DieselNet: Emission Standards

United States: Nonroad Diesel Engines

Background

Tier 1-3 Standards. The first federal standards (Tier 1) for new nonroad (or off-road) diesel engines were adopted in 1994 for engines over 37 kW (50 hp), to be phased-in from 1996 to 2000. In 1996, a Statement of Principles (SOP) pertaining to nonroad diesel engines was signed between EPA, California ARB and engine makers (including Caterpillar, Cummins, Deere, Detroit Diesel, Deutz, Isuzu, Komatsu, Kubota, Mitsubishi, Navistar, New Holland, Wis-Con, and Yanmar). On August 27, 1998, the EPA signed the final rule reflecting the provisions of the SOP [2787]. The 1998 regulation introduced Tier 1 standards for equipment under 37 kW (50 hp) and increasingly more stringent Tier 2 and Tier 3 standards for all equipment with phase-in schedules from 2000 to 2008. The Tier 1-3 standards are met through advanced engine design, with no or only limited use of exhaust gas aftertreatment (oxidation catalysts). Tier 3 standards for NOx+HC are similar in stringency to the 2004 standards for highway engines, however Tier 3 standards for PM were never adopted.

Tier 4 Standards. On May 11, 2004, EPA signed the final rule introducing Tier 4 emission standards, which are phased-in over the period of 2008-2015 [2786]. The Tier 4 standards require that emissions of PM and NOx be further reduced by about 90%. Such emission reductions can be

achieved through the use of control technologies—including advanced exhaust gas aftertreatment—similar to those required by the 2007-2010 standards for highway engines.

Nonroad Diesel Fuel. At the Tier 1-3 stage, the sulfur content in nonroad diesel fuels was not limited by environmental regulations. The oil industry specification was 0.5% (wt., max), with the average in-use sulfur level of about 0.3% = 3,000 ppm. To enable sulfur-sensitive control technologies in Tier 4 engines—such as catalytic particulate filters and NOx adsorbers—the EPA mandated reductions in sulfur content in nonroad diesel fuels, as follows:

- 500 ppm effective June 2007 for nonroad, locomotive and marine (NRLM) diesel fuels
- 15 ppm (ultra-low sulfur diesel) effective June 2010 for nonroad fuel, and June 2012 for locomotive and marine fuels

California. In most cases, federal nonroad regulations also apply in California, whose authority to set emission standards for new nonroad engines is limited. The federal Clean Air Act Amendments of 1990 (CAA) preempt California's authority to control emissions from new farm and construction equipment under 175 hp [CAA Section 209(e)(1)(A)] and require California to receive authorization from the federal EPA for controls over other off-road sources [CAA Section 209 (e)(2)(A)].

The US nonroad emission standards are harmonized to a certain degree with European nonroad emission standards.

EPA emission standards for nonroad diesel engines are published in the US Code of Federal Regulations, Title 40, Part 89. Regulatory text, fact sheets and related documents are available from the EPA web site [2788].

Applicability

The nonroad standards cover mobile *nonroad diesel engines* of all sizes used in a wide range of construction, agricultural and industrial equipment. The EPA definition of the *nonroad engine* is based on the principle of mobility/portability, and includes engines installed on (1) self-propelled equipment, (2) on equipment that is propelled while performing its function, or (3) on equipment

that is portable or transportable, as indicated by the presence of wheels, skids, carrying handles, dolly, trailer, or platform [40 CFR 1068.30]. In other words, nonroad engines are all internal combustion engines except motor vehicle (highway) engines, stationary engines (or engines that remain at one location for more than 12 months), engines used solely for competition, or engines used in aircraft.

Effective May 14, 2003, the definition of nonroad engines was changed to also include all diesel powered engines—including stationary ones—used in agricultural operations in California. This change applies only to engines sold in the state of California; stationary engines sold in other states are not classified as nonroad engines.

The nonroad diesel emission regulations are not applicable to all nonroad diesel engines. Exempted are the following nonroad engine categories:

- Engines used in railway locomotives; those are subject to separate EPA regulations.
- Engines used in marine vessels, also covered by separate EPA regulations. Marine engines below 37 kW (50 hp) are subject to Tier 1-2—but not Tier 4—nonroad standards. Certain marine engines that are exempted from marine standards may be subject to nonroad regulations.
- Engines used in underground mining equipment. Diesel emissions and air quality in mines are regulated by the Mine Safety and Health Administration (MSHA).
- Hobby engines (below 50 cm^3 per cylinder)

Examples of regulated applications include farm tractors, excavators, bulldozers, wheel loaders, backhoe loaders, road graders, diesel lawn tractors, logging equipment, portable generators, skid steer loaders, or forklifts.

A new definition of a compression-ignition (diesel) engine was introduced in the 1998 rule, consistent with definitions established for highway engines. The definition focuses on the engine cycle, rather than the ignition mechanism, with the presence of a throttle as an indicator to distinguish between diesel-cycle and otto-cycle operation. Regulating power by controlling the fuel supply in lieu of a throttle corresponds with lean combustion and diesel-cycle operation.

This language allows the possibility that a natural gas-fueled engine equipped with a spark plug is considered a compression-ignition engine.

Tier 1-3 Emission Standards

The 1998 nonroad engine regulations were structured as a 3-tiered progression. Each tier involved a phase-in (by horsepower rating) over several years. Tier 1 standards were phased-in from 1996 to 2000. The more stringent Tier 2 standards took effect from 2001 to 2006, and yet more stringent Tier 3 standards phased-in from 2006 to 2008 (Tier 3 standards applied only for engines from 37-560 kW).

Tier 1-3 emissions standards are listed in Table 1. Nonroad regulations use the metric system of units, with regulatory limits expressed in grams of pollutant per kWh.

Table 1
EPA Tier 1-3 nonroad diesel engine emission standards, g/kWh (g/bhp·hr)

Engine Power	Tier	Year	CO	HC	NMHC+NOx	NOx	PM
kW < 8 (hp < 11)	Tier 1	2000	8.0 (6.0)	-	10.5 (7.8)	-	1.0 (0.75)
	Tier 2	2005	8.0 (6.0)	-	7.5 (5.6)	-	0.8 (0.6)
8 ≤ kW < 19 (11 ≤ hp < 25)	Tier 1	2000	6.6 (4.9)	-	9.5 (7.1)	-	0.8 (0.6)
	Tier 2	2005	6.6 (4.9)	-	7.5 (5.6)	-	0.8 (0.6)
19≤ kW < 37 (25 ≤ hp < 50)	Tier 1	1999	5.5 (4.1)	-	9.5 (7.1)	-	0.8 (0.6)
	Tier 2	2004	5.5 (4.1)	-	7.5 (5.6)	-	0.6 (0.45)
37 ≤ kW < 75 (50 ≤ hp < 100)	Tier 1	1998	-	-	-	9.2 (6.9)	-
	Tier 2	2004	5.0 (3.7)	-	7.5 (5.6)	-	0.4 (0.3)
	Tier 3	2008	5.0 (3.7)	-	4.7 (3.5)	-	-†
75 ≤ kW < 130 (100 ≤ hp < 175)	Tier 1	1997	-	-	-	9.2 (6.9)	-
	Tier 2	2003	5.0 (3.7)	-	6.6 (4.9)	-	0.3 (0.22)
	Tier 3	2007	5.0 (3.7)	-	4.0 (3.0)	-	-†
130 ≤ kW < 225 (175 ≤ hp < 300)	Tier 1	1996	11.4 (8.5)	1.3 (1.0)	-	9.2 (6.9)	0.54 (0.4)
	Tier 2	2003	3.5 (2.6)	-	6.6 (4.9)	-	0.2 (0.15)
	Tier 3	2006	3.5 (2.6)	-	4.0 (3.0)	-	-†
225 ≤ kW < 450 (300 ≤ hp < 600)	Tier 1	1996	11.4 (8.5)	1.3 (1.0)	-	9.2 (6.9)	0.54 (0.4)

Engine Power	Tier	Year	CO	HC	NMHC+NOx	NOx	PM
	Tier 2	2001	3.5 (2.6)	-	6.4 (4.8)	-	0.2 (0.15)
	Tier 3	2006	3.5 (2.6)	-	4.0 (3.0)	-	-†
450 ≤ kW < 560 (600 ≤ hp < 750)	Tier 1	1996	11.4 (8.5)	1.3 (1.0)	-	9.2 (6.9)	0.54 (0.4)
	Tier 2	2002	3.5 (2.6)	-	6.4 (4.8)	-	0.2 (0.15)
	Tier 3	2006	3.5 (2.6)	-	4.0 (3.0)	-	-†
kW ≥ 560 (hp ≥ 750)	Tier 1	2000	11.4 (8.5)	1.3 (1.0)	-	9.2 (6.9)	0.54 (0.4)
	Tier 2	2006	3.5 (2.6)	-	6.4 (4.8)	-	0.2 (0.15)
† Not adopted, engines must meet Tier 2 PM standard.							

Manufacturers who signed the 1998 Consent Decrees with the EPA may have been required to meet the Tier 3 standards one year ahead of schedule (i.e. beginning in 2005).

Voluntary, more stringent emission standards that manufacturers could use to earn a designation of "Blue Sky Series" engines (applicable to Tier 1-3 certifications) are listed in Table 2.

Table 2
EPA voluntary emission standards for nonroad diesel engines, g/kWh (g/bhp·hr)

Rated Power (kW)	NMHC+NOx	PM
kW < 8	4.6 (3.4)	0.48 (0.36)
8 ≤ kW <19	4.5 (3.4)	0.48 (0.36)
19 ≤ kW <37	4.5 (3.4)	0.36 (0.27)
37 ≤ kW < 75	4.7 (3.5)	0.24 (0.18)
75 ≤ kW <130	4.0 (3.0)	0.18 (0.13)
130 ≤ kW < 560	4.0 (3.0)	0.12 (0.09)
kW ≥ 560	3.8 (2.8)	0.12 (0.09)

Engines of all sizes had to meet smoke standards of 20/15/50% opacity at acceleration/lug/peak modes, respectively.

The regulations included several other provisions, such as averaging, banking and trading of emission credits and maximum "family emission limits" (FEL) for emission averaging.

Tier 4 Emission Standards

The Tier 4 emission standards—phased-in from 2008 through 2015—introduce substantial reductions of NOx (for engines above 56 kW) and PM (above 19 kW), as well as more stringent HC limits. CO emission limits remain unchanged from the Tier 2-3 stage.

Engines up to 560 kW. Tier 4 emission standards for engines up to 560 kW are listed in Table 3.

Table 3
Tier 4 emission standards—Engines up to 560 kW, g/kWh (g/bhp-hr)

Engine Power	Year	CO	NMHC	NMHC+NO_x	NO_x	PM
kW < 8 (hp < 11)	2008	8.0 (6.0)	-	7.5 (5.6)	-	0.4[a] (0.3)
8 ≤ kW < 19 (11 ≤ hp < 25)	2008	6.6 (4.9)	-	7.5 (5.6)	-	0.4 (0.3)
19 ≤ kW < 37 (25 ≤ hp < 50)	2008	5.5 (4.1)	-	7.5 (5.6)	-	0.3 (0.22)
	2013	5.5 (4.1)	-	4.7 (3.5)	-	0.03 (0.022)
37 ≤ kW < 56 (50 ≤ hp < 75)	2008	5.0 (3.7)	-	4.7 (3.5)	-	0.3[b] (0.22)
	2013	5.0 (3.7)	-	4.7 (3.5)	-	0.03 (0.022)
56 ≤ kW < 130 (75 ≤ hp < 175)	2012-2014[c]	5.0 (3.7)	0.19 (0.14)	-	0.40 (0.30)	0.02 (0.015)
130 ≤ kW ≤ 560 (175 ≤ hp ≤ 750)	2011-2014[d]	3.5 (2.6)	0.19 (0.14)	-	0.40 (0.30)	0.02 (0.015)

a - hand-startable, air-cooled, DI engines may be certified to Tier 2 standards through 2009 and to an optional PM standard of 0.6 g/kWh starting in 2010
b - 0.4 g/kWh (Tier 2) if manufacturer complies with the 0.03 g/kWh standard from 2012
c - PM/CO: full compliance from 2012; NOx/HC: Option 1 (if banked Tier 2 credits used)—50% engines must comply in 2012-2013; Option 2 (if no Tier 2 credits claimed)—25% engines must comply in 2012-2014, with full compliance from 2014.12.31
d - PM/CO: full compliance from 2011; NOx/HC: 50% engines must comply in 2011-2013

In engines of 56-560 kW rated power, the NOx and HC standards are phased-in over a few year period, as indicated in the notes to Table 3. The initial standards (PM compliance) are sometimes referred to as the 'interim Tier 4' (or 'Tier 4i'), 'transitional Tier 4' or 'Tier 4 A', while the final standards (NOx/HC compliance) are sometimes referred to as 'Tier 4 B'.

As an alternative to introducing the required percentage of Tier 4 compliant engines, manufacturers may certify all their engines to an *alternative NOx limit* in each model year during the phase-in period. These alternative NOx standards are:

- Engines 56-130 kW:
  - Option 1: NOx = 2.3 g/kWh = 1.7 g/bhp-hr (Tier 2 credits used to comply, MY 2012-2013)
  - Option 2: NOx = 3.4 g/kWh = 2.5 g/bhp-hr (no Tier 2 credits claimed, MY 2012-2014)
- Engines 130-560 kW: NOx = 2.0 g/kWh = 1.5 g/bhp-hr (MY 2011-2013)

Engines Above 560 kW. Tier 4 emission standards for engines above 560 kW are listed in Table 4. The 2011 standards are sometimes referred to as 'transitional Tier 4', while the 2015 limits represent final Tier 4 standards.

Table 4
Tier 4 emission standards—Engines above 560 kW, g/kWh (g/bhp-hr)

Year	Category	CO	NMHC	NO_x	PM
2011	Generator sets > 900 kW	3.5 (2.6)	0.40 (0.30)	0.67 (0.50)	0.10 (0.075)
	All engines except gensets > 900 kW	3.5 (2.6)	0.40 (0.30)	3.5 (2.6)	0.10 (0.075)
2015	Generator sets	3.5 (2.6)	0.19 (0.14)	0.67 (0.50)	0.03 (0.022)
	All engines except gensets	3.5 (2.6)	0.19 (0.14)	3.5 (2.6)	0.04 (0.03)

Other Provisions. The Tier 4 regulation and later amendments include a number of additional provisions:

- *Smoke Opacity*—Existing Tier 2-3 smoke opacity standards and procedures continue to apply in some engines. Exempted from smoke emission standards are engines certified to PM emission standards at or below 0.07 g/kWh (because an engine of such low PM level has inherently low smoke emission).
- *Crankcase Ventilation*—The Tier 4 regulation does not require closed crankcase ventilation in nonroad engines. However, in engines with open crankcases, crankcase emissions must be

measured and added to exhaust emissions in assessing compliance.

- *DEF Refill Interval*—For SCR-equipped nonroad diesel engines, a minimum DEF (urea solution) refill interval is defined as at least as long (in engine-hours) as the vehicle's fuel capacity [3408].
- *Ammonia Emissions*—While ammonia emissions are unregulated, the EPA recommends that ammonia slip should be below 10 ppm average over the applicable test cycles [3693].
- *Emergency Operation*—To facilitate the use of certain nonroad engines in temporary emergency situations, the engines can be equipped with an AECD to override performance inducements related to the emission control system—for example, to allow engine operation without urea in the SCR system during an emergency [3408]. This flexibility is intended primarily for engines used in construction equipment and portable equipment used for temporary power generation and flood control.
- *ABT Program*—Similarly to earlier standards, the Tier 4 regulation includes such provisions as averaging, banking and trading of emission credits and FEL limits for emission averaging.

Test Cycles and Fuels

Nonroad engine emissions are measured on a steady-state test cycle that is equivalent to the ISO 8178 C1, 8-mode steady-state test cycle. Other ISO 8178 test cycles are allowed for selected applications, such as constant-speed engines (D2 5-mode cycle), variable-speed engines rated under 19 kW (G2 cycle), and marine engines (E3 cycle).

Transient Testing. Tier 4 standards have to be met over both the steady-state test and the nonroad transient cycle, NRTC. The transient testing requirements started with MY 2013 for engines below 56 kW, MY 2012 for 56-130 kW, and MY 2011 for 130-560 kW engines. Engines above 560 kW are not tested on the transient test. Also constant-speed, variable-load engines of any power category are not subject to transient testing. The NRTC protocol includes a cold start test. The cold start emissions are weighted at 5% and hot start emissions are weighted at 95% in calculating the final result.

Tier 4 nonroad engines must also meet not-to-exceed standards (NTE), which are measured without reference to any specific test schedule. The NTE standards became effective in 2011 for

engines above 130 kW; in 2012 for 56-130 kW; and in 2013 for engines below 56 kW. In most engines, the NTE limits are set at 1.25 times the regular standard for each pollutant. In engines certified to NOx standards below 2.5 g/kWh or PM standards below 0.07 g/kWh, the NTE multiplier is 1.5. The NTE standards apply to engines at the time of certification, as well as in use throughout the useful life of the engine. The purpose of the added testing requirements is to prevent the possibility of "defeating" the test cycle by electronic engine controls.

Certification Fuels. Fuels with sulfur levels no greater than 0.2 wt% (2,000 ppm) were used for certification testing of Tier 1-3 engines. From 2011, all Tier 4 engines are tested using fuels of 7-15 ppm sulfur content. The transition from the 2000 ppm S specification to the 7-15 ppm specification took place in the 2006-2010 period (see Certification Diesel Fuel).

A change from measuring total hydrocarbons to nonmethane hydrocarbons (NMHC) has been introduced in the 1998 rule. Since there is no standardized EPA method for measuring methane in diesel engine exhaust, manufacturers can either use their own procedures to analyze nonmethane hydrocarbons or measure total hydrocarbons and subtract 2% from the measured hydrocarbon mass to correct for methane.

Environmental Benefit and Cost

1998 Regulation

At the time of signing the 1998 rule, the EPA estimated that by 2010 NO_x emissions would be reduced by about a million tons per year, the equivalent of taking 35 million passenger cars off the road.

The costs of meeting the emission standards were expected to add under 1% to the purchase price of typical new nonroad diesel equipment, although for some equipment the standards may cause price increases on the order of 2-3%. The program was expected to cost about $600 per ton of NO_x reduced.

Tier 4 Regulation

When the full inventory of older nonroad engines are replaced by Tier 4 engines, annual emission reductions are estimated at 738,000 tons of NOx and 129,000 tons of PM. By 2030,

12,000 premature deaths would be prevented annually due to the implementation of the proposed standards.

The estimated costs for added emission controls for the vast majority of equipment was estimated at 1-3% as a fraction of total equipment price. For example, for a 175 hp bulldozer that costs approximately $230,000 it would cost up to $6,900 to add the advanced emission controls and to design the bulldozer to accommodate the modified engine.

EPA estimated that the average cost increase for 15 ppm S fuel would be 7 cents per gallon. This figure would be reduced to 4 cents by anticipated savings in maintenance costs due to low sulfur diesel.

Nonroad Compression-I□nition □n□ines□□□ha□st □mission Standards

	Rated Power □W□	Tier	Model □ear	NMHC □□□W-hr□	NMHC □ NO□ □□□W-hr□	NO□ □□□W-hr□	PM □□□W-hr□	CO □□□W-hr□	Smo□e [a] □Percenta□e□	□sef□l Life □ho□rs □□ears□[b]	Warrant□ Period □ho□rs □□ears□[b]
Federal	kW < 8	1	2000-2004	-	10.5	-	1.0	8.0	20/15/50	3,000/5	1,500/2
		2	2005-2007	-	7.5	-	0.80	8.0			
		4	2008+	-	7.5	-	0.40 [c]	8.0			
	8 ≤ kW < 19	1	2000-2004	-	9.5	-	0.80	6.6		3,000/5	1,500/2
		2	2005-2007	-	7.5	-	0.80	6.6			
		4	2008+	-	7.5	-	0.40	6.6			
	19 ≤ kW < 37	1	1999-2003	-	9.5	-	0.80	5.5		5,000/7 [d]	3,000/5 [e]
		2	2004-2007	-	7.5	-	0.60	5.5			
		4	2008-2012	-	7.5	-	0.30	5.5			
			2013+	-	4.7	-	0.03	5.5			
	37 ≤ kW < 56	1	1998-2003	-	-	9.2	-	-		8,000/10	3,000/5
		2	2004-2007	-	7.5	-	0.40	5.0			
		3 [f]	2008-2011	-	4.7	-	0.40	5.0			
		4 (Option 1) □	2008-2012	-	4.7	-	0.30	5.0			
		4 (Option 2) □	2012	-	4.7	-	0.03	5.0			
		4	2013+	-	4.7	-	0.03	5.0			
	56 ≤ kW < 75	1	1998-2003	-	-	9.2	-	-			
		2	2004-2007	-	7.5	-	0.40	5.0			
		3	2008-2011	-	4.7	-	0.40	5.0			
		4	2012-2013 [h]	-	4.7	-	0.02	5.0			
			2014+ [i]	0.19	-	0.40	0.02	5.0			
	75 ≤ kW < 130	1	1997-2002	-	-	9.2	-	-			
		2	2003-2006	-	6.6	-	0.30	5.0			
		3	2007-2011	-	4.0	-	0.30	5.0			
		4	2012-2013 [h]	-	4.0	-	0.02	5.0			
			2014+	0.19	-	0.40	0.02	5.0			

Contin□ed

	Rated Power □W□	Tier	Model □ear	NMHC □□□W-hr□	NMHC □ NO□ □□□W-hr	NO□ □□□W-hr	PM □□□W-hr	CO □□□W-hr□	Smo□e [a] □Percenta□e□	□sef□l Life □ho□rs □□ears□[b]	Warrant□ Period □ho□rs □□ears□[b]
Federal	130 ≤ kW < 225	1	1996-2002	1.3 □	-	9.2	0.54	11.4	20/15/50	8,000/10	3,000/5
		2	2003-2005	-	6.6	-	0.20	3.5			
		3	2006-2010	-	4.0	-	0.20	3.5			
		4	2011-2013 [h]	-	4.0	-	0.02	3.5			
			2014+ [i]	0.19	-	0.40	0.02	3.5			
	225 ≤ kW < 450	1	1996-2000	1.3 □	-	9.2	0.54	11.4			
		2	2001-2005	-	6.4	-	0.20	3.5			
		3	2006-2010	-	4.0	-	0.20	3.5			
		4	2011-2013 [h]	-	4.0	-	0.02	3.5			
			2014+ [i]	0.19	-	0.40	0.02	3.5			
	450 ≤ kW < 560	1	1996-2001	1.3 □	-	9.2	0.54	11.4			
		2	2002-2005	-	6.4	-	0.20	3.5			
		3	2006-2010	-	4.0	-	0.20	3.5			
		4	2011-2013 [h]	-	4.0	-	0.02	3.5			
			2014+ [i]	0.19	-	0.40	0.02	3.5			
	560 ≤ kW < 900	1	2000-2005	1.3 □	-	9.2	0.54	11.4			
		2	2006-2010	-	6.4	-	0.20	3.5			
		4	2011-2014	0.40	-	3.5	0.10	3.5			
			2015+ [i]	0.19	-	3.5 □	0.04 [l]	3.5			
	kW > 900	1	2000-2005	1.3 □	-	9.2	0.54	11.4			
		2	2006-2010	-	6.4	-	0.20	3.5			
		4	2011-2014	0.40	-	3.5 □	0.10	3.5			
			2015+ [i]	0.19	-	3.5 □	0.04 [l]	3.5			

Notes on followin□ pa□e.

