calculated using AP 42 emission factors as noted in Tables 3B, 3C and 3D. Table 3 presents the actual air emission calculations for portable and non-road engine sources. The PTE hourly flare emissions are presented in Table 3B and Table 3C. See Table 6 for “Engine PTE hourly emissions” and the attached Table 7A & 7B for Engine Emissions Standards from EPA.

Tank Emissions Inventory

An inventory of tanks associated with the project is included as Table 4 – Snyder E1 & E1-A Tanks for Drilling Process and Table 5 – Snyder E1-A Tanks for Completion Process. No emissions from the tanks have been included because the tanks consist of exempt or trivial source emissions, or the tanks have no emissions and therefore actual emission calculations for these tanks has not been included. Please note the tank list does not include closed systems such as pressure vessels that do not vent to the atmosphere.

Order of Operations (post-drilling)

The operations described above use the equipment listed in the following tables. The operations (including the combustion engines used at each stage) run serially, not concurrently.

Pre-Fracturing Workover Operations: After the drilling rig leaves the site, a workover rig will be brought to location. A mill & motor will be run on a work string (2 7/8” tubing) to drill out the “PAC valve” and ball seat at the bottom of the curve. Then, a Vector Annular Cleaning System (“VACS”) tool will be run to clean out any drilling debris. The workover rig leaves the site after this work is completed.

Propane Fracturing Operations: The Snyder E1-A well will be hydraulically stimulated in 10 stages using liquid propane, minimal chemicals, & fracturing sand.

Post-Fracturing Coiled Tubing Operations: A coiled tubing unit will be brought to location. A mill & motor will be run to drill out the ball seats and to sweep the cuttings out of the well using mineral oil as the circulating fluid. The coiled tubing unit leaves the site after this work is completed.

Post-Fracturing Workover Operations: A wireline unit, workover rig, and slickline unit will be brought to location. The wireline unit will be used to set a retrievable production packer in the production casing. Then the workover rig will run a 2 3/8” production tubing string in the well and tie it into the production packer. Weight bars will then be run inside the tubing string via the slickline unit to break the ceramic discs in the production packer.

The well will be ready to flow once all of the flowback equipment is rigged up.

Table 1 - Emissions Summary Based Upon Hourly PTE

Drilling Emissions	Nox	CO	VOC	PM	SO2	CO2
	Act. total lb	Act. total lb	Act. total lb	Act. total lb	Act. total lb	Act. total lb
Portable Drill Rig Flare	4	20	0	0	0	7,577
Non-road Engines	15,313	8,659	1,244	504	793	1,679,914
Subtotal Emissions	15,317	8,680	1,244	504	793	1,687,490

Completions Process	Nox	CO	VOC	PM	SO2	CO2
	Act. total lb	Act. total lb	Act. total lb	Act. total lb	Act. total lb	Act. total lb
Portable Flares / Heaters	1,485	3,486	76	86	75	1,989,618
Non-road Engine Sources	42,517	23,913	3,574	1,388	2,315	4,666,938
Subtotal Emissions	44,002	27,399	3,650	1,473	2,390	6,656,555

Total Project Emissions	Nox	CO	VOC	PM	SO2	CO2
	Act. Totals	Act. Total	Act. Total	Act. Total	Act. Totals	Act. Totals
Portable Flares / Heaters (lbs)	1,490	3,506	76	86	909	1,997,194
Non-road Engine Sources (lbs)	57,829	32,572	4,818	2,181	2,315	6,346,851
Total Emissions (lbs)	59,319	36,078	4,894	2,266	3,223	8,344,046
Total Emissions (tons)	29.66	18.04	2.45	1.13	1.61	4,172.02

Engine emissions calculated on a per engine basis using 40 CFR 89 Table 1 and AP-42 factors Ch 3.3
 Line Heater & Glycol Reboiler emissions calculated using AP-42 Table 1.5-1 for LPG fueled
 Flare emission calculated using AP-42 factors and assuming 4 mscf released per day of propane