Notes

- For Tier 1, 2, and 3 standards, exhaust emissions of nitrogen oxides (NOx), carbon monoxide (CO), hydrocarbons (HC), and non-methane hydrocarbons (NMHC) are measured using the procedures in 40 Code of Federal Regulations (CFR) Part 89 Subpart E. For Tier 1, 2, and 3 standards, particulate matter (PM) exhaust emissions are measured using the California Regulations for New 1996 and Later Heavy-Duty Off-Road Diesel Cycle Engines.
- For Tier 4 standards, engines are tested for transient and steady-state exhaust emissions using the procedures in 40 CFR Part 1039 Subpart F. Transient standards do not apply to engines below 37 kilowatts (kW) before the 2013 model year, constant-speed engines, engines certified to Option 1, and engines above 560 kW.
- Tier 2 and later model naturally aspirated nonroad engines shall not discharge crankcase emissions into the atmosphere unless these emissions are permanently routed into the exhaust. This prohibition does not apply to engines using turbochargers, pumps, blowers, or superchargers.
- In lieu of the Tier 1, 2, and 3 standards for NOX, NMHC + NOX, and PM, manufacturers may elect to participate in the averaging, banking, and trading (ABT) program described in 40 CFR Part 89 Subpart C.

a Smoke emissions may not exceed 20 percent during the acceleration mode, 15 percent during the lugging mode, and 50 percent during the peaks in either mode. Smoke emission standards do not apply to single-cylinder engines, constant-speed engines, or engines certified to a PM emission standard of 0.07 grams per kilowatt-hour (g/kW-hr) or lower. Smoke emissions are measured using procedures in 40 CFR Part 86 Subpart I.

b Useful life and warranty period are expressed hours and years, whichever comes first.

c Hand-startable air-cooled direct injection engines may optionally meet a PM standard of 0.60 g/kW-hr. These engines may optionally meet Tier 2 standards through the 2009 model years. In 2010 these engines are required to meet a PM standard of 0.60 g/kW-hr.

d Useful life for constant speed engines with rated speed 3,000 revolutions per minute (rpm) or higher is 5 years or 3,000 hours, whichever comes first.

e Warranty period for constant speed engines with rated speed 3,000 rpm or higher is 2 years or 1,500 hours, whichever comes first.

f These Tier 3 standards apply only to manufacturers selecting Tier 4 Option 2. Manufacturers selecting Tier 4 Option 1 will be meeting those standards in lieu of Tier 3 standards.

 A manufacturer may certify all their engines to either Option 1 or Option 2 sets of standards starting in the indicated model year. Manufacturers selecting Option 2 must meet Tier 3 standards in the 2008-2011 model years.

h These standards are phase-out standards. Not more than 50 percent of a manufacturer's engine production is allowed to meet these standards in each model year of the phase out period. Engines not meeting these standards must meet the final Tier 4 standards.

i These standards are phased in during the indicated years. At least 50 percent of a manufacturer's engine production must meet these standards during each year of the phase in. Engines not meeting these standards must meet the applicable phase-out standards.

 For Tier 1 engines the standard is for total hydrocarbons.

 The NOx standard for generator sets is 0.67 g/kW-hr.

l The PM standard for generator sets is 0.03 g/kW-hr.

Citations Code of Federal Re lations CFR citations

- 40 CFR 89.112 = Exhaust emission standards
- 40 CFR 1039.101 = Exhaust emission standards for after 2014 model year
- 40 CFR 1039.102 = Exhaust emission standards for model year 2014 and earlier
- 40 CFR 1039 Subpart F = Exhaust emissions transient and steady state test procedures
- 40 CFR 86 Subpart I = Smoke emission test procedures
- 40 CFR 1065 = Test equipment and emissions measurement procedures

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Image shown may not reflect actual engine

CATERPILLAR® ENGINE SPECIFICATIONS

I-6, 4-Stroke-Cycle Diesel	
Bore (mm, in)	112.0 mm, 4.41 in.
Stroke (mm, in)	149.0 mm, 5.87 in.
Displacement	8.8 liters, 537 cu.in.
Aspiration	Turbocharged/ATAAC
Compression Ratio	16:3
Rotation (from flywheel end)	Counterclockwise
Cooling System	13.9 liters, 3.7 gallons
Lube Oil System (refill)	32.0 liters, 8.5 gallons
Weight, Net Dry (approximate kg, lb)	776 kg, 1711 lb.

FEATURES

Emissions

Meets Tier 3, Stage IIIA emission requirements. Tier 3 refers to EPA (U.S.) standards. Stage IIIA refers to European standards.

Worldwide Supplier Capability

Caterpillar
– Casts engine blocks, heads, and cylinder liners
– Machines critical components
– Assembles complete engine
Ownership of these manufacturing processes enables Caterpillar to produce high quality, dependable product.
Factory-designed systems built at Caterpillar ISO 9001:2000 certified facilities.

Testing

Prototype testing on every model:
– proves computer design
– verifies system torsional stability
– tests functionality on every model
Every Caterpillar engine is dynamometer tested under full load to ensure proper engine performance.

Full Range of Attachments

Wide range of bolt-on system expansion attachments, factory designed and tested

Unmatched Product Support Offered Through Worldwide Caterpillar Dealer Network

More than 1,500 dealer outlets
Caterpillar factory-trained dealer technicians service every aspect of your industrial engine
99.7% of parts orders filled within 24 hours worldwide
Caterpillar parts and labor warranty
Preventive maintenance agreements available for repair before failure options
Scheduled Oil Sampling program matches your oil sample against Caterpillar set standards to determine:
– internal engine component condition
– presence of unwanted fluids
– presence of combustion by-products

Web Site

For all your industrial power requirements, visit www.cat-industrial.com.

CATERPILLAR®

Industrial Engine

C9 ACERT®

205-280 bkW/ 275-375 bhp

STANDARD ENGINE EQUIPMENT

Air Inlet System
- Air to air aftercooled (ATAAC)
- Turbocharged

Control System
- Electronic governing, PTO speed control
- Programmable ratings
- Cold mode start strategy
- Automatic altitude compensation
- Power compensation for fuel temperature
- Programmable low and high idle and total engine limit
- Electronic diagnostics and fault logging
- Engine monitoring system
- J1939 Broadcast (diagnostic and engine status)
- ADEM™ A4

Cooling System
- Thermostats and housing, vertical outlet
- Jacket water pump, centrifugal
- Water pump, inlet

Exhaust System
- Exhaust manifold, dry
- Optional exhaust outlet

Flywheels and Flywheel Housing
- SAE No. 1 Flywheel housing

Fuel System
- HEUI™ injection
- Fuel filter, secondary (2 micron high performance)
- Fuel transfer pump
- Fuel priming pump
- ACERT® Technology

Lube System
- Crankcase breather
- Oil cooler
- Oil filler
- Oil filter
- Oil pan front sump
- Oil dipstick
- Oil pump (gear driven)

General
- Paint, Caterpillar Yellow
- Vibration damper
- Lifting eyes

CATERPILLAR®

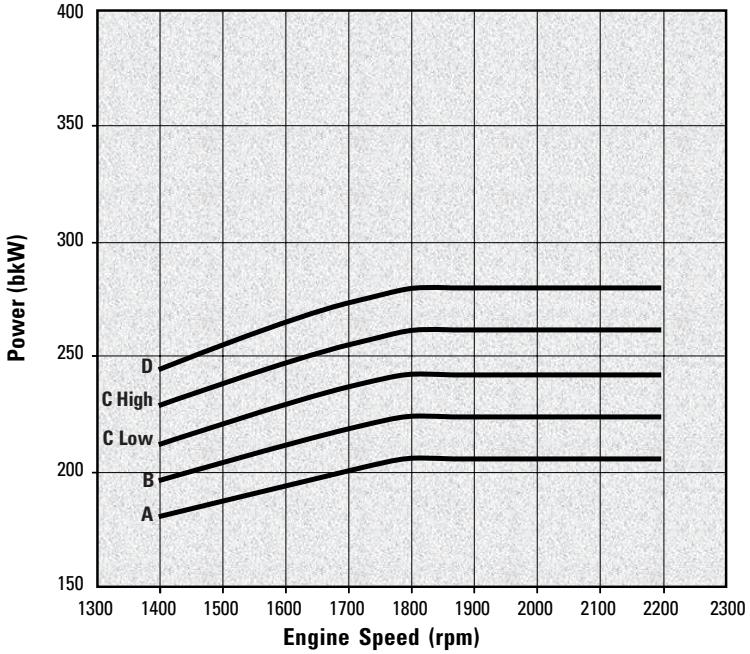
Industrial Engine

C9 ACERT®

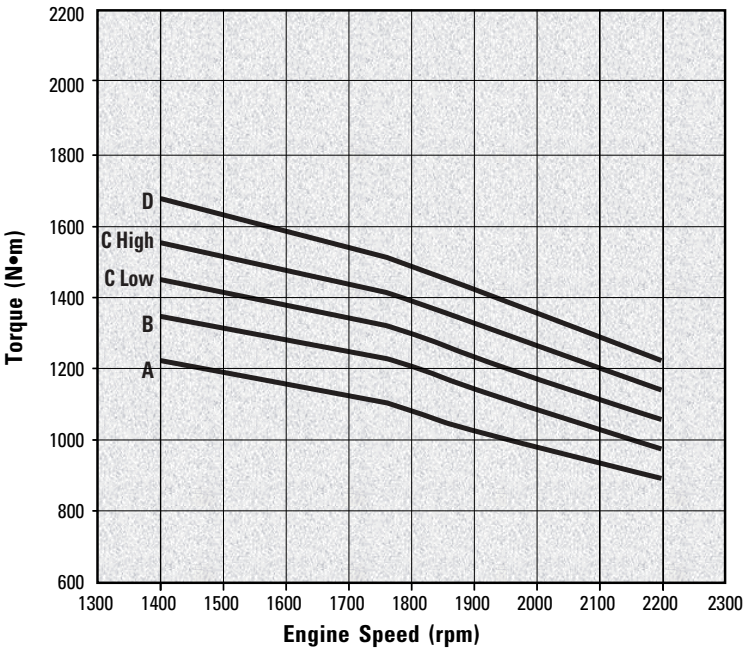
205-280 bkW/ 275-375 bhp

PERFORMANCE CURVES

Performance Curves by Rating (Power)



Performance Curves by Rating (Torque)



DIMENSIONS

Length	mm (in)	1198 (47)
Width	mm (in)	819 (32)
Height	mm (in)	1002 (39)

CATERPILLAR®

Industrial Engine

C9 ACERT®

205-280 bkW/ 275-375 bhp

INDUSTRIAL RATINGS AND CONDITIONS

IND - A (Continuous) Continuous heavy duty service where the engine is operated at maximum power and speed up to 100% of the time without interruption or load cycling.

IND - B For service where power and/or speed are cyclic (time at full load not to exceed 80%).

IND - C (Intermittent) Intermittent service where maximum power and/or speed are cyclic (time at full load not to exceed 50%).

IND - D For service where maximum power is required for periodic overloads.

Engine Performance Engine performance is corrected to inlet air standard conditions of 99 kPa (29.31 in Hg) dry barometer and 25° C (77° F) temperature. These values correspond to the standard atmospheric pressure and temperature as shown in SAE J1995.

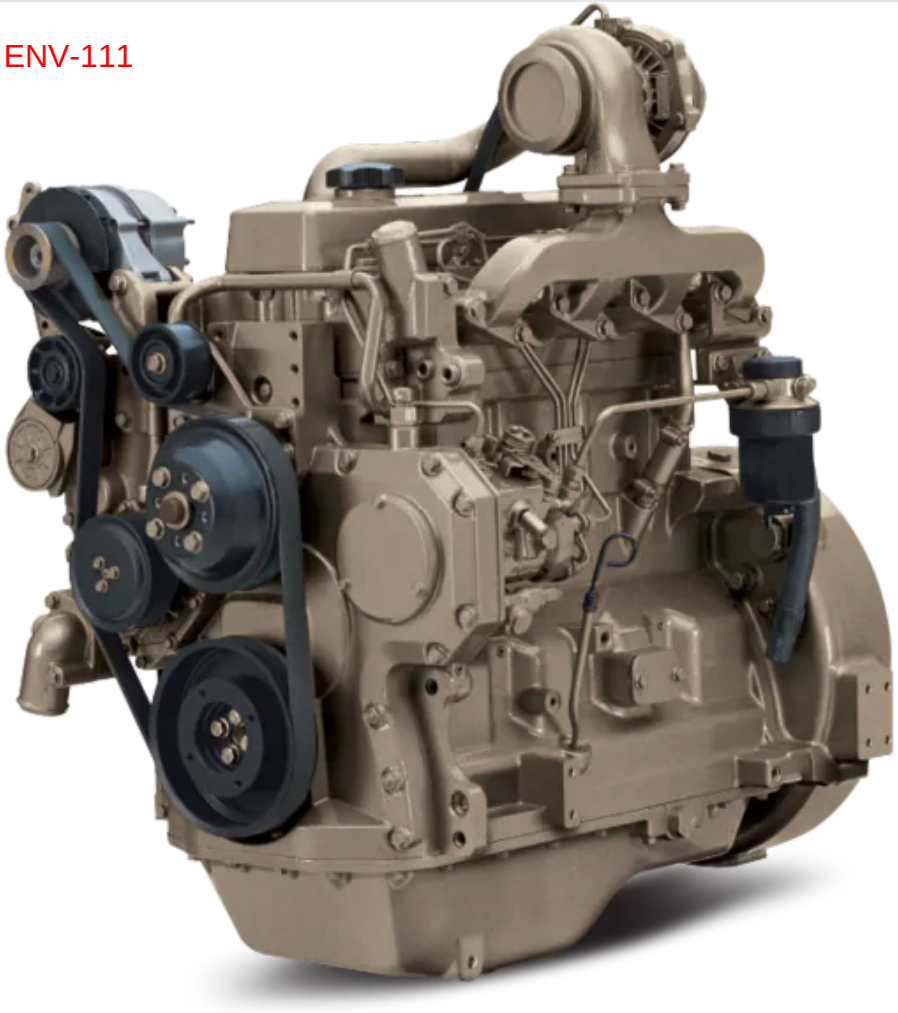
Performance measured using a standard fuel with fuel gravity of 35 degrees API having a lower heating value of 42 780 kJ/kg (18,390 Btu/lb) when used at 29° C (84.2° F) where the density is 838.9 g/liter (7.001 lb/U.S. gal).

The corrected performance values shown for Caterpillar engines will approximate the values obtained when the observed performance data is corrected to SAE J1995, ISO 3046-2 and 8665 and 2288 and 9249 and 1585, EEC 80/1269 and DIN 70020 standard reference conditions.

LEHH4592-01 (3-05)

JOHN DEERE

Units ENV-101 and ENV-111



4045TF250

4.5L Industrial Diesel Engine

- PowerTech™
- 86 - 93 kW (115 - 125 hp)

Contact a Distributor

Diesel Engine Technology >

Industrial PowerSource Magazine >

Features

Collapse All

— Dynamically balanced crankshaft

- Crankshafts are formed from nodular iron

— Forged-steel connecting rods

- Unique 45-degree design permits use of larger crankshaft connecting-rod bearings for increased durability

— Self-adjusting poly-vee fan drive

- Self-adjusting, eight-groove, poly-vee fan drive provides multiple fan drive ratios and fan heights that can be matched to specific application requirements
- Poly-vee design provides more than twice the drive capacity of comparable vee-belts

— Replaceable wet-type cylinder liners

- Provides excellent heat dissipation
- Precision machined for long life

— Either-side service

- Engine installation and maintenance simplified and convenient by providing dipstick and oil filter options on both sides of the engine

— Standard gear auxiliary drive

- Standard gear auxiliary drive produces up to 50 hp (37 kW) for gear-driven accessories

— Mounting points

- Standard front and side mounting points provide easy installation and application flexibility

— Optional engine-balancer shafts

- Provides smooth engine operation

Show Less

Specifications

Emissions Certifications

Non-Emissions Certified	

General engine data

Model	4045TF250
Number of cylinders	4
Displacement-- L (cu in)	4.5 (275)
Bore and Stroke-- mm (in)	106 x 127 (4.17 x 5.00)
Compression Ratio	17.0:1
Engine Type	In-line, 4-Cycle
Aspiration	Turbocharged
Length - mm (in)	860 (33.9)
Width-- mm (in)	612 (24.1)
Height-- mm (in)	994 (39.1)
Weight, dry - kg (lb)	396 (873)

Performance data range

Intermittent - Rated	85-93 kW (114-125 hp) @2200-2400 rpm
Intermittent - Peak power	85-93 kW (114-125 hp) @2200-2400 rpm
Intermittent - Peak torque	445-446 N·m (328-329 ft-lb) @1400-1500 rpm
Intermittent - Torque rise	NA

Show Less

Drivetrain Components

Pump Drives
Transmissions
Axles
Planetary Gear Drives
Vehicle Electrification

Accessories

Engine Accessories Brochure

Parts

Engine Parts

Resources

Confidence is Built In

Backed by a powerful support network

Engine Parts >

Engine Support >

Warranty

Warranty & Protection Plans >

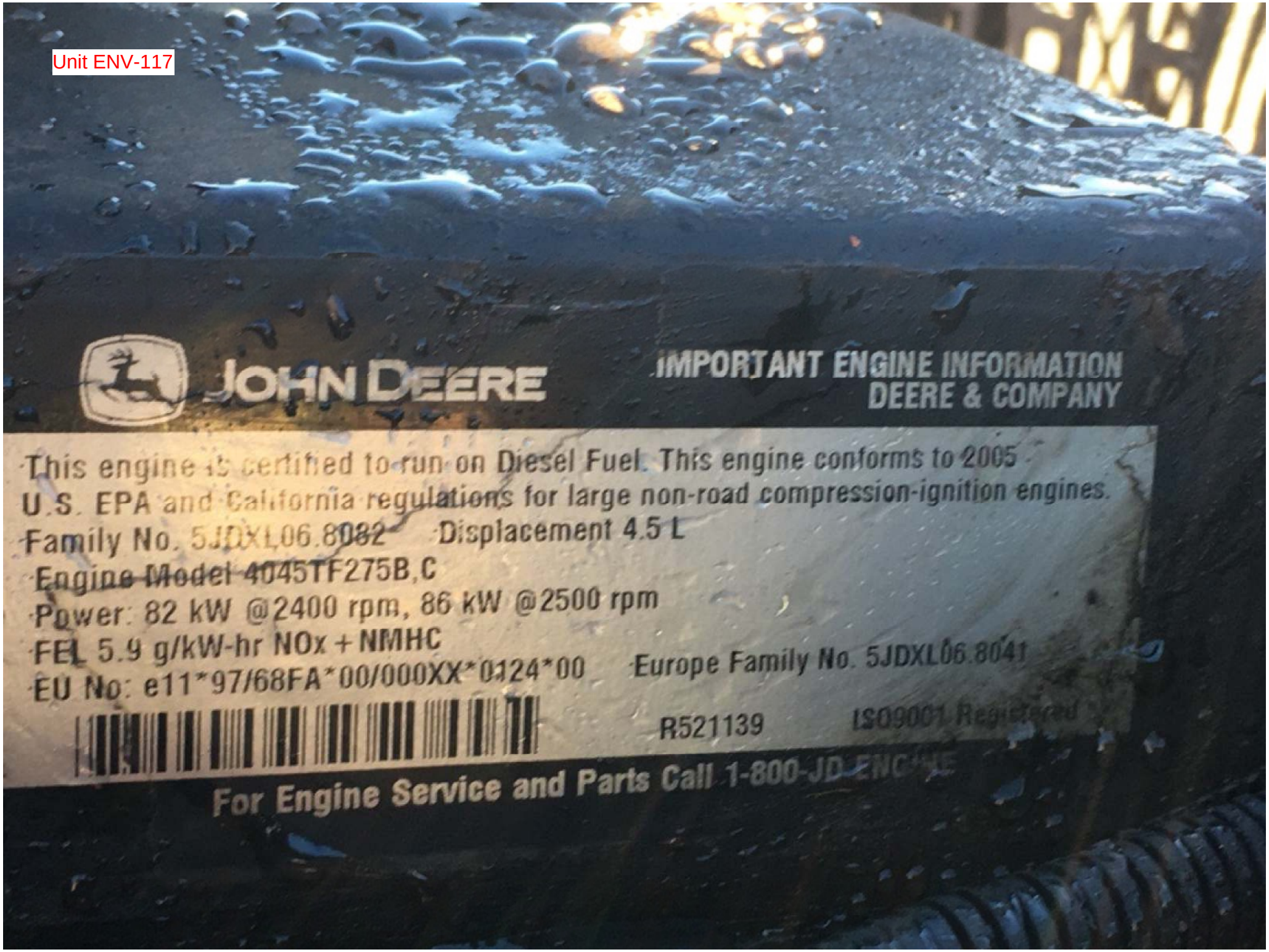
Register Your Engine or Drivetrain Component >

Safety

Safety Tips & Maintenance >

Manuals

Manuals & Training >


Unit ENV-117
JOHN DEERE
IMPORTANT ENGINE INFORMATION
DEERE & COMPANY
This engine is certified to run on Diesel Fuel. This engine conforms to 2005
U.S. EPA and California regulations for large non-road compression-ignition engines.
Family No. 5JDXL06.8082 Displacement 4.5 L
Engine Model 4045TF275B,C
Power: 82 kW @2400 rpm, 86 kW @2500 rpm
FEL 5.9 g/kW-hr NOx + NMHC
EU No: e11*97/68FA*00/000XX*0124*00 Europe Family No. 5JDXL06.8041
R521139
ISO9001 Registered
For Engine Service and Parts Call 1-800-JD-ENGINE

Unit ENV-122

PRODUCT SPECIFICATIONS FOR 3054C

POWER RATING

Maximum Power	97 kW
Maximum Torque	500 Nm @ 1400 rpm
Rated Speed	2200-2400 rpm
Minimum Power	52 kW

EMISSION STANDARDS

Emissions	U.S. EPA Tier 2 Equivalent, EU Stage II Equivalent

GENERAL

Engine Configuration	Inline 4, 4-Stroke-Cycle Diesel
Bore	105 mm
Stroke	127 mm
Displacement	4.4 l
Compression Ratio	16.2:1
Aspiration	Naturally Aspirated (NA), Turbocharged (T) or Turbocharged Aftercooled (TA)
Combustion System	Direct Injection
Rotation from Flywheel End	Counterclockwise
Aftertreatment	-

ENGINE DIMENSIONS - APPROXIMATE

Length	663 mm

Length	[illegible]
Width	620 mm
Height	810 mm
Weight - Net Dry - Basic Operating Engine Without Optional Attachments	306 kg

3054C STANDARD EQUIPMENT

AIR INLET SYSTEM

Inlet manifold with choice of inlets.

CONTROL SYSTEM

Alternator

Starter motor

Control Panel

Glow plug starting aid

COOLING SYSTEM

Top tank temperature 108° C (226° F) as standard to minimize cooling pack size

50:50 water glycol mix

FLYWHEELS AND FLYWHEEL HOUSING

SAE No. 3 flywheel housing

Flywheel and starter rings

FUEL SYSTEM

Fuel filter positions

LUBE SYSTEM

Lubricating oil filters and breathers

Oil filter positions

Lube oil sump

POWER TAKE OFF

SAE B Power Take Off (PTO)

GENERAL

Timing case and gear-driven auxiliaries

Belt-driven auxiliaries

Engine mountings

Gauges

Displays

Power and torque curve tailoring

Paint: Caterpillar yellow, with optional colors available at request

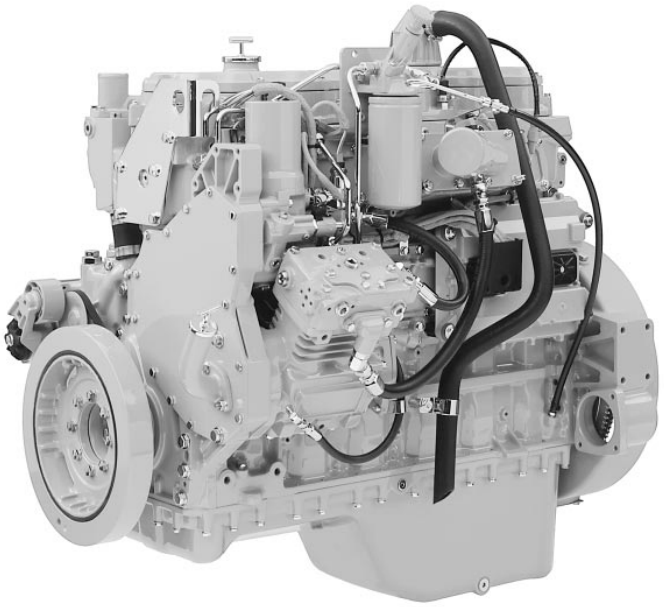
Unit ENV-123

CATERPILLAR®

Diesel Truck Engine

3126B 175-330 hp

420-860 lb-ft @ 1440 rpm Peak Torque



Shown with Optional Equipment

CATERPILLAR® ENGINE SPECIFICATIONS

6-Cylinder, 4-Stroke-Cycle Diesel
Bore — in (mm) 4.33 (110)
Stroke — in (mm) 5.0 (127)
Displacement — cu in (L) 439 (7.2)
Aspiration . . . . . ATAAC[1]
Compression Ratio
175-300 hp 16:1
Rotation (from flywheel end) . . Counterclockwise
Cooling System[2] — gal (L) 3.5 (13.2)
Lube Oil System (refill) — gal (L) . . . . 4.75 (18.0)[3]
Weight, Net Dry (approx) — lb (kg)
Including Flywheel. 1295 (588)

[1] Air-to-Air AfterCooling

[2] Engine Only. Capacity will vary with radiator size and use of cab heater.

[3] Optional 28L (7.5 gal) oil pan also available in some chassis.

STANDARD EQUIPMENT

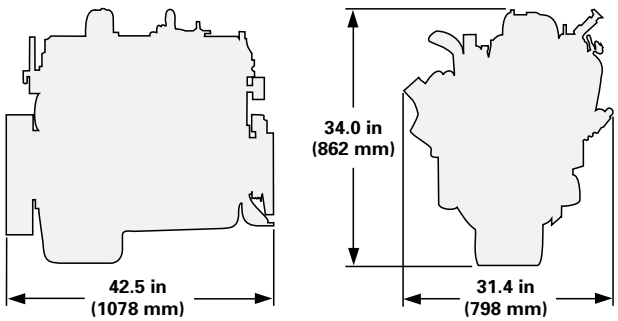
Air inlet manifold heater
Cooling: belt-driven jacket water pump, oil cooler
Crankcase breather
Electronic Control Module (ECM)
Electronic Data Link, SAE J1922, J1939, ATA J1587
HEUI Fuel System (Hydraulically actuated, Electronically controlled Unit Injector)
Flywheel and SAE No. 1 or SAE No. 2 housing
Fuel: spin-on secondary filter, transfer pump, hand priming pump
Governor: full-range, electronically controlled
Lifting eyes
Lubrication: gear-driven pump, front or rear sump, full flow spin-on filter, left-hand side oil level gauge (dipstick)
Turbocharger
Vibration damper

CATERPILLAR FACILITIES ISO 9001 CERTIFIED

ACCESSORY EQUIPMENT

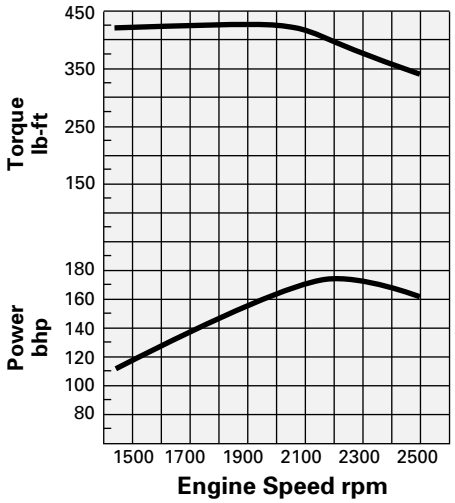
Air compressor: gear driven, 0.37 m^3/min (13.2 cfm) or 0.46 m^3/min(16.5 cfm)
Air conditioner compressor mounting
Air inlet elbow
Auxiliary brake compatible (exhaust)
Ether starting aid/adaptation
Fan drive mounting bracket
Fan drive
Front engine support
Front PTO adapter
Jacket water heater
Rear power take-off
Starting motor: 12 V or 24 V
Turbocharger compressor outlet elbow
Hydraulic pump drive, SAE A

DIMENSIONS

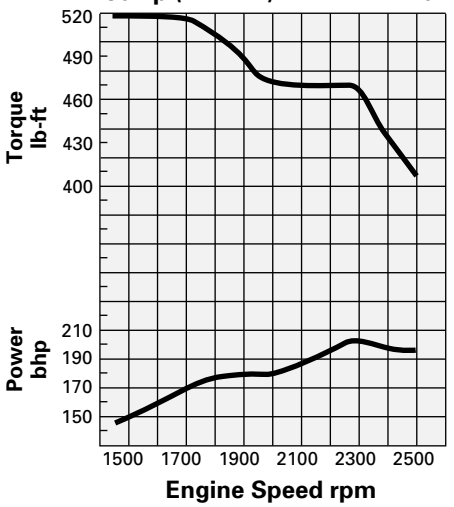


PERFORMANCE CURVES

175 hp (131 kW) DM3276



190 hp (142 kW) DM4201



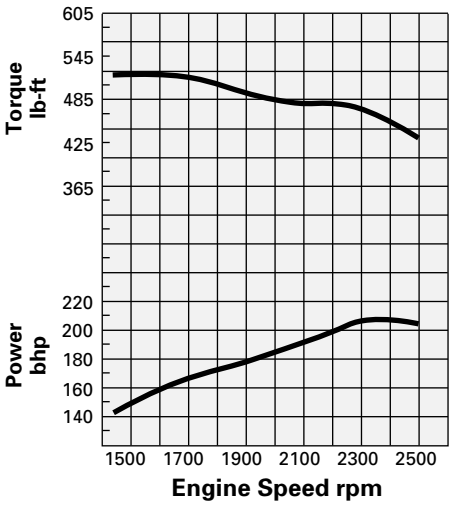
PERFORMANCE DATA

Max hp (kW)	175 (131)
Advertised hp (kW)	175 (131)
Operating Range (rpm)	1440-2500 (1060)
Maximum Engine rpm	2640
Governed Speed rpm	2500
Peak Torque — lb-ft (N•m)	420 (569)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	25
Altitude Capability — ft (m)	10 000 (3050)

Max hp (kW)	207 (154)
Advertised hp (kW)	190 (142)
Operating Range (rpm)	1440-2500 (1060)
Maximum Engine rpm	2640
Governed Speed rpm	2500
Peak Torque — lb-ft (N•m)	520 (705)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	27
Altitude Capability — ft (m)	10 000 (3050)

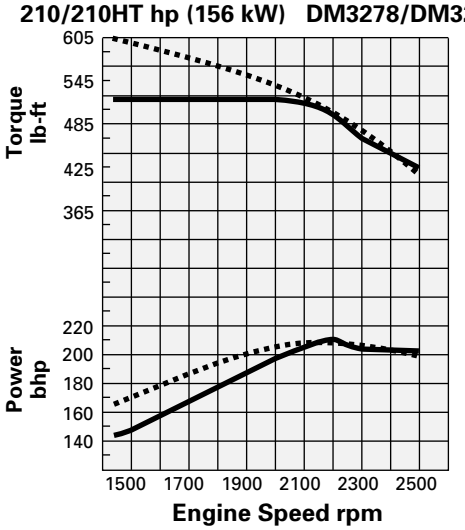
PERFORMANCE CURVES

210 AT* (156 kW) DM4202



* Approved for use with the AT 545 Transmission

210/210HT hp (156 kW) DM3278/DM3279



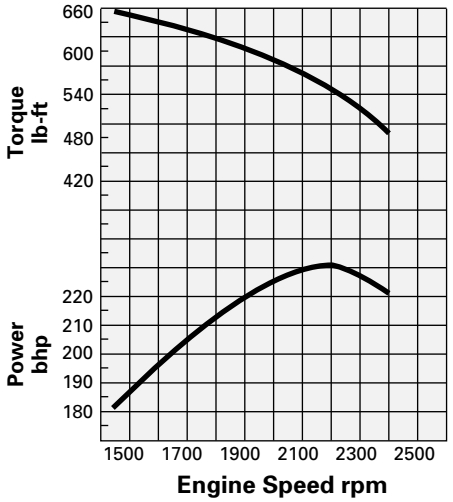
PERFORMANCE DATA

Max hp (kW)	216 (161)
Advertised hp (kW)	210 (156)
Operating Range (rpm)	1440-2500 (1060)
Maximum Engine rpm	2640
Governed Speed rpm	2500
Peak Torque — lb-ft (N•m)	520 (705)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	21
Altitude Capability — ft (m)	10 000 (3050)

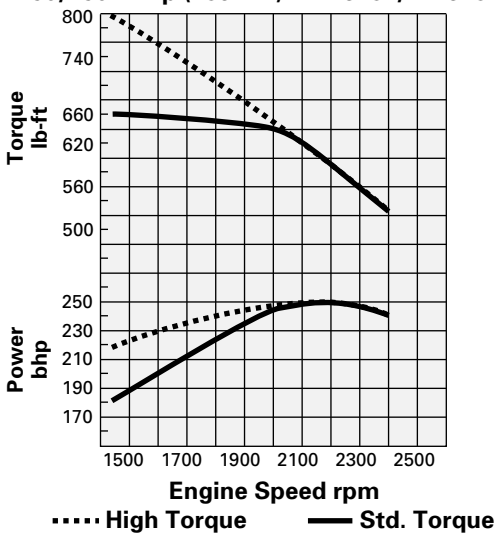
Max hp (kW)	210 (156)
Advertised hp (kW)	210 (156)
Operating Range (rpm)	1440-2500 (1060)
Maximum Engine rpm	2640
Governed Speed rpm	2500
Peak Torque — lb-ft (N•m)	520 (705)/605 (820)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	23/45
Altitude Capability — ft (m)	10 000 (3050)

PERFORMANCE CURVES

230 hp (172 kW) DM3280



250/250HT hp (186 kW) DM3281/DM3282



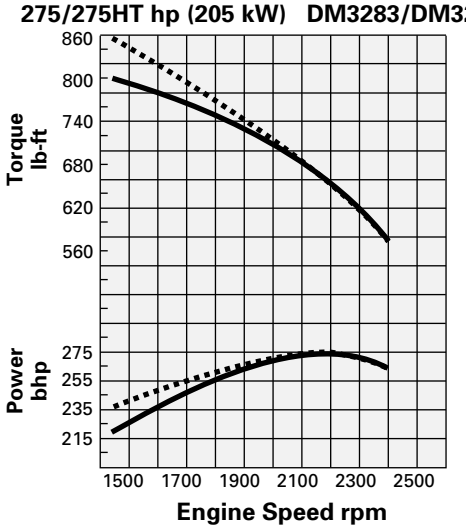
PERFORMANCE DATA

Max hp (kW)	230 (172)
Advertised hp (kW)	230 (172)
Operating Range (rpm)	1440-2400 (960)
Maximum Engine rpm	2640
Governed Speed rpm	2400
Peak Torque — lb-ft (N•m)	660 (895)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	37
Altitude Capability — ft (m)	10 000 (3050)

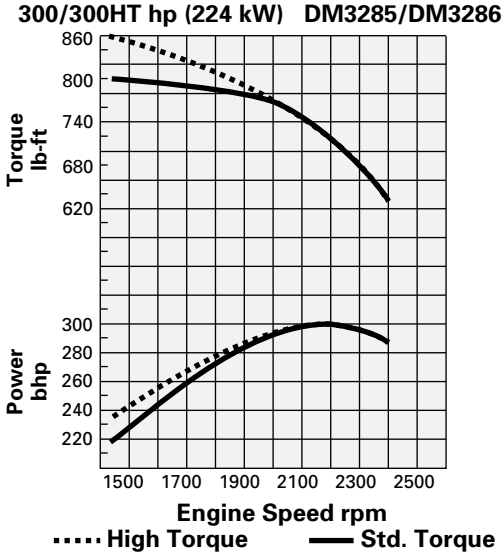
Max hp (kW)	250 (186)
Advertised hp (kW)	250 (186)
Operating Range (rpm)	1440-2400 (960)
Maximum Engine rpm	2640
Governed Speed rpm	2400
Peak Torque — lb-ft (N•m)	660 (895)/800 (1085)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	26/52
Altitude Capability — ft (m)	10 000 (3050)

PERFORMANCE CURVES

275/275HT hp (205 kW) DM3283/DM3284



300/300HT hp (224 kW) DM3285/DM3286

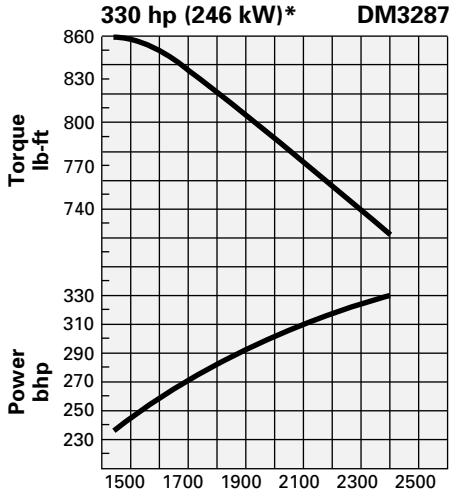


PERFORMANCE DATA

Max hp (kW)	275 (205)
Advertised hp (kW)	275 (205)
Operating Range (rpm)	1440-2400 (960)
Maximum Engine rpm	2640
Governed Speed rpm	2400
Peak Torque — lb-ft (N•m)	800 (1085)/860 (1166)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	39/49
Altitude Capability — ft (m)	10 000 (3050)

Max hp (kW)	300 (224)
Advertised hp (kW)	300 (224)
Operating Range (rpm)	1440-2400 (960)
Maximum Engine rpm	2640
Governed Speed rpm	2400
Peak Torque — lb-ft (N•m)	800 (1085)/860 (1166)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	27/37
Altitude Capability — ft (m)	10 000 (3050)

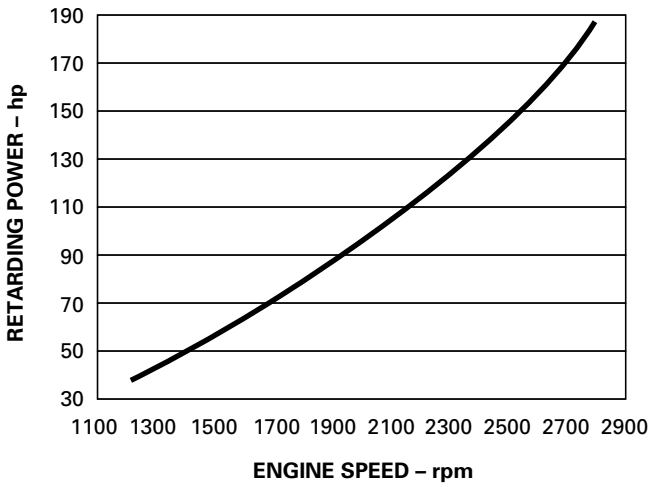
PERFORMANCE CURVES



* For RV and Fire Truck only

PERFORMANCE DATA

Max hp (kW)	330 (246)
Advertised hp (kW)	330 (246)
Operating Range (rpm)	1440-2400 (960)
Maximum Engine rpm	2640
Governed Speed rpm	2400
Peak Torque — lb-ft (N•m)	860 (1166)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	19
Altitude Capability — ft (m)	10 000 (3050)



Exhaust Brake Performance

Three operational modes can be programmed: Coast, Latch, or Manual

ELECTRONIC FEATURES

Electronic self-diagnostics
Compatible with Caterpillar electronic technician (ET), electronic control analyzer programmer (ECAP), and MPSI Pro-Link service tools
Cold weather startup strategy and electronic idle control functions
ECM storage of operational, maintenance, and diagnostic data
J1939 compatible — ABS, Allison WT
Customer selectable, re-programmable operational parameters:
- Engine Monitoring System — off, warning, derate, or shutdown
- Cruise control with exclusive SoftCruise
- Vehicle speed [mph (km/h)] limiting and protection
- Idle shutdown timer & override
- 2-speed fast idle
- Maintenance monitor [miles (km) or hours]
- Cooling fan control
- Customer password protection
- Exhaust brake operational modes
- Theft deterrent
- Adjustable low idle rpm
- OEM parameter lockout

Programmable Power Take-Off (PTO) functions:
- Adjustable speed control [mph (km/h)] of vehicle while in PTO mode
- Adjustable maximum engine rpm speed
- Adjustable minimum engine rpm speed
- Limit engine torque to driven equipment
- Adjustable ramp rate up or down between PTO set speed(s)
- Adjustable rpm "bump" intervals
- Selectable PTO configuration for "in cab" or station of remote operation

GEARING CONSIDERATIONS

The 3126B is designed and built to take full advantage of a "gear fast, run slow" strategy. Unlike mechanically governed engines of the past, the fully electronic 3126B need not be gear-bound to limit maximum vehicle speed — this should be done using Vehicle Speed Limiting (VSL) and Protection.

For the best balance of performance and fuel economy, spec axle ratios and tire sizes to obtain: **2000 rpm @ 60 mph** (97 km/h) subject to the following: Maximum cruise speed of **65 mph** (105 km/h) **or below.** Maximum recommended engine speed at cruise — 2400 rpm. Minimum recommended engine speed at a cruise speed of 55 mph (89 km/hr) — **1800 rpm**

Depending on the application, the absolute minimum startability in first gear should be 6 percent, preferably in excess of 10 percent. On/off highway severe service applications will require considerably greater startability. Minimum gradeability should be 1.5 percent (1.8 percent recommended) at peak torque in top gear, and 0.5 percent at cruise rpm.

To further optimize the matching of your truck to the performance characteristics of the engine, a computerized spec'ing tool called Caterpillar Truck Engine Pro (TEP) is offered by your Caterpillar dealer. It calculates the effects of various driveline variables on engine operation such as transmissions, axles, and tires. This lets you see the results before you finalize your truck specs.

RATING DEFINITIONS AND CONDITIONS

Performance is based on SAE J1349 standard conditions of 29.61 in. Hg (100 kPa) and 77° F (25° C).

The curves shown are for a standard engine without fan, but equipped with air compressor and fuel, lubricating oil, and jacket water pumps.

Materials and specifications are subject to change without notice.

The International System of Units (SI) is used in this publication.

LEHT9055
Supersedes LEHT8389

Printed in U.S.A.

Unit OP-2

400 Series

403C-15

Industrial Open Power Unit

24.2 kW/32.5 bhp

The 400 Series compact engine family has been developed alongside customers to fulfil their needs in the construction, materials handling, agricultural/turf, genset and compressor markets, becoming the latest class-leading diesel range from Perkins.

Built to the most demanding standards, the 400 Series engines meet all the requirements of EC Stage 2 and USA EPA Tier 2 off-highway emissions legislation and bring significant improvements over their predecessors.

Perkins IOPUs offer the advantages of an industrial engine, with the convenience of a cost effective cooling and filtration solution. This minimises machine development time and costs, and enables applications to be powered with ease.

The 403C-15 IOPU is a powerful but quiet 1.5 litre packaged unit. It delivers impressive performance with low operating costs in a small, efficient package ideal for a range of industrial applications.

Outstanding performance

- 25.1 kW (33.7 bhp) performance from a compact complete radiator cooled unit
- Torque backup has risen to over 20%, providing excellent responsiveness when load is increased
- Durability and reliability have been enhanced through product design and process improvements
- A new governor, valve seat inserts and new compliance testing deliver reliability and 6000 hours durability
- Standard two year warranty demonstrates our confidence in the engine

Clean and quiet

- Full-load smoke emissions levels are invisible to the naked eye, measuring less than 2 Bosch
- Noise levels have been kept to a minimum. Subjective harshness has also been controlled, making the engine sound even quieter

Compact fit

- The open power unit benefits from a compact engine design combined with a newly designed more compact radiator package
- The air filter position has also been lowered to further improve compactness

Low operating costs

- Oil and filter changes are now set at 500 hours as standard
- Engine durability and reliability, the warranty offering, and ease of installation combine to drive down the cost of ownership

Product support

- Total worldwide service is provided through 4000 service points around the world

Performance Data	Net Intermittent (ISO/TR 14396)	Speed (rev/min)
Power Output (kW)	24.2	3000
Power Output (bhp)	32.5	3000
Peak Torque (Nm)	128.0	1800
Peak Torque (lbf ft)	94.4	1800

Power output for a run-in engine after 60 hours.