Table 2A - Snyder E1 & E1-A (DRILLING PROCESS) - Emission Source Inventory, Run Times & Emissions

<u>Fuel-Fired Stationary Combustion Equipment</u>	<u>Count</u>	<u>Size</u>	<u>Source Type</u>	<u>Fuel Type</u>	<u>Duration on Site (days)</u>	<u>Run Time (hrs)</u>	<u>Gas Processed (mscf)</u>
<u>Drilling Rig Generator</u> -- Caterpillar 3512-C engines each coupled to 1365 KW Kato Generators	3	2206 HP	Nonroad	Diesel	25	600	N/A
<u>Living Quarters</u> -- 100 KVA Generator trailer mounted with 350 gal fuel tank	1	131.5 HP	Nonroad	Diesel	35	840	N/A
<u>Trash Pump</u> -- 3" trash pump	1	75 HP	Nonroad	Diesel	35	35	N/A
<u>Light Towers</u>	3	30 HP	Nonroad	Diesel	35	420	N/A
<u>Drill Rig Flare - Snyder E1 & E1-A Wells</u>	1	5 mmbtu/hr	Portable	Propane Methane	25	600	63.5

NOTES

1. Flare is drill rig mounted heater designed to handle small volumes of unexpected methane gas coming from the wells.
2. See Table 4 for Drilling Process Tanks List.

Table 2B - Snyder E1 & E1-A (DRILLING PROCESS) - Emission Calculations

Well Flaring*	Nox		CO		VOC		PM		SO2		CO2	
	lb/hr (PTE)	Act. total lb	lb/hr (PTE)	Act. total lb	lb/hr (PTE)	Act. total lb	lb/hr (PTE)	Act. total lb	lb/hr (PTE)	Act. total lb	lb/hr (PTE)	Act. total lbs
E1 & E1-A methane	20.264	4,404	92.380	20,079	0.193	0.042	2.220	0.483	0.175	0.038	584.89	7,577

*Drill Rig Flare emissions calculated based on AP-42 factors and the estimated volumes of methane to be processed during drilling operations.

Engines **	Nox		CO		VOC		PM		SO2		CO2	
	lb/hr (PTE)	Act. total lb	lb/hr (PTE)	Act. total lb	lb/hr (PTE)	Act. total lb	lb/hr (PTE)	Act. total lb	lb/hr (PTE)	Act. total lb	lb/hr (PTE)	Act. total lbs
Drilling Rig	23.211	13,926	12.693	7,616	1.555	933	0.725	435	0.892	535	2559.0	1,535,376
Living Quarters	1.427	1,199	1.081	908	0.325	273	0.065	54	0.270	226	151.2	127,029
Trash Pump	0.925	32	0.616	22	0.185	6	0.049	2	0.154	5	86.3	3,019
Light Tower	0.370	155	0.271	114	0.074	31	0.030	12	0.062	26	34.5	14,490

**Engine emissions calculated based on 40 CFR 89 Table 1 and AP-42 factors - See Table 6 & 7 for Engine

Emission Data used to generate emissions

Total Drilling Emissions

Drilling Emissions	Nox		CO		VOC		PM		SO2		CO2	
	Act. total lb	Act. total lb	Act. total lb	Act. total lb	Act. total lb	Act. total lb	Act. total lb	Act. total lb	Act. total lb	Act. total lbs	Act. total lbs	
Drill Rig Flare Source	4	20	0	0	0	0	0	0	0	0	7,577	
Non-road Engines	15,313	8,659	1,244	504	793	1,679,914						
Subtotal Emissions	15,317	8,680	1,244	504	793	1,687,490						