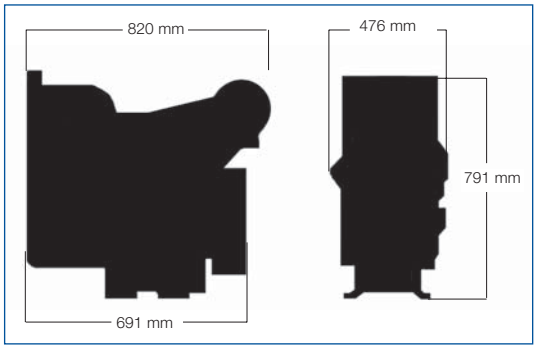
Photographs are for illustrative purposes only and may not reflect final specification.

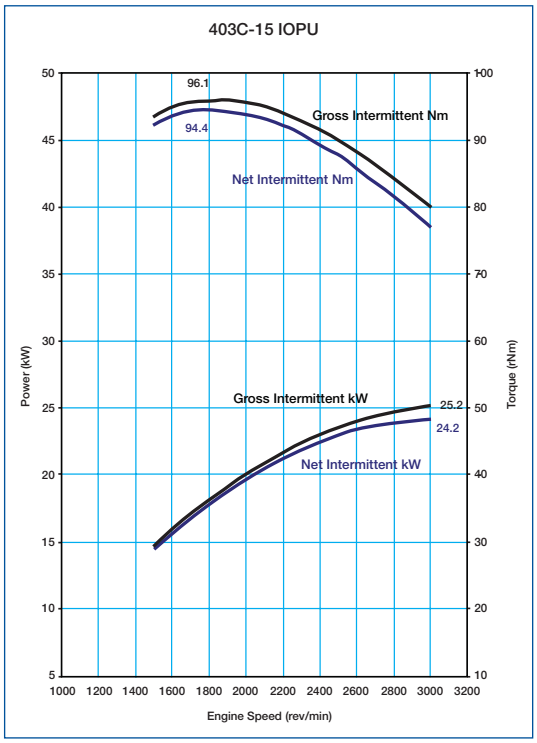
400 Series

403C-15

Engine Specification

- Cast iron engine block
- SAE Flywheel size 6½
- SAE 5 flywheel housing
- Fuel injection pump
- Fuel filter
- Glow plug starting aid
- Lub oil sump
- Spin on lub oil filter
- Inlet manifold
- Cast iron exhaust manifold – side outlet
- Coolant pump belt driven
- Mounted radiator and fan
- Mounted air cleaner
- Starter motor 12 volt
- Alternator 12 volt 65 amp
- ESOS
- Lub oil pressure switch
- Coolant temperature switch





Lower speed ratings cannot be read from this curve.

General Data

Number of cylinders	3 in-line
Bore and stroke	84 x 90 mm
Displacement	1.5 litres
Aspiration	Naturally aspirated
Cycle	4 stroke
Combustion system	Indirect injection
Compression ratio	22.5:1
Rotation	Anti-clockwise viewed on flywheel
Cooling system	Pressurised water
Total lubrication capacity	6 litres
Total coolant capacity	5.98 litres
Dimensions	Length 820 mm
	Width 476 mm
	Height 791 mm
Dry weight	175 kg

Final weight and dimensions will depend on completed specification.

Option Groups

A selection of optional items is available to enable the customer to prepare a specification precisely matched to their needs.

Perkins®

Perkins Engines Company Limited
Peterborough PE1 5NA
United Kingdom
Telephone +44 (0)1733 583000
Fax +44 (0)1733 582240
www.perkins.com

Units OP-4 and ENV-120

CATERPILLAR®

Industrial Engine C6.6 ACERT®

88-186 bkW/120-250 bhp 2200 rpm

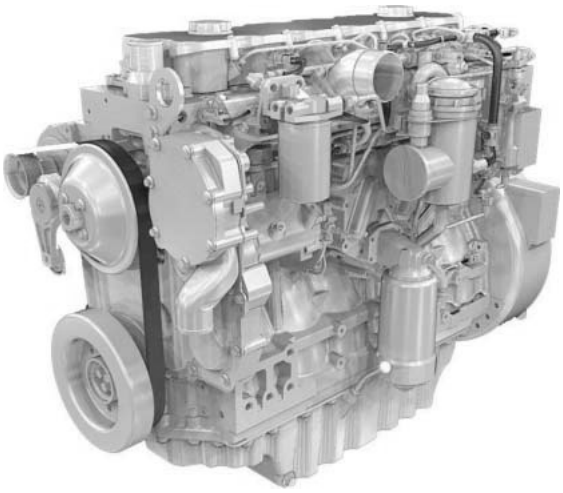


Image shown may not reflect actual engine

CATERPILLAR® ENGINE SPECIFICATIONS

I-6, 4-Stroke-Cycle Diesel	
Bore (mm, in)	105 mm, 4.13 in.
Stroke (mm, in)	127 mm, 5.00 in.
Displacement	6.6 liters, 402.8 cu. in.
Aspiration	Turbocharged/ATAAC
Rotation (from flywheel end)	Counterclockwise
Cooling System	Liquid
Weight, Net Dry (approximate kg, lb)	525 kg, 1157 lb.

FEATURES

Emissions

Meets Tier 3, Stage IIIA emission requirements. Tier 3 refers to EPA (U.S.) standards. Stage IIIA refers to European standards.

Worldwide Supplier Capability

Caterpillar
– Casts engine blocks, heads, and cylinder liners
– Machines critical components
– Assembles complete engine
Ownership of these manufacturing processes enables Caterpillar to produce high quality, dependable product.
Factory-designed systems built at Caterpillar ISO 9001:2000 certified facilities.

Testing

Prototype testing on every model:
– proves computer design
– verifies system torsional stability
– tests functionality on every model
Every Caterpillar engine is dynamometer tested under full load to ensure proper engine performance.

Full Range of Attachments

Wide range of bolt-on system expansion attachments, factory designed and tested

Unmatched Product Support Offered Through Worldwide Caterpillar Dealer Network

More than 1,500 dealer outlets
Caterpillar factory-trained dealer technicians service every aspect of your industrial engine
99.7% of parts orders filled within 24 hours worldwide
Caterpillar parts and labor warranty
Preventive maintenance agreements available for repair before failure options
Scheduled Oil Sampling program matches your oil sample against Caterpillar set standards to determine:
– internal engine component condition
– presence of unwanted fluids
– presence of combustion by-products

Web Site

For all your industrial power requirements, visit www.cat-industrial.com.

CATERPILLAR®

Industrial Engine

C6.6 ACERT®

88-186 bkW/ 120-250 bhp

STANDARD ENGINE EQUIPMENT

Air Inlet System
- Air to air aftercooled (ATAAC)
- Turbocharged

Control System
- Electronic governing, PTO speed control
- Programmable ratings
- Cold mode start strategy
- Automatic altitude compensation
- Power compensation for fuel temperature
- Programmable low and high idle and total engine limit
- Electronic diagnostics and fault logging
- Engine monitoring system
- J1939 Broadcast (diagnostic and engine status)
- ADEM™ A4

Cooling System
- Thermostats and housing, vertical outlet
- Jacket water pump, centrifugal
- Water pump, inlet

Exhaust System
- Exhaust manifold, dry
- Optional exhaust outlet

Flywheels and Flywheel Housing
- SAE No. 1 Flywheel housing

Fuel System
- Caterpillar Single Fluid Injection
- Fuel filter, secondary (2 micron high performance)
- Fuel transfer pump
- Fuel priming pump
- ACERT® Technology

Lube System
- Crankcase breather
- Oil cooler
- Oil filler
- Oil filter
- Oil pan front sump
- Oil dipstick
- Oil pump (gear driven)

General
- Paint, Caterpillar Yellow
- Vibration damper
- Lifting eyes

DIMENSIONS

Length	mm (in)	929 (36.6)
Width	mm (in)	620 (24.4)
Height*	mm (in)	1115 (43.9)

*From Crank Center Line

INDUSTRIAL RATINGS AND CONDITIONS

IND - A (Continuous) Continuous heavy duty service where the engine is operated at maximum power and speed up to 100% of the time without interruption or load cycling.

IND - B For service where power and/or speed are cyclic (time at full load not to exceed 80%).

IND - C (Intermittent) Intermittent service where maximum power and/or speed are cyclic (time at full load not to exceed 50%).

IND - D For service where maximum power is required for periodic overloads.

Engine Performance Engine performance is corrected to inlet air standard conditions of 99 kPa (29.31 in Hg) dry barometer and 25° C (77° F) temperature. These values correspond to the standard atmospheric pressure and temperature as shown in SAE J1995.

Performance measured using a standard fuel with fuel gravity of 35 degrees API having a lower heating value of 42 780 kJ/kg (18,390 Btu/lb) when used at 29° C (84.2° F) where the density is 838.9 g/liter (7.001 lb/U.S. gal).

The corrected performance values shown for Caterpillar engines will approximate the values obtained when the observed performance data is corrected to SAE J1995, ISO 3046-2 and 8665 and 2288 and 9249 and 1585, EEC 80/1269 and DIN 70020 standard reference conditions.

LEHH4593-01 (3-05)

Units OP-7 and OP-8

PRODUCT SPECIFICATIONS FOR C7

POWER RATING

Maximum Power	300 HP
Rated Speed	1800-2200 rpm
Minimum Power	225 HP

EMISSION STANDARDS

Emissions	China Stage II, U.S. EPA Tier 3 Equivalent, EU Stage IIIA Equivalent

GENERAL

Engine Configuration	Inline 6, 4-Stroke-Cycle Diesel
Bore	4.3 in
Stroke	5 in
Displacement	442 in^3
Compression Ratio	16.2:1
Aspiration	Turbocharged Aftercooled (TA)
Combustion System	Direct Injection
Rotation from Flywheel End	Counterclockwise
Aftertreatment	-

ENGINE DIMENSIONS - APPROXIMATE

Length	41.5 in
Width	29.8 in
Height	40.6 in
Weight - Net Dry - Basic Operating Engine Without Optional Attachments	1296 lb

C7 STANDARD EQUIPMENT

AIR INLET SYSTEM

- Turbocharged

- Air-to-Air Aftercooled

CONTROL SYSTEM

- Electronic governing, PTO speed control
- Programmable ratings
- Automatic altitude compensation
- Power compensation for fuel temperature
- Programmable low and high idle and total engine limit
- Electronic diagnostics and fault logging
- Engine monitoring system SAE J1939 broadcast and control
- ADEM™ A4 Electronic Control Unit (ECU)

COOLING SYSTEM

- Thermostats and housing, vertical outlet
- Jacket water pump, centrifugal
- Water pump, inlet

EXHAUST SYSTEM

- Exhaust manifold, dry
- Optional exhaust outlet

FLYWHEELS AND FLYWHEEL HOUSING

- SAE No. 1 flywheel housing

FUEL SYSTEM

- HEUI™ injection
- Fuel filter, secondary (2 micron)
- ACERT™ Technology
- Fuel transfer pump
- Fuel priming pump

LUBE SYSTEM

- Crankcase breather

- Oil cooler
- Oil filler
- Lube oil filter
- Front sump oil pan
- Oil dipstick
- Gear driven oil pump

GENERAL

- Vibration damper
- Lifting eyes
- Cold start capability to -20° C (-4° F)
- Paint: Caterpillar yellow, with optional colors available at request

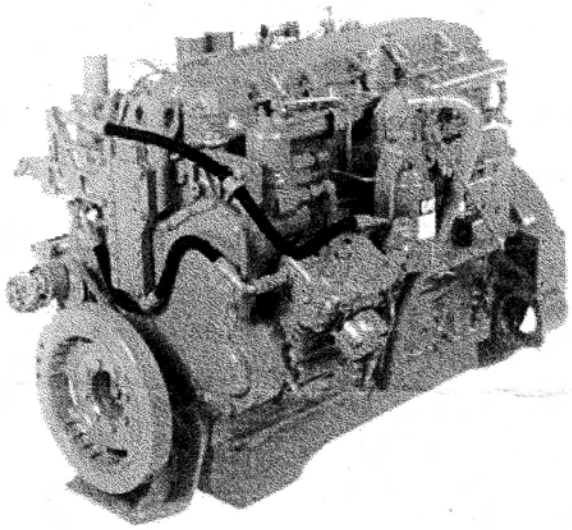
Unit EMP-1

CATERPILLAR®

Diesel Truck Engine

3126

175 hp, 210 hp @ 2400 rpm
190 hp, 210 hp, 230 hp @ 2200 rpm
250 hp, 275 hp, 300 hp @ 2200 rpm



Shown with Optional Equipment

SPECIFICATIONS

6 Cylinder, 4-Stroke-Cycle Diesel
Bore – in (mm) 4.33 (110)
Stroke – in (mm) 5.0 (127)
Displacement – cu in (L) 439 (7.2)
Aspiration ..... ATAAC**
Compression Ratio
175-300 hp 16:1
AMA Rating for USA Tax Purposes – hp 40.94
Rotation (from flywheel end) ..... Counterclockwise
Capacity for Liquids – U.S. gal (L)
Cooling System* 3.5 (13.2)
Lube Oil System (refill) 5.25 (20.0)
Weight, Net Dry (approx) – lb (kg)
Including Flywheel 1,250 (568)

* Engine Only. Capacity will vary with radiator size and use of cab heater
** Air-to-Air AfterCooling

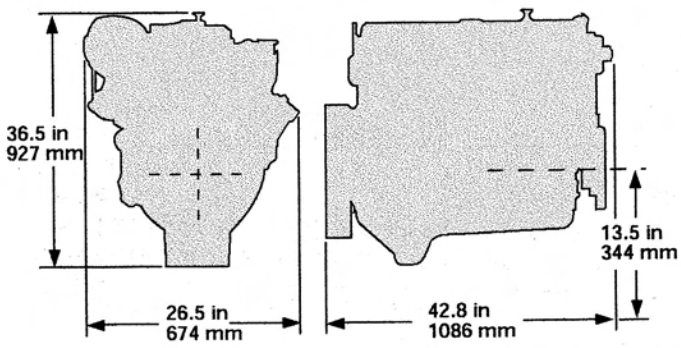
STANDARD EQUIPMENT

Air inlet manifold heater
Cooling, belt driven jacket water pump, oil cooler
Crankcase breather
Dipstick (L.H. side)
Electronic Control Module (ECM)
Electronic Data Link, ATA/SAE
Flywheel and SAE No. 2 housing
Fuel, spin-on filter, transfer pump
Governor – full-range electronically controlled
Hydraulic Electronic Unit Injection (HEUI) system
Lifting eyes
Lubricating, spin-on filter, pump, front or rear sump pan
Turbocharger
Vibration damper

ACCESSORY EQUIPMENT

Air compressor, gear driven, 13.2 cfm (0.37 m³/min), or (16.5 cfm [.46m³/min]) with gear driven pump drive
Air inlet elbow
Alternator, 12 Volt, 115 Ampere; 21SI and drive
Block heater, 1000 Ampere
Coolant, conditioners
Exhaust adapters
Fan drives
Front PTO adapter
Front support
Hydraulic pump drive, SAE A or SAE B
Turbocharger compressor outlet elbow
Starting motor, 12 volt

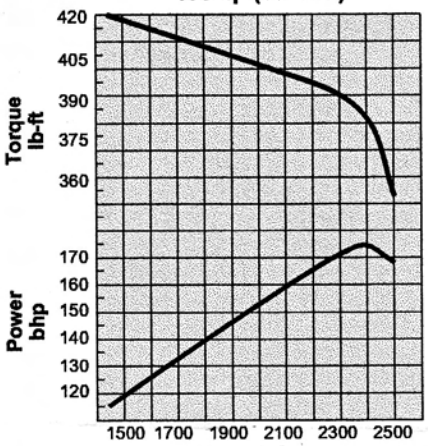
DIMENSIONS



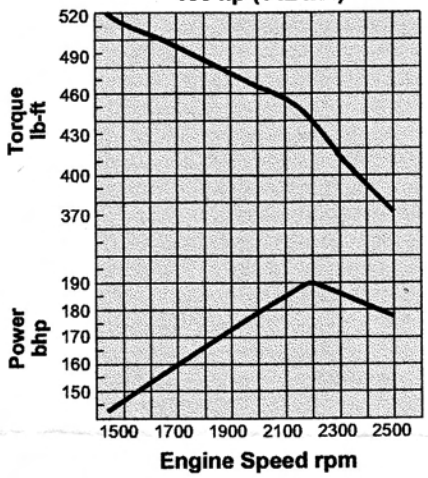
CATERPILLAR ENGINE FACILITIES ISO 9001 CERTIFIED

PERFORMANCE CURVES

175 hp (131 kW)



190 hp (142 kW)



PERFORMANCE DATA

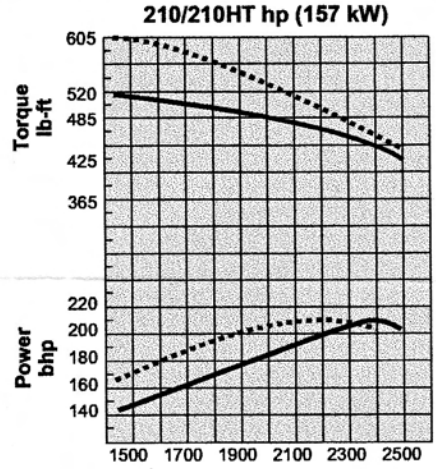
* Selection of Rear Axle Ratio should be based on Governed Speed rpm.

Rated hp (kW)	175 (131)
Rated rpm	2400
Governor Speed rpm*	2500
Low Idle rpm	700
Operating Range (rpm)	1060
Altitude Capability – ft (m)	10,000 (3050)
Peak Torque – lb-ft (N•m)	420 (569)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	19

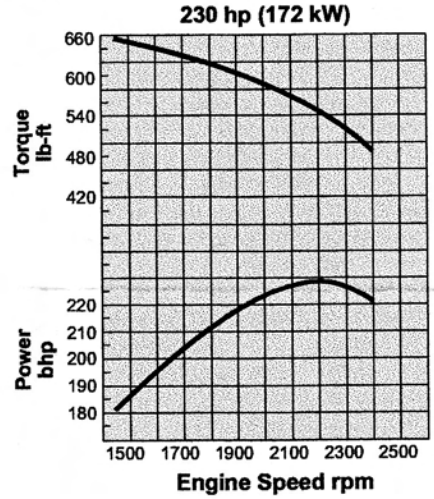
Rated hp (kW)	190 (142)
Rated rpm	2200
Governor Speed rpm*	2500
Low Idle rpm	700
Operating Range (rpm)	1060
Altitude Capability – ft (m)	10,000 (3050)
Peak Torque – lb-ft (N•m)	520 (705)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	40

PERFORMANCE CURVES

210/210HT hp (157 kW)



230 hp (172 kW)



PERFORMANCE DATA

* Selection of Rear Axle Ratio should be based on Governed Speed rpm.

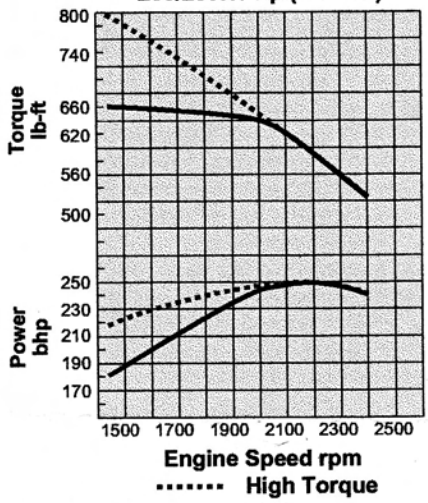
Rated hp (kW)	210 (157)
Rated rpm	2400/2200
Governor Speed rpm*	2500/2400
Low Idle rpm	700
Operating Range (rpm)	1060/960
Altitude Capability – ft (m)	10,000 (3050)
Peak Torque – lb-ft (N•m)	520 (705)/605 (820)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	23/37

Rated hp (kW)	230 (172)
Rated rpm	2200
Governor Speed rpm*	2400
Low Idle rpm	700
Operating Range (rpm)	960
Altitude Capability – ft (m)	10,000 (3050)
Peak Torque – lb-ft (N•m)	660 (898)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	36

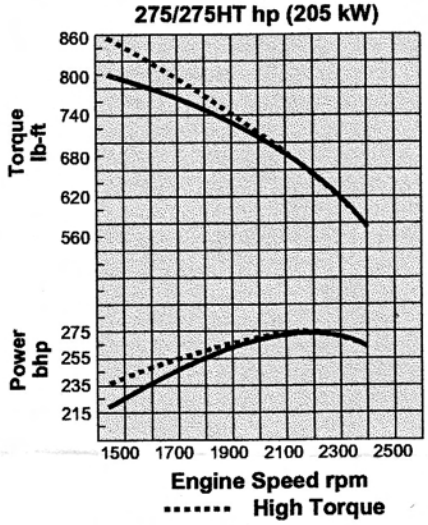
CATERPILLAR®

PERFORMANCE CURVES

250/250HT hp (187 kW)



275/275HT hp (205 kW)



PERFORMANCE DATA

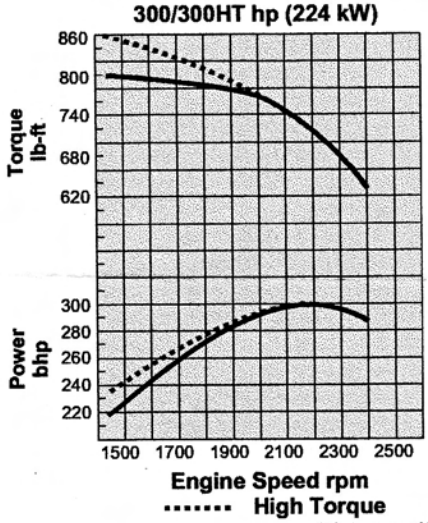
Rated hp (kW)	250 (187)
Rated rpm	2200
Governor Speed rpm*	2400
Low Idle rpm	700
Operating Range (rpm)	960
Altitude Capability – ft (m)	10,000 (3050)
Peak Torque – lb-ft (N•m)	660 (898)/800 (1088)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	26/52

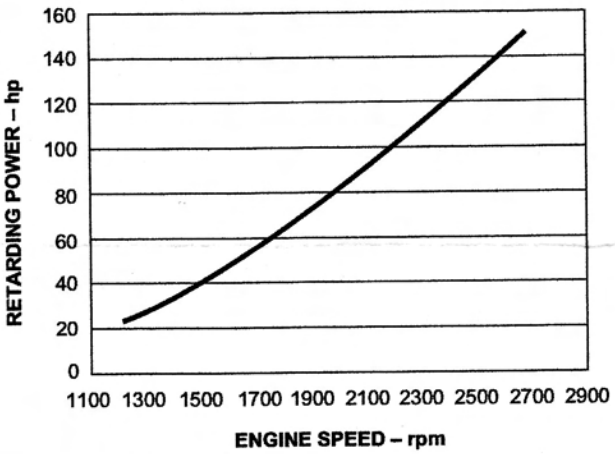
* Selection of Rear Axle Ratio should be based on Governed Speed rpm.