Table 2C - Drill Rig Flare Methane Emissions

Air Contaminant	lb/mmBTU	lb/hr (PTE)	Reference
NOx	0.0680	20.26	AP-42 Table 13.5-1 (New AP-42 does not have NOx)
CO	0.3100	92.38	AP-42 Table 13.5-1
VOC	0.0006	0.19	AP-42 Table 1.4-1 (New AP-42 , VOC factor) where VOC=0.66 lb/mmscf
PMTOT	0.0075	2.22	AP-42 Table 1.4-2 PMTOT=7.6 lb/mmscf
SO2	0.0006	0.18	AP-42 Table 1.4-2 (0.1S) where S=1grain/100scf where SO2=0.65 lb/mi
CO2	116.9773	584.89	40 CFR 98.253 Table C-1 GHG CO2 NG Flare emission 53.07 kg/mmBTU
Methane	1020	btu/cf	BTU content of natural gas

Note: Drill Rig Flare lb/hr PTE calculations performed using Drill Rig Flare maximum rated capacity of ~ 5mmBTU/hr (0.1 mmSCFD)

TABLE 3 - Snyder E1-A - COMPLETION PROCESS - Emission Source Inventory, Run Times by Operation & Emissions

Fuel-Fired Combustion Equipment	Count	Size	Emission Source Type	Fuel Type	Duration on Site (days)	Run Time (hrs)							
PRE-FRAC WORKOVER OPERATIONS							Pre-Frac Workover						
Triplex Mud Pump	1	350 HP	Nonroad	Diesel	2	14		Nox	CO	VOC	PM	SO2	CO2
Workover Rig	1	475 HP	Nonroad	Diesel	2	14		total lb	total lb	total lb	total lb	total lb	total lb
Pump Truck	1	2500 HP	Nonroad	Diesel	1	6	Mud Pump	52	28	12	2	10	5,635
Light Towers (not used in this phase)	3	30 HP	Nonroad	Diesel	2	0	Workover Rig	70	38	16	2	14	7,648
Living Quarters	1	131.5 HP	Nonroad	Diesel	2	48	Pump Truck	126	69	8	4	5	13,920
							Light Tower	0	0	0	0	0	0
							Living Quarters	68	52	16	3	13	7,259
PROPANE FRAC OPERATIONS							Propane Frac						
Living Quarters	1	131.5 HP	Nonroad	Diesel	11	264		Nox	CO	VOC	PM	SO2	CO2
Light Towers	6	30 HP	Nonroad	Diesel	11	132		total lb	total lb	total lb	total lb	total lb	total lb
Flare							Living Quarters	377	285	86	17	71	39,923
Completion & Pilot Operations	1	0-7 MMSCFD	Portable	Propane	11	264	Light Tower	49	36	10	4	8	4,554
Line Heater	1	2 MMBtu/hr	Portable	Propane	11	30	Flare Completion & Pilot	1	2	0	0	0	1,652
Frac Pumps	6	2500 HP	Nonroad	Diesel	10	30	Line Heater	9	5	1	0	1	8,197
Chemical Units	2	400 HP	Nonroad	Diesel	10	30	Frac Pump	789	432	53	25	30	87,000
LPG Boost Pump	1	400 HP	Nonroad	Diesel	10	30	Chemical Unit	126	69	30	4	25	13,800
Data Van	1	95 HP	Nonroad	Diesel	10	30	LPG Boost Pump	126	69	30	4	25	13,800
Safety Trailer	1	27 HP	Nonroad	Diesel	10	30	Data Van	35	23	7	2	6	3,278
N2 Pumper	1	500 HP	Nonroad	Diesel	10	30	Safety Trailer	10	7	2	1	2	932
N2 Vaporizer	1	400 HP	Nonroad	Diesel	10	30	N2 Pumper	158	86	37	5	31	17,250
N2 Transport	1	60 HP	Nonroad	Diesel	10	30	N2 Vaporizer	126	69	30	4	25	13,800
100 ton blender	1	570 HP	Nonroad	Diesel	10	30	N2 Transport	22	15	4	1	4	2,070
Iron Trailer	1	400 HP	Nonroad	Diesel	10	30	100 Ton Blender	180	98	42	6	35	19,665
Fire Safety Truck	2	500 HP	Nonroad	Diesel	10	30	Iron Trailer	126	69	30	4	25	13,800
							Fire Safety Truck	158	86	37	5	31	17,250
POST-FRAC COILED TUBING OPERATIONS							Post-Frac Coiled Tubing						
Living Quarters	1	131.5 HP	Nonroad	Diesel	3	72		Nox	CO	VOC	PM	SO2	CO2
Light Towers	4	30 HP	Nonroad	Diesel	3	36		total lb	total lb	total lb	total lb	total lb	total lbs
Line Heater	1	2 MMBtu/hr	Portable	Propane	3	15	Living Quarters	103	78	23	5	19	10,888
Flare Pilot & Completions Operations	1	0-7 MMSCFD	Portable	Propane	3	15	Light Tower	13	10	3	1	2	1,242
Coiled Tubing Fluid Pump	1	1000 HP	Nonroad	Diesel	3	15	Line Heater	4	2	0	0	0	4,098
Mixing Plant	1	60 HP	Nonroad	Diesel	3	15	Completions Flare	0	2	0	0	0	617
2 3/8" Coiled Tubing Unit	1	600 HP	Nonroad	Diesel	3	15	Coil Tubing Pump	158	86	11	5	6	17,400
							Mixing Plant	11	7	2	1	2	1,035
							Coiled Tubing Unit	95	52	22	3	18	10,350
POST-FRAC WORKOVER OPERATIONS							Propane Frac Workover						
Living Quarters	1	131.5 HP	Nonroad	Diesel	1	24		Nox	CO	VOC	PM	SO2	CO2
Light Towers	4	30 HP	Nonroad	Diesel	1	12		total lb	total lb	total lb	total lb	total lb	total lbs
Line Heater (not used this phase)	1	2 MMBtu/hr	Portable	Propane	1	0	Living Quarters	34	26	8	2	6	3,629
Completions Flare (not used this phase)	1	0-7 MMSCFD	Portable	Propane	1	0	Light Tower	4	3	1	0	1	414
Triplex Mud Pump	1	350 HP	Nonroad	Diesel	1	12	Line Heater	0	0	0	0	0	0
Workover Rig	1	475 HP	Nonroad	Diesel	1	12	Completions Flare	0	0	0	0	0	0
							Mud Pump	44	24	10	1	9	4,830
							Workover Rig	60	33	14	2	12	6,555
FLOWBACK OPERATIONS							Flowback						
Living Quarters	1	131.5 HP	Nonroad	Diesel	66	1536		Nox	CO	VOC	PM	SO2	CO2
Light Towers	4	30 HP	Nonroad	Diesel	66	792		total lb	total lb	total lb	total lb	total lb	total lbs
Line Heater	1	2 MMBtu/hr	Portable	Propane	64	1536	Living Quarters	2,192	1,660	499	100	414	232,282
Glycol Reboiler	1	0.5 MMBtu/h	Portable	Propane	64	1536	Light Tower	293	215	59	23	49	27,324
Flare Pilot & Completions	1	0-7 MMSCFD	Portable	Propane	14	336	Line Heater	436	252	34	24	34	419,672
Gen for Refrig Plant	1	1,000 kW	Nonroad	Diesel	64	1536	Glycol Reboiler	109	63	8	6	8	104,918
							Flare Pilot & Completions	541	2,939	3	35	3	1,081,611
							Refrig Generator	21,672	11,852	1,452	677	833	2,389,376
Production OPERATIONS							Production						
Gen for Refrig Plant	1	1,000 kW	Nonroad	Diesel	45	1080		Nox	CO	VOC	PM	SO2	CO2
Line Heater	1	2 MMBtu/hr	Portable	Propane	45	1080		total lb	total lb	total lb	total lb	total lb	total lbs
Glycol Reboiler	1	0.5 MMBtu/h	Portable	Propane	45	1080	Refrig Generator	15,238	8,333	1,021	476	586	1,680,030
							Line Heater	307	177	24	17	24	295,082
							Glycol Reboiler	77	44	6	4	6	73,770

Table 3A - Flare Pilot Operation Emissions (Propane) for E1-A Completions Process