Rated hp (kW)	275 (205)
Rated rpm	2200
Governor Speed rpm*	2400
Low Idle rpm	700
Operating Range (rpm)	960
Altitude Capability – ft (m)	10,000 (3050)
Peak Torque – lb-ft (N•m)	800 (1088)/860 (1170)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	38/49

PERFORMANCE CURVES

300/300HT hp (224 kW)





PERFORMANCE DATA

* Selection of Rear Axle Ratio should be based on Governed Speed rpm.

Rated hp (kW)	300 (224)
Rated rpm	2200
Governor Speed rpm*	2400
Low Idle rpm	700
Operating Range (rpm)	960
Altitude Capability – ft (m)	10,000 (3050)
Peak Torque – lb-ft (N•m)	800 (1088)/860 (1170)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	27/36

Exhaust Brake Performance

Three operational modes can be programmed: Coast, Latch or Manual

ELECTRONIC FEATURES

Electronic self-diagnostics

Compatible with Caterpillar electronic technician, electronic control analyzer programmer and MPSI Pro-Link service tools

Cold weather startup strategy and electronic idle control functions

ECM storage of operational, maintenance and diagnostic data.

Customer selectable, re-programmable operational parameters:

- Engine Monitoring System
- Cruise control with exclusive SoftCruise
- Vehicle speed [mph (km/h)] limiting and protection
- Idle shutdown timer & override
- Maintenance monitor (miles (km's) or hours)
- Customer password protection
- Exhaust brake operational modes
- Adjustable low idle rpm

Programmable Power Take-Off (PTO) functions:

- Adjustable speed control [mph (km/h)] of vehicle while in PTO mode
- Adjustable maximum engine rpm speed
- Adjustable minimum engine rpm speed
- Limit engine torque to driven equipment
- Adjustable ramp rate up or down from PTO set speed
- Adjustable rpm "bump" rate
- Selectable PTO configuration for "in cab" or station of remote operation

GEARING CONSIDERATIONS

Selection of a rear axle ratio should be based on the governed rpm speed of the engine. For the 175, 190, 210 hp ratings the governed speed is **2500 rpm**. For all other ratings (210HT-300HT) the governed speed is **2400 rpm**.

For the best balance of performance and fuel economy, spec axle ratios and tire sizes to obtain: **2000 rpm @ 60 mph** (96 km/h) subject to the following: Maximum cruise speed of **65 mph** (105 km/h) **or below.** Maximum recommended engine speed at cruise – 2400 rpm. Minimum recommended engine speed at a cruise speed of 55 mph (88 km/hr) **– 2000 rpm**

Depending on the application, the absolute minimum startability in first gear should be 6%, preferably in excess of 10%. On/off highway severe service applications will require considerably greater startability. Minimum gradeability should be 0.5% at cruise rpm.

To further optimize the matching of your truck to the performance characteristics of the engine, a computerized spec'ing tool called Truck Performance Analysis (TPA) is offered by your Caterpillar® dealer. It calculates the effects of various driveline variables on engine operation such as transmissions, axles, and tires. This lets you see the results before you finalize your truck specs.

RATING CONDITIONS

Performance is based on SAE J1349 standard conditions of 29.61 in. Hg (100 kPa) and 77°F (25°C).

Fuel consumption is based on fuel oil having an LHV of 18,390 Btu/lb (42 780 kJ/kg) and weighing 7.001 lb/U.S. gal (839 g/L).

The curves shown are for a standard engine without fan, but equipped with air compressor and fuel, lubricating oil, and jacket water pumps.

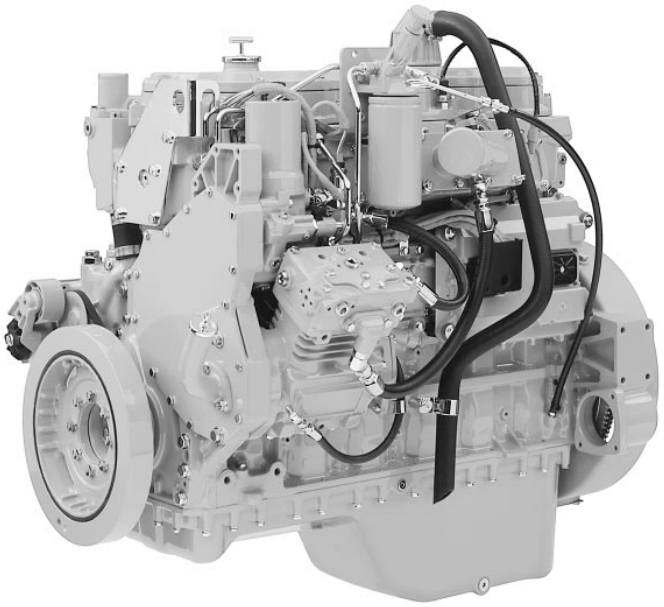
Unit EMP-2

CATERPILLAR®

Diesel Truck Engine

3126B 175-330 hp

420-860 lb-ft @ 1440 rpm Peak Torque



Shown with Optional Equipment

CATERPILLAR® ENGINE SPECIFICATIONS

6-Cylinder, 4-Stroke-Cycle Diesel
Bore — in (mm) 4.33 (110)
Stroke — in (mm) 5.0 (127)
Displacement — cu in (L) 439 (7.2)
Aspiration . . . . . ATAAC[1]
Compression Ratio
175-300 hp 16:1
Rotation (from flywheel end) . . Counterclockwise
Cooling System[2] — gal (L) 3.5 (13.2)
Lube Oil System (refill) — gal (L) . . . . 4.75 (18.0)[3]
Weight, Net Dry (approx) — lb (kg)
Including Flywheel. 1295 (588)

[1] Air-to-Air AfterCooling

[2] Engine Only. Capacity will vary with radiator size and use of cab heater.

[3] Optional 28L (7.5 gal) oil pan also available in some chassis.

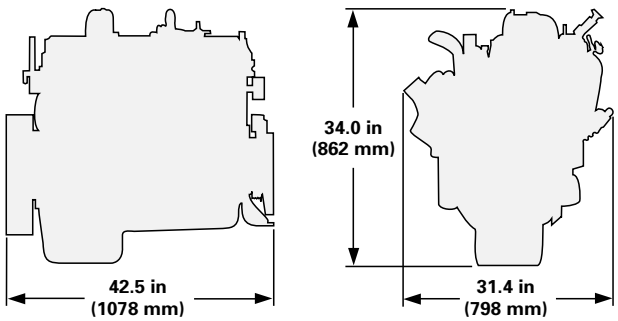
STANDARD EQUIPMENT

Air inlet manifold heater
Cooling: belt-driven jacket water pump, oil cooler
Crankcase breather
Electronic Control Module (ECM)
Electronic Data Link, SAE J1922, J1939, ATA J1587
HEUI Fuel System (Hydraulically actuated, Electronically controlled Unit Injector)
Flywheel and SAE No. 1 or SAE No. 2 housing
Fuel: spin-on secondary filter, transfer pump, hand priming pump
Governor: full-range, electronically controlled
Lifting eyes
Lubrication: gear-driven pump, front or rear sump, full flow spin-on filter, left-hand side oil level gauge (dipstick)
Turbocharger
Vibration damper

ACCESSORY EQUIPMENT

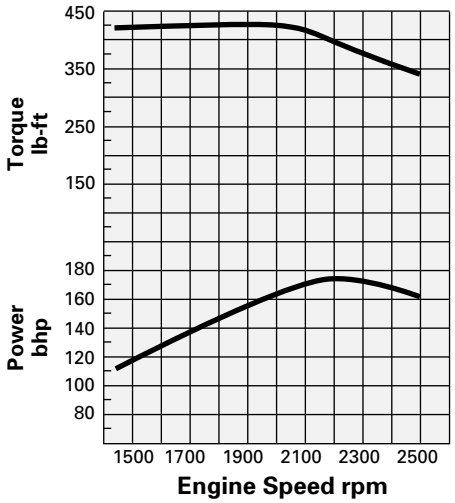
Air compressor: gear driven, 0.37 m^3/min (13.2 cfm) or 0.46 m^3/min(16.5 cfm)
Air conditioner compressor mounting
Air inlet elbow
Auxiliary brake compatible (exhaust)
Ether starting aid/adaptation
Fan drive mounting bracket
Fan drive
Front engine support
Front PTO adapter
Jacket water heater
Rear power take-off
Starting motor: 12 V or 24 V
Turbocharger compressor outlet elbow
Hydraulic pump drive, SAE A

DIMENSIONS

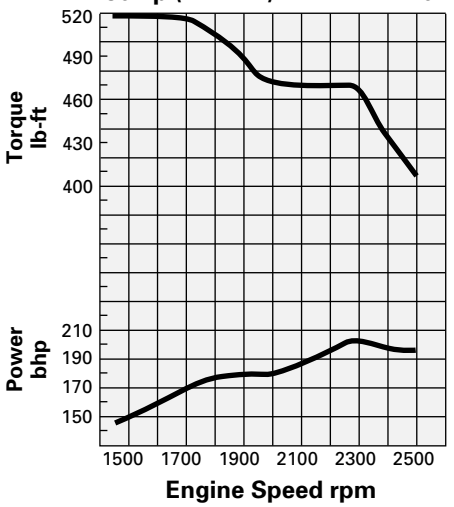


PERFORMANCE CURVES

175 hp (131 kW) DM3276



190 hp (142 kW) DM4201



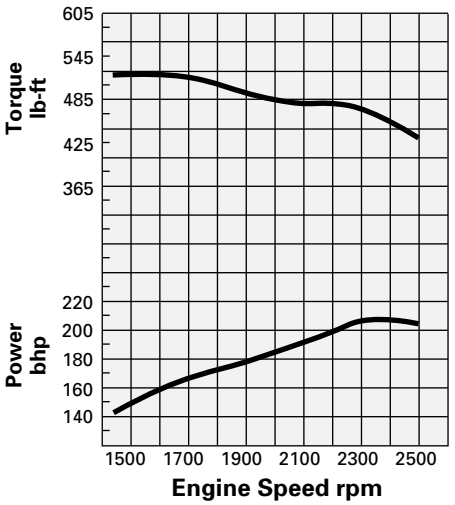
PERFORMANCE DATA

Max hp (kW)	175 (131)
Advertised hp (kW)	175 (131)
Operating Range (rpm)	1440-2500 (1060)
Maximum Engine rpm	2640
Governed Speed rpm	2500
Peak Torque — lb-ft (N•m)	420 (569)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	25
Altitude Capability — ft (m)	10 000 (3050)

Max hp (kW)	207 (154)
Advertised hp (kW)	190 (142)
Operating Range (rpm)	1440-2500 (1060)
Maximum Engine rpm	2640
Governed Speed rpm	2500
Peak Torque — lb-ft (N•m)	520 (705)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	27
Altitude Capability — ft (m)	10 000 (3050)

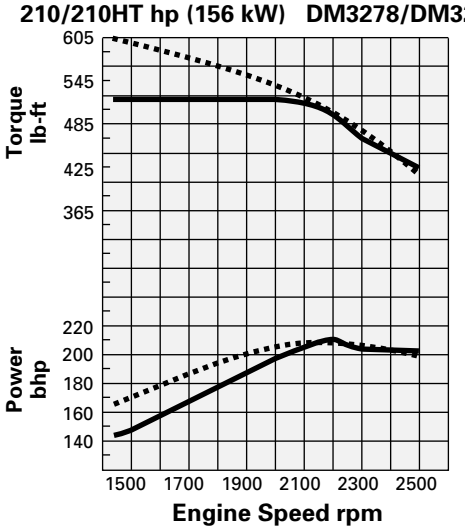
PERFORMANCE CURVES

210 AT* (156 kW) DM4202



* Approved for use with the AT 545 Transmission

210/210HT hp (156 kW) DM3278/DM3279



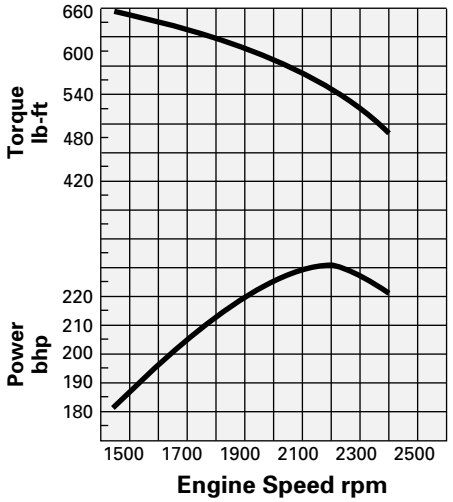
PERFORMANCE DATA

Max hp (kW)	216 (161)
Advertised hp (kW)	210 (156)
Operating Range (rpm)	1440-2500 (1060)
Maximum Engine rpm	2640
Governed Speed rpm	2500
Peak Torque — lb-ft (N•m)	520 (705)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	21
Altitude Capability — ft (m)	10 000 (3050)

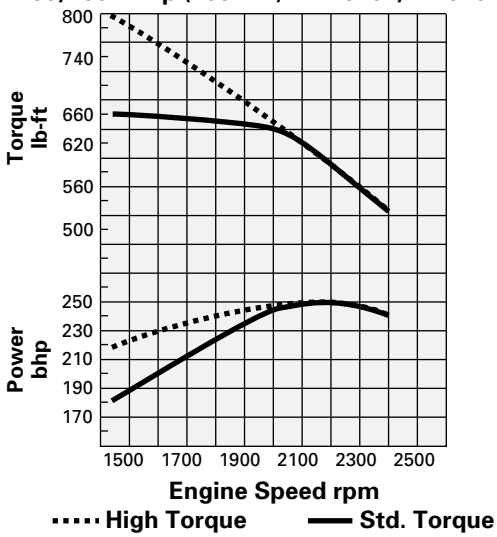
Max hp (kW)	210 (156)
Advertised hp (kW)	210 (156)
Operating Range (rpm)	1440-2500 (1060)
Maximum Engine rpm	2640
Governed Speed rpm	2500
Peak Torque — lb-ft (N•m)	520 (705)/605 (820)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	23/45
Altitude Capability — ft (m)	10 000 (3050)

PERFORMANCE CURVES

230 hp (172 kW) DM3280



250/250HT hp (186 kW) DM3281/DM3282



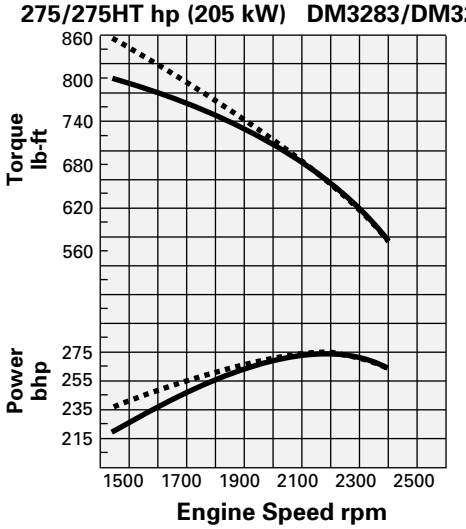
PERFORMANCE DATA

Max hp (kW)	230 (172)
Advertised hp (kW)	230 (172)
Operating Range (rpm)	1440-2400 (960)
Maximum Engine rpm	2640
Governed Speed rpm	2400
Peak Torque — lb-ft (N•m)	660 (895)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	37
Altitude Capability — ft (m)	10 000 (3050)

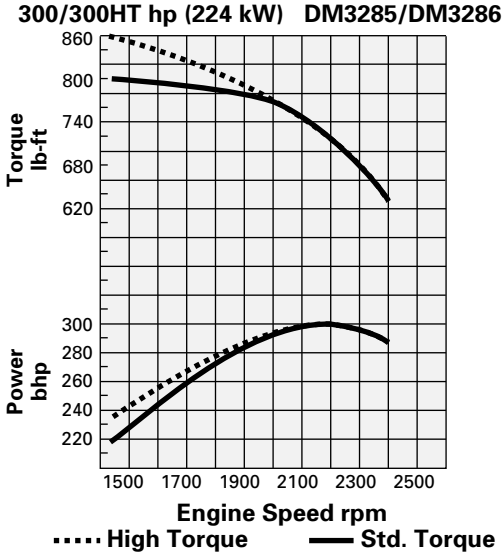
Max hp (kW)	250 (186)
Advertised hp (kW)	250 (186)
Operating Range (rpm)	1440-2400 (960)
Maximum Engine rpm	2640
Governed Speed rpm	2400
Peak Torque — lb-ft (N•m)	660 (895)/800 (1085)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	26/52
Altitude Capability — ft (m)	10 000 (3050)

PERFORMANCE CURVES

275/275HT hp (205 kW) DM3283/DM3284



300/300HT hp (224 kW) DM3285/DM3286

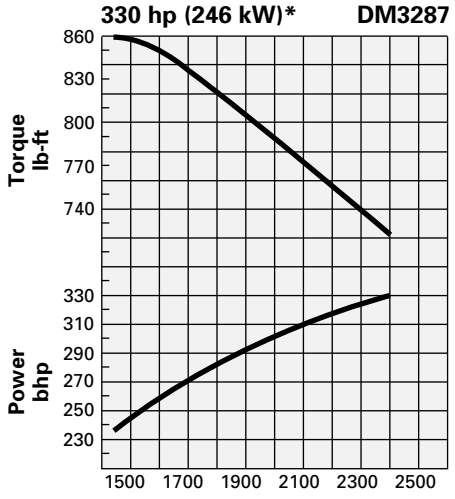


PERFORMANCE DATA

Max hp (kW)	275 (205)
Advertised hp (kW)	275 (205)
Operating Range (rpm)	1440-2400 (960)
Maximum Engine rpm	2640
Governed Speed rpm	2400
Peak Torque — lb-ft (N•m)	800 (1085)/860 (1166)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	39/49
Altitude Capability — ft (m)	10 000 (3050)

Max hp (kW)	300 (224)
Advertised hp (kW)	300 (224)
Operating Range (rpm)	1440-2400 (960)
Maximum Engine rpm	2640
Governed Speed rpm	2400
Peak Torque — lb-ft (N•m)	800 (1085)/860 (1166)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	27/37
Altitude Capability — ft (m)	10 000 (3050)

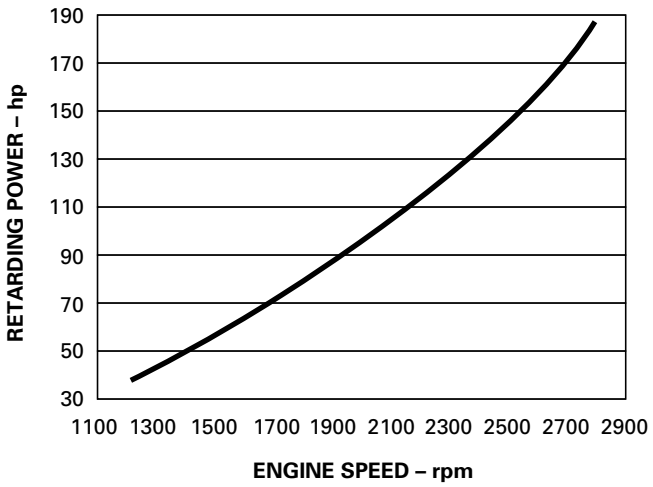
PERFORMANCE CURVES



* For RV and Fire Truck only

PERFORMANCE DATA

Max hp (kW)	330 (246)
Advertised hp (kW)	330 (246)
Operating Range (rpm)	1440-2400 (960)
Maximum Engine rpm	2640
Governed Speed rpm	2400
Peak Torque — lb-ft (N•m)	860 (1166)
Peak Torque rpm	1440
Torque Rise (%) (Gov. rpm)	19
Altitude Capability — ft (m)	10 000 (3050)



Exhaust Brake Performance

Three operational modes can be programmed: Coast, Latch, or Manual

ELECTRONIC FEATURES

Electronic self-diagnostics
Compatible with Caterpillar electronic technician (ET), electronic control analyzer programmer (ECAP), and MPSI Pro-Link service tools
Cold weather startup strategy and electronic idle control functions
ECM storage of operational, maintenance, and diagnostic data
J1939 compatible — ABS, Allison WT
Customer selectable, re-programmable operational parameters:
- Engine Monitoring System — off, warning, derate, or shutdown
- Cruise control with exclusive SoftCruise
- Vehicle speed [mph (km/h)] limiting and protection
- Idle shutdown timer & override
- 2-speed fast idle
- Maintenance monitor [miles (km) or hours]
- Cooling fan control
- Customer password protection
- Exhaust brake operational modes
- Theft deterrent
- Adjustable low idle rpm
- OEM parameter lockout

Programmable Power Take-Off (PTO) functions:
- Adjustable speed control [mph (km/h)] of vehicle while in PTO mode
- Adjustable maximum engine rpm speed
- Adjustable minimum engine rpm speed
- Limit engine torque to driven equipment
- Adjustable ramp rate up or down between PTO set speed(s)
- Adjustable rpm "bump" intervals
- Selectable PTO configuration for "in cab" or station of remote operation

GEARING CONSIDERATIONS

The 3126B is designed and built to take full advantage of a "gear fast, run slow" strategy. Unlike mechanically governed engines of the past, the fully electronic 3126B need not be gear-bound to limit maximum vehicle speed — this should be done using Vehicle Speed Limiting (VSL) and Protection.

For the best balance of performance and fuel economy, spec axle ratios and tire sizes to obtain: **2000 rpm @ 60 mph** (97 km/h) subject to the following: Maximum cruise speed of **65 mph** (105 km/h) **or below.** Maximum recommended engine speed at cruise — 2400 rpm. Minimum recommended engine speed at a cruise speed of 55 mph (89 km/hr) — **1800 rpm**

Depending on the application, the absolute minimum startability in first gear should be 6 percent, preferably in excess of 10 percent. On/off highway severe service applications will require considerably greater startability. Minimum gradeability should be 1.5 percent (1.8 percent recommended) at peak torque in top gear, and 0.5 percent at cruise rpm.

To further optimize the matching of your truck to the performance characteristics of the engine, a computerized spec'ing tool called Caterpillar Truck Engine Pro (TEP) is offered by your Caterpillar dealer. It calculates the effects of various driveline variables on engine operation such as transmissions, axles, and tires. This lets you see the results before you finalize your truck specs.

RATING DEFINITIONS AND CONDITIONS

Performance is based on SAE J1349 standard conditions of 29.61 in. Hg (100 kPa) and 77° F (25° C).

The curves shown are for a standard engine without fan, but equipped with air compressor and fuel, lubricating oil, and jacket water pumps.

Materials and specifications are subject to change without notice.

The International System of Units (SI) is used in this publication.

LEHT9055
Supersedes LEHT8389

Printed in U.S.A.