Air Contaminant	lb/1000 gal	lb/hr (PTE)	Reference
NOx	13	0.0043	AP-42 Table 1.5-1
CO	7.5	0.0025	AP-42 Table 1.5-1
VOC	1.2	0.0004	AP-42 Table 1.5-1
PMTOT	0.7	0.0002	AP-42 Table 1.5-1
SO2	1.5	0.0005	AP-42 Table 1.5-1 (0.15) where S=15grains/100scf
CO2	12,462	4.1536	40 CFR 98.253 Table C-1 GHG CO2 LPG Flare emission 61.71 kg/mmBTU
LPG	2450	btu/cf	BTU content of commercial propane/ 1gal of LPG=91,600 btu/gal

Note: Flare pilot consumes 8 gals/day of LPG or ~0.33 gals/hr

Table 3B - Flare Emissions (Propane/ Methane Mix) for E1-A Completions Process

Air Contaminant	lb/mmBTU	lb/hr (PTE)	Reference
NOx	0.0680	20.26	AP-42 Table 13.5-1 (New AP-42 does not have NOx)
CO	0.3700	110.26	AP-42 Table 13.5-1
VOC	0.0004	0.11	*AP-42 Table 1.4-1 (New AP-42 , VOC factor) where VOC=0.66 lb/mmscf
PMTOT	0.0044	1.31	*AP-42 Table 1.4-2 PMTOT=7.6 lb/mmscf
SO2	0.0003	0.10	*AP-42 Table 1.4-2 (0.15) where S=1grain/100scf where SO2=0.65 lb/mmscf
CO2	136.0473	40,542.09	**40 CFR 98.253 Table C-1 GHG CO2 LPG Flare emission 61.71 kg/mmBTU
LPG	1735	btu/cf	**Average BTU content of propane (2,450 btu/scf) and Natural Gas (1,020 btu/scf)

Note: *Used worst case emission factor for Methane but adjusted for average BTU content

** Used worst case emission factor for Propane

Table 3C - Flare Process Operations - E1-A Completions Process Volume

Process	BTU/SCF	Volume MSCF	Reference
Completions Flaring	1020.0000	4.0000	Estimate Volume of Methane during well completions
Post Frac Completions Flaring	1020.0000	4.0000	Estimate Volume of Methane during well completions
FlowBack Flaring	7940.0000	mmbtu	HYSYS Model Prediction of Methane/Propane mixture to be flared during Flowback

Table 4 Snyder E1 & E1-A TANKS INVENTORY (DRILLING PROCESS)

<u>Tank Description</u>	<u># Tanks</u>	<u>Volume/tank</u>	<u>Fluid Type</u>	<u>Exemption Status</u>
Diesel Tank for Rig	1	15,000 gal	Diesel Fuel	Fuel Tank<300,000bbl
Diesel Tank for Living Quarters Generator	1	350 gal	Diesel Fuel	Fuel Tank<300,000bbl
Mud Tanks	2	1,000 bbls	Drilling Mud	No emissions (WBM)
Drilling Mud storage tank	1	500 bbls	Drilling Mud	No emissions (WBM)
Water Tanks	2	500 bbls	Water	No emissions
Potable Water Tanks	4	3,000 gal	Water	No emissions
Portable Septic Storage Tanks	4	500 gal	Waste	No emissions
Cuttings Tanks	2	200 bbls	Drill cuttings	No emissions (WBM**)

Note: There will also be fuel tanks for each engine listed in Table 1. These fuel tanks will also be exempt because they are less than 300,000 bbl in size.

*** WBM stands for Water Based Mud*

Table 5 - Snyder E1A (COMPLETION PROCESS)

Pre-frac Workover Operations:

Tank Description	# Tanks	Volume/tank	Fluid Type	Exemption Status
Workover Rig Tank	1	210 bbls	Oil	<10,000 gallons
Workover Fluid Frac Tank	1	500 bbls	Oil	Horizontal Tank

Propane Frac Operations:

Tank Description	# Tanks	Volume/tank	Fluid Type	Exemption Status
Propane Bulkers	8	459 bbls	Propane	Pressurized Vessel
Water Tanks	2	500 bbls	Water	No Emissions
Potable Water Tanks	2	3,000 gal	Water	No Emissions
Diesel Tank for Living Quarters Generator	1	350 gal	Diesel Fuel	Fuel Tank<300,000bbl
Propane Tank for Line Heater	1	500 gal	Propane	Pressurized Vessel
Open Top Tank (for emergency)	1	210 bbls (empty)	n/a	<10,000 gallons
Septic Tanks	2	500 gal	Waste	No Emissions

Post-frac Coiled Tubing Operations:

Tank Description	# Tanks	Volume/tank	Fluid Type	Exemption Status
Workover Fluid Frac Tank	2	500 bbls	Oil	Horizontal Tank
Potable Water Tanks (same as above)	2	3,000 gal	Water	No Emissions
Septic Tanks (same as above)	2	500 gal	Waste	No Emissions
Propane Tank for Line Heater	1	500 gal	Propane	Pressurized Vessel
Diesel Tank for Living Quarters Generator (same as above)	1	350 gal	Diesel Fuel	Fuel Tank<300,000bbl
Open Top Tank (same as above)	1	210 bbls	Oil	<10,000 gallons

Post-frac Workover Operations:

Tank Description	# Tanks	Volume/tank	Fluid Type	Exemption Status
Workover Rig Tank	1	210 bbls	Oil	<10,000 gallons
Workover Fluid Frac Tank	1	500 bbls	Oil	Horizontal Tank
Potable Water Tanks (same as above)	2	3,000 gal	Water	No Emissions
Septic Tanks (same as above)	2	500 gal	Waste	No Emissions
Diesel Tank for Living Quarters Generator (same as above)	1	350 gal	Diesel Fuel	Fuel Tank<300,000bbl
Open Top Tank (same as above)	1	210 bbls	Oil	<10,000 gallons

Flowback Operations:

Tank Description	# Tanks	Volume/tank	Fluid Type	Exemption Status
Sealed Frac Tank	1	500 bbls (empty)	Water (minimal wtr expected)	Horizontal Tank
Diesel Tank for Generator	1	500 Gal	Diesel Fuel	Fuel Tank<300,000bbl
Propane Tank for Line Heater (same as above)	1	500 gal	Propane	Pressurized Vessel
Bullet Tanks for Recaptured Propane	3	15,000 gal	Propane	Pressurized Vessel
Potable Water Tanks (same as above)	2	3,000 gal	Water	No Emissions
Septic Tanks (same as above)	2	500 gal	Waste	No Emissions
Diesel Tank for Living Quarters Generator (same as above)	1	350 gal	Diesel Fuel	Fuel Tank<300,000bbl
Produced Water Tank	1	8820 gal	Produced Water	Petroleum Liquid <10,000gal

Note: There will also be fuel tanks for each engine listed in Table 2. These fuel tanks will also be exempt because they are less than 300,000 bbl in size.