Units GEN-1 through GEN-4

[redacted]

14/17/20 kW

[redacted]

GENERAC®

GUARDIAN® SERIES
Residential Standby Generators
Air-Cooled Gas Engine

14/17/20 kW

INCLUDES:

- True Power™ Electrical Technology
- Two Line LCD Multilingual Digital Evolution™ Controller (English/Spanish/ French/Portuguese)
- Two Transfer Switch Options Available: 100 Amp Pre-Wired Switch or 200 Amp Smart Switch. See Page 4 for Details.
- Electronic Governor
- External Main Circuit Breaker, System Status & Maintenance Interval LED Indicators
- GFCI Duplex Outlet (17 & 20 kW units only)
- Sound Attenuated Enclosure
- Flexible Fuel Line Connector
- Composite Mounting Pad
- Natural Gas or LP Gas Operation
- 5 Year Limited Warranty
- Capability to be installed within 18" (457 mm) of a building*

Standby Power Rating

Models 006240-0, 006241-0, 006247-0 (Steel - Bisque) - 14 kW 60 Hz
Models 006242-0, 006248-0 (Steel - Bisque) - 17 kW 60 Hz
Models 006243-0, 006249-0 (Aluminum - Gray) - 17 kW 60 Hz
Models 006244-0, 006250-0 (Aluminum - Gray) - 20 kW 60 Hz

c UL us LISTED

USA ENGINEERED & BUILT* *Built in the USA using domestic and foreign parts

QUIET-TEST

Note: Quiet-Test™ only available on 17 & 20 kW units.

Note: CUL certification only applies to unbundled units and units packaged with pre-wired switches. Units packaged with the Smart Switch are UL certified in the USA only.

*Only if located away from doors, windows and fresh air intakes, and unless otherwise directed by local codes.

FEATURES

- **INNOVATIVE DESIGN & PROTOTYPE TESTING** are key components of GENERAC'S success in "IMPROVING POWER BY DESIGN." But it doesn't stop there. Total commitment to component testing, reliability testing, environmental testing, destruction and life testing, plus testing to applicable CSA, NEMA, EGSA, and other standards, allows you to choose GENERAC POWER SYSTEMS with the confidence that these systems will provide superior performance.

- **TRUE POWER™ ELECTRICAL TECHNOLOGY:** Superior harmonics and sine wave form produce less than 5% Total Harmonic Distortion for utility quality power. This allows confident operation of sensitive electronic equipment and micro-chip based appliances, such as variable speed HVAC systems.

- **TEST CRITERIA:**
  - ✓ **PROTOTYPE TESTED**
  - ✓ **SYSTEM TORSIONAL TESTED**
  - ✓ **NEMA MG1-22 EVALUATION**
  - ✓ **MOTOR STARTING ABILITY**

- **SOLID-STATE, FREQUENCY COMPENSATED VOLTAGE REGULATION.** This state-of-the-art power maximizing regulation system is standard on all Generac models. It provides optimized FAST RESPONSE to changing load conditions and MAXIMUM MOTOR STARTING CAPABILITY by electronically torque-matching the surge loads to the engine. Digital voltage regulation at ±1%.

- **SINGLE SOURCE SERVICE RESPONSE** from Generac's extensive dealer network provides parts and service know-how for the entire unit, from the engine to the smallest electronic component.

- **GENERAC TRANSFER SWITCHES.** Long life and reliability are synonymous with GENERAC POWER SYSTEMS. One reason for this confidence is that the GENERAC product line includes its own transfer systems and controls for total system compatibility.

GENERAC® ISO 9001:2008

GENERAC

14/17/20 kW

features and benefits

Engine	
• Generac (OHVI) design	Maximizes engine "breathing" for increased fuel efficiency. Plateau honed cylinder walls and plasma moly rings helps the engine run cooler, reducing oil consumption resulting in longer engine life.
• Quiet-Test™ (17 & 20 kW units only)	Greatly reduces sound output and fuel consumption during weekly exercise, compared to other brands.
• "Spiny-lok" cast iron cylinder walls	Rigid construction and added durability provide long engine life.
• Electronic ignition/spark advance	These features combine to assure smooth, quick starting every time.
• Full pressure lubrication system	Pressurized lubrication to all vital bearings means better performance, less maintenance and longer engine life. Now featuring up to a 2 year/200 hour oil change interval.
• Low oil pressure shutdown system	Shutdown protection prevents catastrophic engine damage due to low oil.
• High temperature shutdown	Prevents damage due to overheating.
Generator	
• Revolving field	Allows for a smaller, light weight unit that operates 25% more efficiently than a revolving armature generator.
• Skewed stator	Produces a smooth output waveform for compatibility with electronic equipment.
• Displaced phase excitation	Maximizes motor starting capability.
• Automatic voltage regulation	Regulates the output voltage to ±1% prevents damaging voltage spikes.
• UL 2200 listed	For your safety.
Transfer Switch	
• Fully automatic	Transfers your vital electrical loads to the energized source of power.
• Pre-wired, color-coded conduits (Pre-wired switches only)	Ensures the easiest, trouble-free installation.
• DPM Technology (Smart Switch only)	Digital Power Management Technology allows for the smart control of two air conditioners without any additional items.
• Remote mounting	Mounts near your existing distribution panel for simple, low-cost installation.
Evolution™ Controls	
• Auto/Manual/Off illuminated buttons	Selects the operating mode and provides easy, at-a-glance status indication in any condition.
• Sealed, raised buttons	Smooth, weather-resistant user interface for programming and operations.
• Utility voltage sensing	Constantly monitors utility voltage, setpoints 60% dropout, 80% pick-up, of standard voltage.
• Generator voltage sensing	Constantly monitors generator voltage to ensure the cleanest power delivered to the home.
• Utility interrupt delay	Prevents nuisance start-ups of the engine, adjustable 2-1500 seconds from the factory default setting of 5 seconds by a qualified dealer.
• Engine warm-up	Ensures engine is ready to assume the load, setpoint approximately 5 seconds.
• Engine cool-down	Allows engine to cool prior to shutdown, setpoint approximately 1 minute.
• Programmable seven day exerciser	Operates engine to prevent oil seal drying and damage between power outages by running the generator for 12 minutes every week.
• Smart battery charger	Delivers charge to the battery only when needed at varying rates depending on outdoor air temperature.
• Main line circuit breaker	Protects generator from overload.
• Electronic governor	Maintains constant 60 Hz frequency.
Unit	
• SAE weather protective enclosure	Sound attenuated enclosure ensures quiet operation and protection against mother nature, withstanding winds up to 150 mph. Hinged key locking roof panel for security. Lift-out front for easy access to all routine maintenance items. Electrostatically applied textured epoxy paint for added durability.
• Enclosed critical grade muffler	Quiet, critical grade muffler is mounted inside the unit to prevent injuries.
• Small, compact, attractive	Makes for an easy, eye appealing installation.
Installation System	
• 1 ft (305 mm) flexible fuel line connector • Composite mounting pad	Easy installation.

GENERAC

14/17/20 kW

specifications

Generator

Model	006240-0, 006241-0, 006247-0, (14 kW)	006242-0, 006243-0, 006248-0, 006249-0 (17 kW)	006244-0, 006250-0 (20 kW)
Rated Maximum Continuous Power Capacity (LP)	14,000 Watts*	17,000 Watts*	20,000 Watts*
Rated Maximum Continuous Power Capacity (NG)	14,000 Watts*	16,000 Watts*	18,000 Watts*
Rated Voltage	240	240	240
Rated Maximum Continuous Load Current – 240 Volts (LP/NG)	58.3/58.3	70.8/66.6	83.3/75
Total Harmonic Distortion	Less than 5%	Less than 5%	Less than 5%
Main Line Circuit Breaker	60 Amp	65 Amp	90 Amp
Phase	1	1	1
Number of Rotor Poles	2	2	2
Rated AC Frequency	60 Hz	60 Hz	60 Hz
Power Factor	1.0	1.0	1.0
Battery Requirement (not included)		Group 26R, 12 Volts and 525 CCA Minimum	
Unit Weight (lb/kg)	435/197.3	471/213.6 (Steel); 437/198.2 (Aluminum)	451/204.6
Dimensions (L x W x H) in/mm		48 x 25 x 29/1218 x 638 x 732	
Sound output in dB(A) at 23 ft (7 m) with generator operating at normal load**	66	66	66
Sound output in dB(A) at 23 ft (7 m) with generator in Quiet-Test™ low-speed exercise mode**	N/A	60	60

Engine

Type of Engine		GENERAC OHVI V-TWIN	GENERAC OHVI V-TWIN	GENERAC OHVI V-TWIN
Number of Cylinders		2	2	2
Displacement		992 cc	992 cc	999 cc
Cylinder Block			Aluminum w/ Cast Iron Sleeve	
Valve Arrangement		Overhead Valve	Overhead Valve	Overhead Valve
Ignition System		Solid-state w/ Magneto	Solid-state w/ Magneto	Solid-state w/ Magneto
Governor System		Electronic	Electronic	Electronic
Compression Ratio		9.5:1	9.5:1	9.5:1
Starter		12 Vdc	12 Vdc	12 Vdc
Oil Capacity Including Filter		Approx. 1.9 qt/1.8 L	Approx. 1.9 qt/1.8 L	Approx. 1.9 qt/1.8 L
Operating rpm		3,600	3,600	3,600
Fuel Consumption				
Natural Gas	ft^3/hr (m^3/hr)			
	1/2 Load	177 (5.01)	193 (5.47)	205 (5.8)
	Full Load	279 (7.9)	312 (8.83)	308 (8.72)
Liquid Propane	ft^3/hr (gal/hr) [l/hr]			
	1/2 Load	67.2 (1.85) [6.99]	72.4 (1.99) [7.53]	75.6 (2.08) [7.87]
	Full Load	111.6 (3.07) [11.61]	130 (3.57) [13.53]	140 (3.85) [14.57]

Note: **Fuel pipe must be sized for full load.** Required fuel pressure to generator fuel inlet at all load ranges - 3.5-7" water column (7-13 mm mercury) for natural gas, 10-12" water column (19-22 mm mercury) for LP gas. For Btu content, multiply ft^3/hr x 2500 (LP) or ft^3/hr x 1000 (NG). For Megajoule content, multiply m^3/hr x 93.15 (LP) or m^3/hr x 37.26 (NG)

Controls

2-Line Plain Text Multilingual LCD Display		Simple user interface for ease of operation.
Mode Buttons:	Auto	Automatic Start on Utility failure. 7 day exerciser.
	Manual	Start with starter control, unit stays on. If utility fails, transfer to load takes place.
	Off	Stops unit. Power is removed. Control and charger still operate.
Ready to Run/Maintenance Messages		Standard
Engine Run Hours Indication		Standard
Programmable start delay between 2-1500 seconds		Standard (programmable by dealer only)
Utility Voltage Loss/Return to Utility Adjustable		From 140-171 V/190-216 V
Future Set Capable Exerciser/Exercise Set Error Warning		Standard
Run/Alarm/Maintenance Logs		50 Events Each
Engine Start Sequence		Cyclic cranking: 16 sec on, 7 rest (90 sec maximum duration).
Starter Lock-out		Starter cannot re-engage until 5 sec after engine has stopped.
Smart Battery Charger		Standard
Charger Fault/Missing AC Warning		Standard
Low Battery/Battery Problem Protection and Battery Condition Indication		Standard
Automatic Voltage Regulation with Over and Under Voltage Protection		Standard
Under-Frequency/Overload/Stepper Overcurrent Protection		Standard
Safety Fused/Fuse Problem Protection		Standard
Automatic Low Oil Pressure/High Oil Temperature Shutdown		Standard
Overcrank/Overspeed (@ 72 Hz)/rpm Sense Loss Shutdown		Standard
High Engine Temperature Shutdown		Standard
Internal Fault/Incorrect Wiring Protection		Standard
Common External Fault Capability		Standard
Field Upgradable Firmware		Standard

**Sound levels are taken from the front of the generator. Sound levels taken from other sides of the generator may be higher depending on installation parameters. Rating definitions - Standby: Applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. (All ratings in accordance with BS5514, ISO3046 and DIN6271). * Maximum wattage and current are subject to and limited by such factors as fuel Btu/megajoule content, ambient temperature, altitude, engine power and condition, etc. Maximum power decreases about 3.5 percent for each 1,000 feet (304.8 meters) above sea level; and also will decrease about 1 percent for each 6 °C (10 °F) above 16 °C (60 °F).

GENERAC

14/17/20 kW

switch options

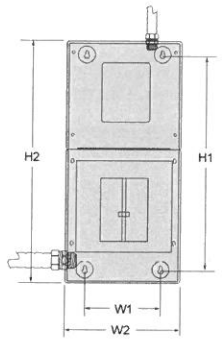
Pre-wired Features

available on 14 & 17 kW models only

- Electrically operated, mechanically-held contacts for fast, positive connections.
- Rated for all classes of load, 100% equipment rated, both inductive and resistive.
- 2 pole, 250 VAC contactors.
- 30 millisecond transfer time.
- Dual coil design.
- Main contacts are silver plated or silver alloy to resist welding and sticking.
- NEMA 1 (indoor rated) enclosure is standard on the pre-wired switch.
- Pre-wired 30 foot (9.1 meter) whip to connect to the provided 5 foot pre-wired whip and external connection box.
- Pre-wired 2 foot (0.61 meter) whip, color coded to connect into the existing electrical panel.

Model	006240-0 (14 kW)	006242-0 (17 kW)
No. of Poles	2	2
Current Rating (Amps)	100	100
Voltage Rating (VAC)	250	120/240, 1Ø
Utility Voltage Monitor (Fixed)*		
-Pick-up	80%	80%
-Dropout	60%	60%
Return to Utility*	approx. 15 sec.	approx. 15 sec.
Exercise weekly for 12 minutes*	Standard	Standard
UL Listed	Standard	Standard
Total of Pre-wired Circuits	14	16
No. 15 A 120 V	4	5
No. 20 A 120 V	6	5
No. 20 A 240 V	1	1
No. 30 A 240 V	-	-
No. 40 A 240 V	1	1
No. 50 A 240 V	-	1
Circuit Breaker Protected Available RMS Symmetrical Fault Current @ 250 Volts	10,000	10,000

*Function of Evolution Controller



Dimensions

Mechanical Dimensions					
	Height		Width		Depth
	H1	H2	W1	W2	
in	23.5	26.4	8.3	12.6	6.3
mm	597	671.7	211	320.7	159.6

Wire Ranges		
Conductor Lug	Neutral Lug	Ground Lug
2/0 - #14	2/0 - #14	2/0 - #14

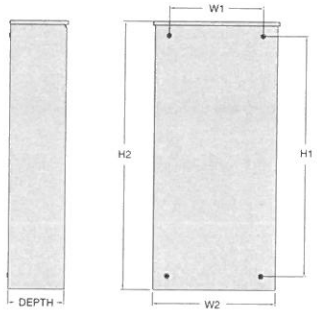
Smart Switch Features

- Includes Digital Power Management Technology standard (DPM).
- Intelligently manages two air conditioner loads with no additional hardware.
- Up to four more large (120/240 VAC) loads can be managed when used in conjunction with Power Management Modules (PMM**).
- Electrically operated, mechanically-held contacts for fast, clean connections.
- Rated for all classes of load, 100% equipment rated, both inductive and resistive.
- 2 pole, 250 VAC contactors.
- Service equipment rated, dual coil design.
- Rated for both aluminum and copper conductors.
- NEMA/UL 3R aluminum outdoor enclosure.
- Main contacts are silver plated or silver alloy to resist welding and sticking.

**Note: PMM starter kit is required prior to using the modules.

Model	006241-0 (14 kW)/006243-0 (17 kW)/006244-0 (20 kW)
No. of Poles	2
Current Rating (Amps)	200
Voltage Rating (VAC)	120/240, 1Ø
Utility Voltage Monitor (Fixed)*	
-Pick-up	80%
-Dropout	60%
Return to Utility*	approx. 13 sec.
Exercise weekly for 12 minutes*	Standard
UL Listed	Standard
Enclosure Type	NEMA/UL 3R
Withstand Rating (Amps)	22,000
Lug Range	250 MCM - #6

*Function of Evolution Controller



Dimensions

	200 Amps 120/240, 1ø Open Transition Service Rated				
	Height		Width		Depth
	H1	H2	W1	W2	
in	27.24	30.0	11.4	13.5	7.09
mm	692.0	762.4	289.0	343.0	180.0

GENERAC

14/17/20 kW

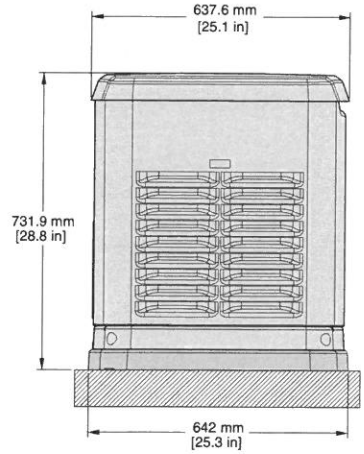
available accessories

Model #	Product	Description
005819-0	26R Wet Cell Battery	Every standby generator requires a battery to start the system. Generac offers the recommended 26R wet cell battery for use with all air-cooled standby product.
006212-0	Cold Weather Kit	If the temperature regularly falls below 32 °F (0 °C), install a cold weather kit to maintain optimal battery and oil temperatures. Kit consists of a battery warmer and oil filter heater with built-in thermostats.
005621-0	Auxiliary Transfer Switch Contact Kit	The auxiliary transfer switch contact kit allows the transfer switch to lock out a single large electrical load you may not need. Not compatible with 50 amp pre-wired switches.
005839-0 - Bisque 005666-0 - Gray	Fascia Base Wrap Kit* (Standard on 20 kW)	The fascia base wrap snaps together around the bottom of the new air cooled generators. This offers a sleek, contoured appearance as well as offering protection from rodents and insects by covering the lifting holes located in the base.
005703-0 - Bisque 005704-0 - Gray	Paint Kit*	If the generator enclosure is scratched or damaged, it is important to touch-up the paint to protect from future corrosion. The paint kit includes the necessary paint to properly maintain or touch-up a generator enclosure.
006484-0 - 14 & 17 kW 006485-0 - 20 kW	Scheduled Maintenance Kit	Generac's scheduled maintenance kits provide all the hardware necessary to perform complete routine maintenance on a Generac automatic standby generator.
005928-0	Wireless Remote	Completely wireless and battery powered, Generac's wireless remote monitor provides you with instant status information without ever leaving the house. Not compatible with CorePower or EcoGen systems.
006199-0	PMM Starter Kit	The PMM Starter Kit consists of a 24 VAC, field installed transformer that enables the use of the 24 VAC Power Management Modules (PMMs)and one PMM. The standard controller (without starter kit) can control two HVAC loads with no additional hardware. Not compatible with pre-wired switches.
006186-0	Power Management Module (50 Amps)	Power Management Modules are used in conjunction with the Smart Switch to increase its power management capabilities. It gives the Smart Switch additional power management flexibility not found in any other transfer switch. Not compatible with pre-wired switches. Note: PMM Starter Kit required.
006463-1	Mobile Link™	Generac's Mobile Link allows you to check the status of your generator from anywhere that you have access to an Internet connection from a PC or with any smart device. You will even be notified when a change in the generator's status occurs via e-mail or text message.

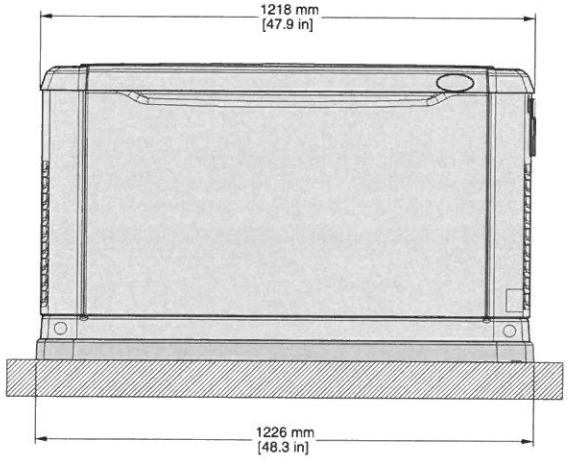
* Note: Bisque kits are used in conjunction with steel enclosures. Gray kits are used in conjunction with aluminum enclosures.

dimensions & UPCs

Dimensions shown are approximate. Refer to installation manual for exact dimensions. DO NOT USE THESE DIMENSIONS FOR INSTALLATION PURPOSES.



LEFT SIDE VIEW



FRONT VIEW

Model	UPC
006247-0	696471062472
006240-0	696471062403
006241-0	696471062410
006248-0	696471062489
006249-0	696471062496
006242-0	696471062427
006243-0	696471062434
006250-0	696471062502
006244-0	696471062441

Units Generac Emergency Generator 1 and Generac Emergency Generator 2

GRI-HAPCalc ® 3.01
Engines Report

Facility ID:	**TYRONE**	**Notes:**
Operation Type:	**GAS PLANT**	
Facility Name:	**TYRONE**	
User Name:		
Units of Measure:	**U.S. STANDARD**	

Note: Emissions less than 5.00E-09 tons (or tonnes) per year are considered insignificant and are treated as zero. These emissions are indicated on the report with a "0". Emissions between 5.00E-09 and 5.00E-05 tons (or tonnes) per year are represented on the report with "0.0000".