Table 6 - Snyder E1 & E1A ENGINE EMISSION CALCULATIONS																			
Engine Use	Make	Model	Rating (hp)	Rating (kw)	Category	Certification	Hox		CO		VOC		PM		SO2		CO2		
							lb/hr	Total Tons	lb/hr	Total Tons	lb/hr	Total Tons	lb/hr	Total Tons	lb/hr	Total Tons	lb/hr	Total Tons	lb/hr
Drilling Rig	Caterpillar	3512-C	2,206	1,645	NR 9	Tier 2 Nonroad	1,800	23.21	20.89	12.69	11.42	1.56	1.40	0.73	0.80	0.89	0.80	2,559	2,303
Living Quarters	Isuzu	4HK1X	132	98	NR 5	Tier 2 Nonroad	10,560	1.43	7.53	1.08	5.71	0.32	1.71	0.06	0.34	0.27	1.42	151	798
Trash Pump	Deutz	F4L914	75	56	NR 4	Tier 2 Nonroad	35	0.92	0.02	0.62	0.01	0.19	0.00	0.05	0.00	0.15	0.00	86	2
Light Tower	Isuzu	4LE1	30	22	NR 3	Tier 2 Nonroad	21,672	0.37	4.01	0.27	2.94	0.07	0.80	0.03	0.32	0.06	0.67	35	374
Mud Pump	John Deere	6090H	350	261	NR 7	Tier 2 Nonroad	52	3.68	0.10	2.01	0.05	0.86	0.02	0.12	0.02	0.72	0.02	403	10
Heat Pump	Caterpillar	3512-C	2,500	1,864	NR 9	Tier 2 Nonroad	180	26.30	2.37	14.38	1.29	1.76	0.16	0.82	0.07	1.01	0.09	2,900	261
Chemical Unit	Kenworth	T800	400	298	NR 7	Tier 2 Nonroad	60	4.21	0.13	2.30	0.07	0.99	0.03	0.13	0.00	0.82	0.02	460	14
LPG Boost Pump	Caterpillar	C11	400	298	NR 7	Tier 2 Nonroad	30	4.21	0.06	2.30	0.03	0.99	0.01	0.13	0.00	0.82	0.01	460	7
Data Van	Kenworth	T800	95	71	NR 4	Tier 2 Nonroad	30	1.17	0.02	0.78	0.01	0.23	0.00	0.06	0.00	0.19	0.00	109	2
Safety Trailer	Kubota	V2203-44	27	20	NR 3	Tier 2 Nonroad	30	0.33	0.06	0.24	0.00	0.07	0.00	0.03	0.00	0.05	0.00	31	0
R2 Pumper	Kenworth	T800	500	373	NR 7	Tier 2 Nonroad	30	5.26	0.08	2.88	0.04	1.24	0.02	0.16	0.00	1.03	0.02	575	9
R2 Vaporizer	Caterpillar	C11	400	298	NR 7	Tier 2 Nonroad	30	4.21	0.06	2.30	0.03	0.99	0.01	0.13	0.00	0.82	0.01	460	7
N2 Transport	Kubota	V-2003-T	60	45	NR 4	Tier 2 Nonroad	30	0.74	0.01	0.49	0.01	0.15	0.00	0.04	0.00	0.12	0.00	69	1
100 Ton Blender	Kenworth	T800	570	425	NR 7	Tier 2 Nonroad	30	6.00	0.09	3.28	0.05	1.41	0.02	0.19	0.00	1.17	0.02	656	10
Iron Trailer	Kenworth	T800	400	298	NR 7	Tier 2 Nonroad	30	4.21	0.06	2.30	0.03	0.99	0.01	0.13	0.00	0.82	0.01	460	7
Fire Safety Truck	Detroit	DD15	500	373	NR 7	Tier 2 Nonroad	60	5.26	0.16	2.88	0.09	1.24	0.04	0.16	0.00	1.03	0.03	575	17
Workover Rig	Detroit	Series 60	475	354	NR 7	Tier 2 Nonroad	52	5.00	0.13	2.73	0.07	1.17	0.03	0.16	0.00	0.97	0.03	546	14
Pump Truck	Detroit	16V149	2,000	1,491	NR 9	Tier 2 Nonroad	6	21.04	0.06	11.51	0.03	1.41	0.00	0.66	0.00	0.81	0.00	2,320	7
Coil Tubing Pump	Cummins	QSK19	1,000	746	NR 9	Tier 2 Nonroad	15	10.52	0.08	5.75	0.04	0.71	0.01	0.33	0.00	0.40	0.00	1,160	9
Mixing Plant	Isuzu	4LE2X	60	45	NR 4	Tier 2 Nonroad	15	0.74	0.01	0.49	0.00	0.15	0.00	0.04	0.00	0.12	0.00	69	1
Coiled Tubing Unit	Kenworth	T800	600	447	NR 7	Tier 2 Nonroad	15	6.31	0.05	3.45	0.03	1.48	0.01	0.20	0.00	1.23	0.01	690	5
Refrig Generator	Caterpillar	3508B	1,341	1,000	NR 9	Tier 2 Nonroad	5,232	14.11	36.91	7.72	20.19	0.85	2.47	0.44	1.15	0.54	1.42	1,556	4,069
							Engine Total:	149.24	72.82	82.48	42.17	18.91	6.78	4.80	2.59	14.06	4.60	16,329	7,927

Table 7A - EPA Engine Emission Factors (40 CFR 89.112 - Table 1)

Rated Power (kW)	Tier	Model Year ¹	NOx	HC	NMHC + NOx	CO	PM
kW<8	Tier 1	2000	---	---	10.5	8.0	1.0
	Tier 2	2005	---	---	7.5	8.0	0.80
8≤kW<19	Tier 1	2000	---	---	9.5	6.6	0.80
	Tier 2	2005	---	---	7.5	6.6	0.80
19≤kW<37	Tier 1	1999	---	---	9.5	5.5	0.80
	Tier 2	2004	---	---	7.5	5.5	0.60
37≤kW<75	Tier 1	1998	9.2	---	---	---	---
	Tier 2	2004	---	---	7.5	5.0	0.40
	Tier 3	2008	---	---	4.7	5.0	---
75≤kW<130	Tier 1	1997	9.2	---	---	---	---
	Tier 2	2003	---	---	6.6	5.0	0.30
	Tier 3	2007	---	---	4.0	5.0	---
130≤kW<225	Tier 1	1996	9.2	1.3	---	11.4	0.54
	Tier 2	2003	---	---	6.6	3.5	0.20
	Tier 3	2006	---	---	4.0	3.5	---
225≤kW<450	Tier 1	1996	9.2	1.3	---	11.4	0.54
	Tier 2	2001	---	---	6.4	3.5	0.20
	Tier 3	2006	---	---	4.0	3.5	---
450≤kW≤560	Tier 1	1996	9.2	1.3	---	11.4	0.54
	Tier 2	2002	---	---	6.4	3.5	0.20
	Tier 3	2006	---	---	4.0	3.5	---
kW>560	Tier 1	2000	9.2	1.3	---	11.4	0.54
	Tier 2	2006	---	---	6.4	3.5	0.20

¹ The model years listed indicate the model years for which the specified tier of standards take effect.

TABLE 7B-- Engine Emission Factors for Tier 2 Equipment (EPA AP 4.2 Ch 3.3 and 3.4)

Engine Category	Engine Rated Power kw min	kw max	Model Year min	Tier 2 Emission Standards (g/kw-hr) per Table 1				TOC*	SO2*	CO2*	Max. Engine Rating (hp)**	
				Nox	HC	NMHC+Nox	CO	PM	lb/hp-hr	lb/hp-hr	lb/hp-hr	
NR 1	0	8	2005	-	-	7.5	8.0	0.8	2.47E-03	2.05E-03	1.15	<600
NR 2	8	19	2005	-	-	7.5	6.6	0.8	2.47E-03	2.05E-03	1.15	<600
NR 3	19	37	2004	-	-	7.5	5.5	0.6	2.47E-03	2.05E-03	1.15	<600
NR 4	37	75	2004	-	-	7.5	5.0	0.4	2.47E-03	2.05E-03	1.15	<600
NR 5	75	130	2003	-	-	6.6	5.0	0.3	2.47E-03	2.05E-03	1.15	<600
NR 6	130	225	2003	-	-	6.6	3.5	0.2	2.47E-03	2.05E-03	1.15	<600
NR 7	225	450	2001	-	-	6.4	3.5	0.2	2.47E-03	2.05E-03	1.15	<600
NR 8	450	560	2002	-	-	6.4	3.5	0.2	7.05E-04	4.05E-04	1.16	>600
NR 9	560		2006	-	-	6.4	3.5	0.2	7.05E-04	4.05E-04	1.16	>600

Note

* emission factors per AP 4.2 Table 3.3-1 & Table 3.4-1 where 1 KW = 1.341 HP
1.34102 hp/kw