Engine Unit

Unit Name: GEN 1 & 2

Hours of Operation:	500 Yearly
Rate Power:	19 hp
Fuel Type:	NATURAL GAS
Engine Type:	4-Stroke, Lean Burn
Emission Factor Set:	FIELD > EPA > LITERATURE
Additional EF Set:	-NONE-

Calculated Emissions (ton/yr)

Chemical Name	Emissions	Emission Factor	Emission Factor Set
HAPs			
Tetrachloroethane	0.0000	0.00000820 g/bhp-hr	EPA
Formaldehyde	0.0012	0.11500000 g/bhp-hr	GRI Field
Methanol	0.0000	0.00437210 g/bhp-hr	GRI Field
Acetaldehyde	0.0001	0.00500000 g/bhp-hr	GRI Field
1,3-Butadiene	0.0000	0.00088120 g/bhp-hr	EPA
Acrolein	0.0002	0.01696380 g/bhp-hr	EPA
Benzene	0.0000	0.00020500 g/bhp-hr	GRI Field
Toluene	0.0000	0.00134650 g/bhp-hr	EPA
Ethylbenzene	0.0000	0.00013100 g/bhp-hr	EPA
Xylenes(m,p,o)	0.0000	0.00060730 g/bhp-hr	EPA
2,2,4-Trimethylpentane	0.0000	0.00082510 g/bhp-hr	EPA
n-Hexane	0.0000	0.00005050 g/bhp-hr	GRI Field
Phenol	0.0000	0.00008850 g/bhp-hr	GRI Field
Styrene	0.0000	0.00002450 g/bhp-hr	GRI Field
Naphthalene	0.0000	0.00003800 g/bhp-hr	GRI Field
2-Methylnaphthalene	0.0000	0.00010960 g/bhp-hr	EPA
Acenaphthylene	0.0000	0.00001830 g/bhp-hr	EPA
Biphenyl	0.0000	0.00078500 g/bhp-hr	GRI Field
Acenaphthene	0.0000	0.00000410 g/bhp-hr	EPA
Fluorene	0.0000	0.00003650 g/bhp-hr	GRI Field
Phenanthrene	0.0000	0.00003430 g/bhp-hr	EPA
Ethylene Dibromide	0.0000	0.00014620 g/bhp-hr	EPA
Fluoranthene	0.0000	0.00000370 g/bhp-hr	EPA
Pyrene	0.0000	0.00000450 g/bhp-hr	EPA

Chrysene	0.0000	0.00000230 g/bhp-hr	EPA
Benzo(b)fluoranthene	0.0000	0.00000050 g/bhp-hr	EPA
Benzo(e)pyrene	0.0000	0.00000140 g/bhp-hr	EPA
Benzo(g,h,i)perylene	0.0000	0.00000140 g/bhp-hr	EPA
Vinyl Chloride	0.0000	0.00004920 g/bhp-hr	EPA
Methylene Chloride	0.0000	0.00006600 g/bhp-hr	EPA
1,1-Dichloroethane	0.0000	0.00007790 g/bhp-hr	EPA
1,3-Dichloropropene	0.0000	0.00008710 g/bhp-hr	EPA
Chlorobenzene	0.0000	0.00010030 g/bhp-hr	EPA
Chloroform	0.0000	0.00009410 g/bhp-hr	EPA
1,1,2-Trichloroethane	0.0000	0.00010500 g/bhp-hr	EPA
1,1,2,2-Tetrachloroethane	0.0000	0.00013200 g/bhp-hr	EPA
Carbon Tetrachloride	0.0000	0.00012110 g/bhp-hr	EPA
Total	0.0015		

Criteria Pollutants

PM	0.0003	0.03296090 g/bhp-hr	EPA
CO	0.0087	0.83333330 g/bhp-hr	GRI Field
NMEHC	0.0041	0.38944040 g/bhp-hr	EPA
NOx	0.1491	14.25000000 g/bhp-hr	GRI Field
SO2	0.0000	0.00194060 g/bhp-hr	EPA

Other Pollutants

Butryaldehyde	0.0000	0.00033330 g/bhp-hr	EPA
Chloroethane	0.0000	0.00000620 g/bhp-hr	EPA
Methane	0.0570	5.45250000 g/bhp-hr	GRI Field
Ethane	0.0016	0.15750000 g/bhp-hr	GRI Field
Propane	0.0002	0.01500000 g/bhp-hr	GRI Field
Butane	0.0000	0.00200000 g/bhp-hr	GRI Field
Cyclopentane	0.0000	0.00074920 g/bhp-hr	EPA
n-Pentane	0.0000	0.00235000 g/bhp-hr	GRI Field
Methylcyclohexane	0.0000	0.00405940 g/bhp-hr	EPA
1,2-Dichloroethane	0.0000	0.00007790 g/bhp-hr	EPA
1,2-Dichloropropane	0.0000	0.00008880 g/bhp-hr	EPA
n-Octane	0.0000	0.00115840 g/bhp-hr	EPA
1,2,3-Trimethylbenzene	0.0000	0.00007590 g/bhp-hr	EPA
1,2,4-Trimethylbenzene	0.0000	0.00004720 g/bhp-hr	EPA
1,3,5-Trimethylbenzene	0.0000	0.00011160 g/bhp-hr	EPA
n-Nonane	0.0000	0.00036300 g/bhp-hr	EPA
CO2	3.7983	363.03769350 g/bhp-hr	EPA

Unit Name: GEN 3 & 4 Units Generac Emergency Generator 3 and Generac Emergency Generator 4

Hours of Operation:	500 Yearly
Rate Power:	22 hp
Fuel Type:	NATURAL GAS
Engine Type:	4-Stroke, Lean Burn
Emission Factor Set:	FIELD > EPA > LITERATURE
Additional EF Set:	-NONE-

Calculated Emissions (ton/yr)

Chemical Name	Emissions	Emission Factor	Emission Factor Set

HAPs

Tetrachloroethane	0.0000	0.00000820 g/bhp-hr	EPA
Formaldehyde	0.0014	0.11500000 g/bhp-hr	GRI Field
Methanol	0.0001	0.00437210 g/bhp-hr	GRI Field
Acetaldehyde	0.0001	0.00500000 g/bhp-hr	GRI Field
1,3-Butadiene	0.0000	0.00088120 g/bhp-hr	EPA
Acrolein	0.0002	0.01696380 g/bhp-hr	EPA
Benzene	0.0000	0.00020500 g/bhp-hr	GRI Field
Toluene	0.0000	0.00134650 g/bhp-hr	EPA
Ethylbenzene	0.0000	0.00013100 g/bhp-hr	EPA
Xylenes(m,p,o)	0.0000	0.00060730 g/bhp-hr	EPA
2,2,4-Trimethylpentane	0.0000	0.00082510 g/bhp-hr	EPA
n-Hexane	0.0000	0.00005050 g/bhp-hr	GRI Field
Phenol	0.0000	0.00008850 g/bhp-hr	GRI Field
Styrene	0.0000	0.00002450 g/bhp-hr	GRI Field
Naphthalene	0.0000	0.00003800 g/bhp-hr	GRI Field
2-Methylnaphthalene	0.0000	0.00010960 g/bhp-hr	EPA
Acenaphthylene	0.0000	0.00001830 g/bhp-hr	EPA
Biphenyl	0.0000	0.00078500 g/bhp-hr	GRI Field
Acenaphthene	0.0000	0.00000410 g/bhp-hr	EPA
Fluorene	0.0000	0.00003650 g/bhp-hr	GRI Field
Phenanthrene	0.0000	0.00003430 g/bhp-hr	EPA
Ethylene Dibromide	0.0000	0.00014620 g/bhp-hr	EPA
Fluoranthene	0.0000	0.00000370 g/bhp-hr	EPA
Pyrene	0.0000	0.00000450 g/bhp-hr	EPA
Chrysene	0.0000	0.00000230 g/bhp-hr	EPA
Benzo(b)fluoranthene	0.0000	0.00000050 g/bhp-hr	EPA
Benzo(e)pyrene	0.0000	0.00000140 g/bhp-hr	EPA
Benzo(g,h,i)perylene	0.0000	0.00000140 g/bhp-hr	EPA
Vinyl Chloride	0.0000	0.00004920 g/bhp-hr	EPA
Methylene Chloride	0.0000	0.00006600 g/bhp-hr	EPA
1,1-Dichloroethane	0.0000	0.00007790 g/bhp-hr	EPA
1,3-Dichloropropene	0.0000	0.00008710 g/bhp-hr	EPA
Chlorobenzene	0.0000	0.00010030 g/bhp-hr	EPA
Chloroform	0.0000	0.00009410 g/bhp-hr	EPA
1,1,2-Trichloroethane	0.0000	0.00010500 g/bhp-hr	EPA
1,1,2,2-Tetrachloroethane	0.0000	0.00013200 g/bhp-hr	EPA
Carbon Tetrachloride	0.0000	0.00012110 g/bhp-hr	EPA
Total	0.0018		

Criteria Pollutants

PM	0.0004	0.03296090 g/bhp-hr	EPA
CO	0.0101	0.83333330 g/bhp-hr	GRI Field
NMEHC	0.0047	0.38944040 g/bhp-hr	EPA
NOx	0.1726	14.25000000 g/bhp-hr	GRI Field
SO2	0.0000	0.00194060 g/bhp-hr	EPA

Other Pollutants

Butryaldehyde	0.0000	0.00033330 g/bhp-hr	EPA
Chloroethane	0.0000	0.00000620 g/bhp-hr	EPA
Methane	0.0661	5.45250000 g/bhp-hr	GRI Field
Ethane	0.0019	0.15750000 g/bhp-hr	GRI Field
Propane	0.0002	0.01500000 g/bhp-hr	GRI Field

Butane	0.0000	0.00200000 g/bhp-hr	GRI Field
Cyclopentane	0.0000	0.00074920 g/bhp-hr	EPA
n-Pentane	0.0000	0.00235000 g/bhp-hr	GRI Field
Methylcyclohexane	0.0000	0.00405940 g/bhp-hr	EPA
1,2-Dichloroethane	0.0000	0.00007790 g/bhp-hr	EPA
1,2-Dichloropropane	0.0000	0.00008880 g/bhp-hr	EPA
n-Octane	0.0000	0.00115840 g/bhp-hr	EPA
1,2,3-Trimethylbenzene	0.0000	0.00007590 g/bhp-hr	EPA
1,2,4-Trimethylbenzene	0.0000	0.00004720 g/bhp-hr	EPA
1,3,5-Trimethylbenzene	0.0000	0.00011160 g/bhp-hr	EPA
n-Nonane	0.0000	0.00036300 g/bhp-hr	EPA
CO2	4.3980	363.03769350 g/bhp-hr	EPA

Unit IPG

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2013 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT OF 1990

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Generac Power Systems, Inc.**
(U.S. Manufacturer or Importer)

Certificate Number: DGNXS.9922DB-013

Effective Date: 03/28/2013

Expiration Date: 12/31/2013

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 03/28/2013

Revision Date: N/A

Manufacturer: Generac Power Systems, Inc.
Engine Family: DGNXS.9922DB
Certificate Number: DGNXS.9922DB-013
Useful Life : 500 Hours / 2 Years
Engine Class : Nonhandheld-Class II
Fuel : Natural Gas (CNG/LNG)
LPG/Propane
Emission Standards : CO (g/kW-hr) : 610

FELS :
HC + NOx (g/kW-hr) : 7.5NMHC + NOx (g/kW-hr) : 7.5

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547), 40 CFR Part 1054, 40 CFR Part 1068 and 40 CFR Part 60 (stationary only and combined stationary and mobile), and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued for the following small nonroad engine family, more fully described in the documentation required by 40 CFR Part 1054 and produced in the stated model year.

This certificate of conformity covers only those new small nonroad engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 1054 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 1054. This certificate of conformity does not cover small nonroad engines imported prior to the effective date of the certificate.

This certificate of conformity is conditional upon compliance of said manufacturer with the averaging, banking and trading provisions of 40 CFR Part 1054, Subpart H both during and after model year production. Failure to comply with these provisions may render this certificate void *ab initio*.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.20 and 1068, Subpart E and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 1054. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 1054, 40 CFR Part 1068.

This certificate does not cover small nonroad engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

GRI-HAPCalc ® 3.01
Engines Report

Facility ID:	**18.8 HP**	**Notes:**
Operation Type:	**COMPRESSOR STATION**	
Facility Name:	**TYRONE MINE**	
User Name:		
Units of Measure:	**U.S. STANDARD**	

Note: Emissions less than 5.00E-09 tons (or tonnes) per year are considered insignificant and are treated as zero. These emissions are indicated on the report with a "0". Emissions between 5.00E-09 and 5.00E-05 tons (or tonnes) per year are represented on the report with "0.0000".

Engine Unit

Unit Name: 18.8 HP

Hours of Operation:	8,760 Yearly
Rate Power:	19 hp
Fuel Type:	NATURAL GAS
Engine Type:	4-Stroke, Lean Burn
Emission Factor Set:	EPA > FIELD > LITERATURE
Additional EF Set:	-NONE-

Calculated Emissions (ton/yr)

Chemical Name	Emissions	Emission Factor	Emission Factor Set
HAPs			
Tetrachloroethane	0.0000	0.00000820 g/bhp-hr	EPA
Formaldehyde	0.0319	0.17425810 g/bhp-hr	EPA
Methanol	0.0015	0.00825090 g/bhp-hr	EPA
Acetaldehyde	0.0051	0.02759090 g/bhp-hr	EPA
1,3-Butadiene	0.0002	0.00088120 g/bhp-hr	EPA
Acrolein	0.0031	0.01696380 g/bhp-hr	EPA
Benzene	0.0003	0.00145220 g/bhp-hr	EPA
Toluene	0.0002	0.00134650 g/bhp-hr	EPA
Ethylbenzene	0.0000	0.00013100 g/bhp-hr	EPA
Xylenes(m,p,o)	0.0001	0.00060730 g/bhp-hr	EPA
2,2,4-Trimethylpentane	0.0002	0.00082510 g/bhp-hr	EPA
n-Hexane	0.0007	0.00366340 g/bhp-hr	EPA
Phenol	0.0000	0.00007920 g/bhp-hr	EPA
Styrene	0.0000	0.00007790 g/bhp-hr	EPA
Naphthalene	0.0000	0.00024550 g/bhp-hr	EPA
2-Methylnaphthalene	0.0000	0.00010960 g/bhp-hr	EPA
Acenaphthylene	0.0000	0.00001830 g/bhp-hr	EPA
Biphenyl	0.0001	0.00069970 g/bhp-hr	EPA
Acenaphthene	0.0000	0.00000410 g/bhp-hr	EPA
Fluorene	0.0000	0.00001870 g/bhp-hr	EPA
Phenanthrene	0.0000	0.00003430 g/bhp-hr	EPA
Ethylene Dibromide	0.0000	0.00014620 g/bhp-hr	EPA
Fluoranthene	0.0000	0.00000370 g/bhp-hr	EPA
Pyrene	0.0000	0.00000450 g/bhp-hr	EPA

Chrysene	0.0000	0.00000230 g/bhp-hr	EPA
Benzo(b)fluoranthene	0.0000	0.00000050 g/bhp-hr	EPA
Benzo(e)pyrene	0.0000	0.00000140 g/bhp-hr	EPA
Benzo(g,h,i)perylene	0.0000	0.00000140 g/bhp-hr	EPA
Vinyl Chloride	0.0000	0.00004920 g/bhp-hr	EPA
Methylene Chloride	0.0000	0.00006600 g/bhp-hr	EPA
1,1-Dichloroethane	0.0000	0.00007790 g/bhp-hr	EPA
1,3-Dichloropropene	0.0000	0.00008710 g/bhp-hr	EPA
Chlorobenzene	0.0000	0.00010030 g/bhp-hr	EPA
Chloroform	0.0000	0.00009410 g/bhp-hr	EPA
1,1,2-Trichloroethane	0.0000	0.00010500 g/bhp-hr	EPA
1,1,2,2-Tetrachloroethane	0.0000	0.00013200 g/bhp-hr	EPA
Carbon Tetrachloride	0.0000	0.00012110 g/bhp-hr	EPA
Total	0.0434		

Criteria Pollutants

PM	0.0060	0.03296090 g/bhp-hr	EPA
CO	0.1918	1.04620860 g/bhp-hr	EPA
NMEHC	0.0714	0.38944040 g/bhp-hr	EPA
NOx	2.4683	13.46539810 g/bhp-hr	EPA
SO2	0.0004	0.00194060 g/bhp-hr	EPA

Other Pollutants

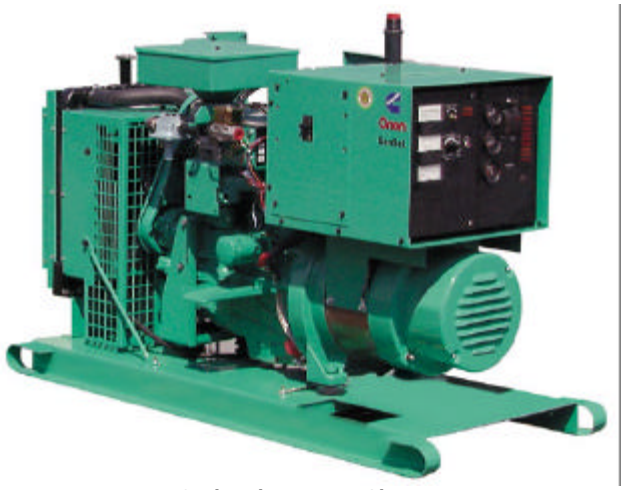
Chloroethane	0.0000	0.00000620 g/bhp-hr	EPA
Butryaldehyde	0.0001	0.00033330 g/bhp-hr	EPA
Methane	0.7562	4.12542830 g/bhp-hr	EPA
Ethane	0.0635	0.34653600 g/bhp-hr	EPA
Propane	0.0253	0.13828440 g/bhp-hr	EPA
Butane	0.0003	0.00178550 g/bhp-hr	EPA
Cyclopentane	0.0001	0.00074920 g/bhp-hr	EPA
n-Pentane	0.0016	0.00858090 g/bhp-hr	EPA
Methylcyclohexane	0.0007	0.00405940 g/bhp-hr	EPA
1,2-Dichloroethane	0.0000	0.00007790 g/bhp-hr	EPA
1,2-Dichloropropane	0.0000	0.00008880 g/bhp-hr	EPA
n-Octane	0.0002	0.00115840 g/bhp-hr	EPA
1,2,3-Trimethylbenzene	0.0000	0.00007590 g/bhp-hr	EPA
1,2,4-Trimethylbenzene	0.0000	0.00004720 g/bhp-hr	EPA
1,3,5-Trimethylbenzene	0.0000	0.00011160 g/bhp-hr	EPA
n-Nonane	0.0001	0.00036300 g/bhp-hr	EPA
CO2	66.5462	363.03769350 g/bhp-hr	EPA

Generator Set

Natural Gas - 20.0 kW, 25.0 kVA, Standby

Propane - 20.0 kW, 25.0 kVA, Standby

GGDB 60 Hz Generator Set



Optional Features Shown

Description

The Cummins® Onan® GGDB series spark ignited generator set is a fully integrated power generation system, providing optimum performance, reliability, and versatility for standby operation in stationary applications.

A primary feature of the GGDB GenSet is strong motor starting capability and fast recovery from transient load changes. The GGDB torque matched system includes a heavy-duty Ford 4-cycle liquid cooled spark ignited engine, an AC alternator with high motor starting capacity, and an electronic voltage regulator for precise regulation under steady-state or transient loads. The GGDB GenSet accepts 100% of the nameplate standby rating in one step, in compliance with NFPA110 requirements.

An LP vapor fuel system is standard with several options for natural gas and LP liquid as well as dual fuel.

The GGDB GenSet offers both user and environment friendly operation. The standard two wire remote control system provides for automatic remote operation and automatic shutdown for fault detection. Controls may be upgraded to the Detector™ Control for NFPA110 compliance.

A wide range of options, accessories, and services are available, allowing configuration to your specific power generation needs.

Every production unit is factory tested at rated load and power factor. This testing includes demonstration of rated power and single-step rated load pickup. Cummins Onan manufacturing facilities are registered to ISO9001 quality standards, emphasizing our commitment to high quality in the design, manufacture, and support of our products. The GenSet is CSA certified.

All Cummins Onan brand power generation systems are backed by a comprehensive warranty program and supported by a worldwide network of 170 distributors and service branches, to assist you with warranty, service, parts, and planned maintenance support.

Features

- **Ford Heavy-Duty Gas Engine** - Rugged 4-cycle industrial spark-ignited engine delivers reliable power. The electronic governor provides fast response to load changes.
- **Electronic voltage regulator** - Torque-matched regulator provides fast recovery from transient load changes, underfrequency compensation, and precise regulation.
- **Alternator** - Several alternator sizes offer selectable motor starting capability with low reactance 2/3 pitch windings, low waveform distortion with non-linear loads and fault clearing short-circuit capability.
- **Control systems** - The standard 2-wire remote control system provides capability for automatic remote starting and stopping, and fault protection features. Upgrade to the Detector™ Control for NFPA110 compliance.
- **Cooling systems** - Standard cooling package provides reliable running up to 40°C ambient temperature. Optional remote cooling capability is offered.
- **Integral Vibration Isolation** - Robust skid base supports the engine, alternator, and radiator on isolators, minimizing transmitted vibration.
- **E-Coat Finish** - Dual electro-deposition paint system provides high resistance to scratches, corrosion, or fading.
- **Housings** - Optional weather proof and sound attenuated enclosures are available.
- **Certifications** - Generator sets are designed, manufactured, tested, and certified to relevant UL, NFPA, ISO, IEC, and CSA standards.
- **Warranty and Service** - Backed by a comprehensive warranty and world wide distributor network.

Generator Set

The general specifications in this document provide representative configuration details, but the outline drawing must be used for installation design.

See outline drawing 500-3194 for installation design specifications.

Unit Width, in.(mm)	26.0 (660)
Unit Height, in.(mm)	39.9 (1013)
Unit Length, in.(mm)	64.0 (1626)
Unit Dry Weight, lbs. (kgs)	847 (384)
Unit Wet Weight, lbs. (kgs)	880 (399)
Rated Speed, rpm	1800
Voltage Regulation, No Load to Full Load	±2.0%
Random Voltage Variation	±1.0%
Frequency Regulation	Isochronous
Random Frequency Variation	±0.3% @ 60Hz, ±0.8% @ 50Hz
Radio Frequency Interference	Meets requirements of most industrial and commerical applications

	Natural Gas		**Propane**	
Cooling	**Standby**		**Standby**	
Fan Load, HP (kW)	2.2 (1.6)		2.2 (1.6)	
Coolant Capacity with radiator, US Gal (L)	3.0 (11.4)		3.0 (11)	
Coolant Flow Rate, Gal/min (L/min)	18.8 (71.2)		18.8 (71)	
Heat Rejection To Coolant, Btu/min (MJ/min)	1200.0 (1.3)		1200 (1.3)	
Heat Radiated To Room, Btu/min (MJ/min)	638.0 (0.7)		638 (0.7)	
Air				
Combustion Air, cfm (m^3/min)	65.0 (1.8)		65.0 (1.8)	
Alternator Cooling Air, cfm (m^3/min)	250.0 (7.1)		250.0 (7.1)	
Radiator Cooling Air, scfm (m^3/min)	2690.0 (76.1)		2690.0 (76.1)	
Minimum Air Opening to Room, ft^2(m^2)	3.9 (0.4)		3.9 (0.4)	
Minimum Discharge Opening, ft^2(m^2)	2.6 (0.2)		2.6 (0.2)	
Max. Static Restriction, in H_2O (Pa)	0.2 (62.5)		0.2 (62.5)	

Rating Definitions

Standby Rating based on: Applicable for supplying emergency power for the duration of normal power interruption. No sustained overload capability is available for this rating. (Equivalent to Fuel Stop Power in accordance with ISO3046, AS2789, DIN6271 and BS5514). Nominally rated.

Prime (Unlimited Running Time) Rating based on: Applicable for supplying power in lieu of commercially purchased power. Prime power is the maximum power available at a variable load for an unlimited number of hours. A 10% overload capability is available for limited time. (Equivalent to Prime Power in accordance with ISO8528 and Overload Power in accordance with ISO3046, AS2789, DIN6271, and BS5514). This rating is not applicable to all generator set models.

Base Load (Continuous) Rating based on: Applicable for supplying power continuously to a constant load up to the full output rating for unlimited hours. No sustained overload capability is available for this rating. Consult authorized distributor for rating. (Equivalent to Continuous Power in accordance with ISO8528, ISO3046, AS2789, DIN6271, and BS5514). This rating is not applicable to all generator set models.

Site Derating Factors

Natural Gas

Engine power available up to 3500 ft (1067 m) at ambient temperatures up to 85°F (29°C). Above 3500 ft (1067 m) derate at 5% per 1000 ft (305 m), and 1% per 10°F (2% per 11°C) above 85°F (29°C).

Propane

Engine power available up to 6000 ft (1829 m) at ambient temperatures up to 85°F (29°C). Above 6000 ft (1829 m) derate at 4% per 1000 ft (305 m), and 1% per 10°F (2% per 11°C) above 85°F (29°C).

Engine

Rugged Ford® spark ignited engines are designed to operate efficiently on gaseous fuels. Fuel system options available for natural gas, LP vapor, and LP liquid. In addition, for extra system reliability combination natural gas/LP vapor or natural gas/LP liquid with automatic changeover are available.

Electronic governing provides precise speed regulation, especially useful for applications requiring constant (isochronous) frequency regulation such as Uninterruptible Power Supply systems, non-linear loads, or sensitive electronic loads. Optional coolant heaters are recommended for all emergency standby installations or any application requiring fast load acceptance after start-up.

Specifications – Engine

Base Engine	Ford Model LRG-425I, naturally aspirated
Displacement in^3 (L)	150.0 (2.5)
Overspeed Limit, rpm	2500 ±50
Cylinder Block Configuration	Cast iron, In-line 4 cylinder
Cranking Current	150 amps at ambient temperature of 32°F (0°C)
Battery Charging Alternator	95 amps
Starting Voltage	12-volt, negative ground
Lube Oil Filter Types	Spin-on, full flow
Standard Cooling System	104°F (40°C) ambient cooling system
Standard Fuel	LP vapor is standard. Optional LP liquid, natural gas, LP liquid/natural gas and LP vapor/natural gas

	Natural Gas		Propane	
Power Output	**Standby**		**Standby**	
Gross Engine Power Output, bhp (kWm)	40.0 (29.8)		42.0 (31.3)	
BMEP, psi (kPa)	105.0 (723.9)		105.0 (723.9)	
Bore, in. (mm)	3.74 (95.0)		3.74 (95.0)	
Stroke, in. (mm)	3.40 (86.4)		3.40 (86.4)	
Piston Speed, ft/min (m/s)	1021.0 (5.2)		1021.0 (5.2)	
Compression Ratio	9.4:1		9.4:1	
Lube Oil Capacity, qt. (L)	4.5 (4.3)		4.5 (4.3)	
Fuel Flow				
Minimum Operating Pressure, in. H_2O (kPa)	7.0 (1.7)		7 (2)	
Maximum Operating Pressure, in. H_2O (kPa)	13.6 (3.4)		14 (3)	
Air Cleaner				
Maximum Air Cleaner Restriction, in. H_2O (kPa)	15.0 (3.7)		15.0 (3.7)	
Exhaust				
Gas Flow (Full Load), cfm (m^3/min)	210.0 (5.9)		210.0 (5.9)	
Gas Temperature,°F (°C)	1250 (677)		1250 (677)	
Maximum Back Pressure, in. H_2O (kPa)	41.0 (10.2)		41.0 (10.2)	

Fuel Consumption - Natural Gas		**Standby**							
60 Hz Ratings, kW (kVA)		**20.0 (25.0)**							
	Load	1/4	1/2	3/4	Full				
	cfh	122.0	163.0	201.0	252.0				
	m^3/hr	461.8	617.0	760.8	953.8				

Fuel Consumption - Propane		**Standby**							
60 Hz Ratings, kW (kVA)		**20.0 (25.0)**							
	Load	1/4	1/2	3/4	Full				
	cfh	44.0	64.0	74.0	84.0				
	m^3/hr	1.2	1.8	2.1	2.4				

Alternator

Single-bearing alternators couple directly to the engine flywheel with flexible discs for drivetrain reliability and durability. No gear reducers or speed changers are used. Two-thirds pitch windings eliminate third-order harmonic content of the AC voltage waveform and provide the standardization desired for paralleling of generator sets. The excitation system is a self (shunt) excited system with the voltage regulator powered directly from the generator set output. The standard alternator is a single phase 4 lead, 105°C rise. Optional alternators include 3 phase and 3 phase with full single phase output capability.

Alternator Application Notes

Alternator Space Heater - is recommended to inhibit condensation.

Available Output Voltages

Three Phase Reconnectable		Single Phase Non-Reconnectable		Three Phase Non-Reconnectable	
[ ]	120/208	[ ]	120/240	[ ]	347/600
[ ]	120/240				
[ ]	127/220				
[ ]	139/240				
[ ]	220/380				
[ ]	240/415				
[ ]	254/440				
[ ]	277/480				

Specifications – Alternator

Design	Revolving field, single bearing, 4-pole, brushless, drip-proof construction.
Stator	Skewed stator and 2/3 pitch windings minimize field heating and voltage harmonics.
Rotor	Dynamically balanced assembly. Direct coupled to engine by a flexible drive disc. Complete amortisseur (damper) windings help minimize voltage deviations and heating effects under unbalanced loads. The rotor is supported by a pre-lubricated, maintenance-free ball bearing.
Insulation System	Class F per NEMA MG1-1.65 and BS2757
Standard Temperature Rise	At rated load is less than 105°C at standby rating, per NEMA MG1.22.40, IEEE 115 and IEC 34-1.
Exciter Type	The excitation system derives its power from the main output of the generator, eliminating the need for a separate excitation power source.
Phase Rotation	A (U), B (V), C (W)
Alternator Cooling	Direct drive centrifugal blower
AC Waveform Total Harmonic Distortion	Less than 7% total no load to full linear load, and less than 3% for any single harmonic.
Telephone Influence Factor (TIF)	Less than 40 per NEMA MG1-22.43.
Telephone Harmonic Factor (THF)	Less than 3

Natural Gas														
Three Phase Table[1]		**105° C**	**105° C**	**105° C**										
Feature Code		B268	B256	B304										
Alternator Data Sheet Number		107	106	106										
Voltage Ranges		120/208 Thru 139/240 240/416 Thru 277/480	120/208 Thru 139/240 240/416 Thru 277/480	347/600										
Surge kW		25	25.6	24.7										
Motor Starting kVA (at 90% sustained voltage)	Shunt	70	52	52										

Full Load Current - Amps at Standby Rating	120/208	127/220	139/240	220/380	240/416	277/480	347/600
	69	66	60	38	35	30	24

Notes:

1. Single phase power can be taken from a three phase generator set at up to 2/3 set rated 3-phase kW at 1.0 power factor. Also see Note 2 below.

Natural Gas														
Single Phase Table		**105° C**	**105° C**	**105° C**										
Feature Code		B274	B256	B268										
Alternator Data Sheet Number		106	106	107										
Voltage Ranges		120/240	120/240	120/240										
Surge kW		23.5	23.5	24										
Motor Starting kVA (at 90% sustained voltage)	Shunt	38	39	49										

Full Load Current - Amps at Standby Rating	120/240[1]	120/240[2]
	56	83

Notes:

1. The broad range alternators can supply single phase output up to 2/3 set rated 3-phase kW at 1.0 power factor.
2. The extended stack (full single phase output) and 4 lead alternators can supply single phase output at full set rated kW at 1.0 power factor.

Propane													
Three Phase Table[1]		**105° C**	**105° C**	**105° C**									
Feature Code		B268	B256	B304									
Alternator Data Sheet Number		107	106	106									
Voltage Ranges		120/208 Thru 139/240 240/416 Thru 277/480	120/208 Thru 139/240 240/416 Thru 277/480	347/600									
Surge kW		26.3	26.9	25.9									
Motor Starting kVA (at 90% sustained voltage)	Shunt	70	52	52									

Full Load Current - Amps at Standby Rating	120/208 69	127/220 66	139/240 60	220/380 38	240/416 35	277/480 30	347/600 24

Notes:

1. Single phase power can be taken from a three phase generator set at up to 2/3 set rated 3-phase kW at 1.0 power factor. Also see Note 2 below.

Propane													
Single Phase Table		**105° C**	**105° C**	**105° C**									
Feature Code		B274	B256	B268									
Alternator Data Sheet Number		106	106	107									
Voltage Ranges		120/240	120/240	120/240									
Surge kW		24.8	24.8	25.2									
Motor Starting kVA (at 90% sustained voltage)	Shunt	38	39	49									

Full Load Current - Amps at Standby Rating	120/240[1] 56	120/240[2] 83

Notes:

1. The broad range alternators can supply single phase output up to 2/3 set rated 3-phase kW at 1.0 power factor.
2. The extended stack (full single phase output) and 4 lead alternators can supply single phase output at full set rated kW at 1.0 power factor.

Control System

Optional Features Shown

Standard 2-Wire Remote Control System

- Automatic remote starting
- Controls generator set starting and shutdown
- Control components designed to withstand the vibration levels typical in generator sets

Standard Control Description

- Crank timer
- Fault reset button
- Remote starting, 12 V, 2 wire
- Run-off-auto switch

Standard Features	Optional Features
• Field circuit breaker • High temperature shutdown • Low oil pressure shutdown • Overcrank shutdown • Overspeed shutdown • Running time meter	• AC meter package • Oil pressure gauge (engine-mounted) • Running time meter (engine-mounted) • Water temperature gauge (engine-mounted)

Optional Features Shown

Optional Detector Control System

- Automatic remote starting
- Control components designed to withstand the vibration levels typical in generator sets
- Controls generator set starting and shutdown

Standard Detector 12 Light (NFPA110) Control Description

- 12 light engine monitor (NFPA110 level)
- Common alarm contact
- Coolant temperature gauge
- Cycle cranking control
- DC Voltmeter
- Field circuit breaker
- Individual 1/2 A relay signals
- Lamp test switch
- Oil pressure gauge
- Remote starting, 12 V, 2 wire
- Reset switch
- Run-Off-Auto switch
- Running time meter

Standard Features		Optional Features
• 5% voltage adjust rheostat • AC ammeter (dual scale) • AC voltmeter (dual scale) • Dual scale frequency/tachometer • Engine gauges • High coolant temperature shutdown (red light) • Low coolant temperature (yellow light) • Low fuel (yellow light) • Low oil pressure shutdown (red light)	• Overcrank shutdown (red light) • Overspeed shutdown (red light) • Pre-alarm high coolant temp (yellow light) • Pre-alarm low oil pressure (yellow light) • Run indicator (green light) • Two customer selected faults (red light) • Voltmeter/Ammeter phase selector	• Audible alarm • Emergency stop • Low battery voltage warning • Low coolant level warning or shutdown • Remote fault signal package • Speed adjust rheostat • Time delay start/stop

Generator Set Options

Engine
[ ] 120/240 V, 1500 W coolant heaters
[ ] Engine gauges

Cooling System
[ ] Remote radiator cooling

Fuel System
[ ] Fuel strainer
[ ] LP liquid
[ ] Natural gas
[ ] Natural gas/LP vapor with automatic changeover
[ ] Natural gas/LP liquid with automatic changeover
[ ] Vacuum safety switch

Alternator
[ ] 120/240 V, 150 W anti-condensation heater
[ ] 12-lead broad range (full output single phase)
[ ] Single phase (4-lead)

Control Panel
[ ] 120/240 V, 100 W control anti-condensation heater
[ ] CSA 282 compliance package
[ ] Detector 12 control (required for any NFPA 110 application)
[ ] Emergency stop
[ ] Low battery voltage warning
[ ] Low coolant level warning/shutdown
[ ] Remote fault signal package

Exhaust System
[ ] Mounted residential muffler

Generator Set
[ ] Coolant drain extension
[ ] Duct Adapter
[ ] Enclosure II, Quiet Site, sound-attenuated
[ ] Enclosure, weather protective, with residential silencer
[ ] Export box packaging
[ ] Main line circuit breakers
[ ] Remote annunciator panel
[ ] 2 year standby warranty
[ ] 5 year basic power warranty

Accessories and Services

A wide range of products and services is available to match your power generation system requirements. Cummins Onan products and services include:

- Diesel and Spark-Ignited Generator Sets
- Transfer Switches
- Bypass Switches
- Parallel Load Transfer Equipment
- Digital Paralleling Switchgear
- PowerCommand Network and Software
- Distributor Application Support
- Planned Maintenance Agreements

Warranty

All components and subsystems are covered by an express limited one-year warranty. Other optional and extended factory warranties and local distributor maintenance agreements are available.

Other available warranties include: 2-year prime power, 2-year standby, 5-year basic power, 5-year comprehensive power and 10-year major component. The 2-year prime power and the 10-year major component warranties are available in North America only.

Certifications

ISO9001 - This generator set was designed and manufactured in facilities certified to ISO9001.

CSA - This generator set is CSA certified to product class 4215-01.

NFPA Testing - The Prototype Test Support program verifies the performance integrity of the generator set design. Cummins Onan products bearing the PTS symbol meet the prototype test requirements of NFPA 110 for Level 1 systems. A complete representative prototype generator set has been subjected to a number of demanding tests to verify the design integrity and performance under both normal and abnormal operating conditions per the requirements of NFPA 110 for Level 1 systems. Tests include short circuit, endurance, temperature rise, torsional vibration, and transient response, including full load pickup in one step.

See your distributor for more information

Onan Corporation
1400 73rd Avenue N.E.
Minneapolis, MN 55432
612.574.5000
Fax: 612.574.5298

Important: Backfeed to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is open.

Unit SX/EW Fire Water Pump

QSB4.5 (Tier 3)

Overview

The Cummins QSB4.5 achieves Tier 3 and Stage IIIA compliance with in-cylinder technology that maintains a compact, simple installation that provides premium performance to every application.

The QSB4.5 makes every piece of construction equipment work harder, smarter, quieter and longer. Every time. It shares technology with the rest of our highly successful B Series, including charge air cooling and turbocharging for strong performance. Power ratings range from 110-170 hp (82-127 kW).

This engine combines proven full-authority electronic controls with the impressive reliability and durability and long maintenance intervals you expect from one of the world's most successful and durable designs.

Every QSB4.5 has improved cold-start capability and is 5-9 decibels quieter in operation than its predecessor. Plus, it runs as quietly at full load as the previous QSB did with no load! A wide range of features are standard.

To ensure that every QSB4.5 is perfectly matched to every piece of equipment, Cummins PowerMatch and Advisor are ready to provide expert assistance with your spec'ing and installation process.

Every QSB4.5 engine is covered by Cummins three-step warranty, one of the most comprehensive and simplest plans in the industry.

Specifications

Engine Type	In-Line, 4-Cylinder
Displacement	4.5 L* (275 cu in)
Advertised Horsepower	109-170 hp (81-127 kW)
Peak Torque	460 lb-ft (624 N•m)
Aspiration	Turbocharged and Charge Air Cooled
Oil System Capacity	11.6 U.S. qt (11 L*)
Coolant Capacity	9 U.S. qt (8.5 L*)
Length	32.2 in (818 mm)
Width	28.1 in (713 mm)
Height	34.5 in (878 mm)
Wet Weight	818 lb (371 kg)

*L=Liters/Litres

Product Finder Specifications

Markets	**Off-Highway Construction**
Certification Level	Tier 3 / Stage IIIA
Power	109 - 170 hp / 81 - 127 kW
Torque	360 - 460 lb-ft / 488 - 624 N•m

Ratings

Engine Model	Advertised hp (kW) @ rpm	Peak hp (kW) @ rpm	Peak Torque lb-ft (N•m) @ rpm
QSB4.5 170*	170 (127) @ 2500	170 (127) @ 2500	459 (622) @ 1500
QSB4.5 160	160 (119) @ 2500	165 (123) @ 2300	460 (624) @ 1500
QSB4.5 160	160 (119) @ 2400	165 (123) @ 2200	460 (624) @ 1500
QSB4.5 160**	160 (119) @ 2300	165 (122) @ 2200	460 (624) @ 1500
QSB4.5 160	160 (225) @ 2200	168 (125) @ 2000	459 (622) @ 1500
QSB4.5 160**	160 (225) @ 2200	165 (123) @ 2000	460 (624) @ 1500
QSB4.5 155	155 (116) @ 2000	155 (116) @ 2000	460 (622) @ 1500
QSB4.5 152	152 (110) @ 2200	152 (110) @ 2200	405 (537) @ 1500
QSB4.5 148	148 (110) @ 2300	156 (116) @ 2000	441 (598) @ 1500
QSB4.5 139	139 (104) @ 2000	139 (104) @ 2000	371 (503) @ 1800
QSB4.5 132	132 (98) @ 2000	132 (98) @ 2000	368 (499) @ 1500
QSB4.5 130	130 (97) @ 2500	140 (104) @ 2400	459 (622) @ 1500
QSB4.5 130	130 (97) @ 2300	130 (97) @ 2300	377 (511) @ 1500
QSB4.5 130**	130 (97) @ 2200	140 (104) @ 2000	459 (622) @ 1500
QSB4.5 130	130 (97) @ 2000	135 (101) @ 1800	457 (620) @ 1500
QSB4.5 130	130 (97) @ 1800	130 (97) @ 1800	400 (452) @ 1400
QSB4.5 121**	121 (90) @ 2200	121 (90) @ 2200	347 (470) @ 1500
QSB4.5 110	110 (82) @ 2500	115 (86) @ 2300	360 (489) @ 1500
QSB4.5 110**	110 (82) @ 2200	115 (86) @ 2000	360 (489) @ 1500
QSB4.5 110	110 (82) @ 1800	110 (82) @ 1800	360 (488) @ 1300

Additional ratings may be available. Check with your Cummins distributor.

*Indicates a restricted rating.

**Indicates a continuous rating.

Features

The QSB4.5 delivers lasting value for your farming operation, with standard features that include:

- **High Pressure Common Rail Fuel System** - Delivers high injection pressure (1600 bar) for improved performance and fuel efficiency at every rpm
- **In-Cylinder Combustion Technology** - Meets emissions standards without external components; is compatible with high-sulfur fuels for worldwide use
- **Rear Gear Train** - Significantly lowers noise output to meet worldwide noise emission standards
- **Wastegated Turbocharger** - Designed by Cummins Turbo Technology. Wastegated for better low-speed performance and high-speed boost
- **Two-Stage Dual Fuel Filter** - Provides a balanced level of particle separation to maximize fuel filter life and protect vital fuel system components
- **Parent Bore Cylinder Block** - Designed for reduced noise and increased durability
- **Directed Piston Cooling** - Lower piston temperatures lead to longer life
- **Wider Camshaft Lobes and Larger Tappet Wear Surface** - Enhance durability and reliability

Maintenance

The QSB4.5 has been designed for minimal maintenance procedures. Dual stage fuel filtration will improve particle separation and filter life, and protect vital fuel system components. The QSB4.5 is designed to run up to 500 hours between scheduled fuel and oil filter changes.

For complete maintenance information, please consult your Owner's Manual or Operations and Maintenance Manual.

Brochures Available

Search Our Complete Brochure Library for More Product Information >>

Title	Bulletin Number
Cummins Power Products Brochure	4087018
Encompass Tri-Fold Mailer	3624570
Every Solution - Tier 3 Engine Brochure	4087035
QSB Tier 3 for Industrial Applications Spec Sheet	4087063
QSB Tier 3 for Industrial Applications Spec Sheet - French	4087085
Underground Mining Engines Brochure	4087284

Case Studies Available

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Cummins Inc, Box 3005,
Columbus, IN 47202-3005 USA

DG50-2 Generator Set

Electric Power

Unit SX Tankhouse Emergency Generator

Image shown may not reflect actual configuration

Caterpillar is leading the power generation marketplace with Power Solutions engineered to deliver unmatched flexibility, expandability, reliability, and cost-effectiveness.

Specifications

Generator Set Specifications	
Rating (Natural Gas)	50 ekW (50 kVA)
Rating (LP Vapor)	50 ekW (50 kVA)
Voltage	240 Volts
Frequency	60 Hz
Speed	1800 rpm

Generator Set Configurations	
Emissions/Fuel Strategy	U.S. EPA Certified for Stationary Emergency Application

Engine Specifications		
Engine Model		5.7L V8, 4-cycle
Bore	101.6 mm	4.0 in
Displacement	5.7 L	350 in³
Stroke	88.4 mm	3.48 in
Compression Ratio		9.4:1
Aspiration		Naturally Aspirated
Governor Type		Electronic
Fuel Type		Natural Gas, LP Vapor
Fuel Pressure Operating Range*	2.7 - 3.5 kPa	11 - 14 in. water

Package Dimensions**		
Length	2117 mm	83.3 in
Width	1000 mm	39.4 in
Height	1360 mm	53.5 in
Weight†	920 kg	2028 lb

*Optional fuel pressure options may be available, please contact your local dealer.

**Note: For reference only – do not use for installation design. Please contact your local dealer for exact weight and dimensions.

†Weight includes: Oversize generator, skid base, circuit breaker, oil, and coolant.

Benefits & Features

Generator

- Matched to the performance and output characteristics of engine
- Industry-leading mechanical and electrical design
- Industry-leading motor starting capabilities
- High efficiency

Cat® EMCP Control Panel

The EMCP 4 controller features the reliability and durability you have come to expect from your Cat equipment. EMCP 4 is a scalable control platform designed to ensure reliable generator set operation, providing extensive information about power output and engine operation. EMCP 4 systems can be further customized to meet your needs through programming and expansion modules.

Design Criteria

- The generator set facilitates compliance with NFPA 110 and meets ISO 8528-5 requirements for transient response
- Cooling system designed to operate in 50˚C/122˚F ambient temperatures with an air flow restriction of 0.5 in. water

UL 2200/CSA – Optional

- UL 2200 Listed
- CSA Certified

Certain restrictions may apply. Consult with your Cat dealer.

Worldwide Product Support

Cat dealers provide extensive post-sale support including maintenance and repair agreements. Cat dealers have over 1,800 dealer branch stores operating in 200 countries.

Standard Equipment

Air Inlet

- Single element air filter

Cooling

- Radiator and cooling fan complete with protective guards
- Standard ambient temperatures up to 50°C (122°F)

Exhaust

- Exhaust outlet with 3” pipe

Fuel

- Natural Gas or LP Vapor
- Dual lock off valves
- NPT connection

Generator

- Matched to the performance and output characteristics of engine
- IP23 protection
- Integrated Voltage Regulator

Governor

- Electronic governor (non adjustable)

Control Panels

- EMCP 4.2 Series generator set controller

Mounting

- Rubber vibration isolators

Starting/Charging

- 12 volt starting motor
- Batteries with rack and cables

Optional Equipment

Generator

- Excitation: [ ] Permanent Magnet Excited (PM)
- Oversize and premium generators
- Anti Condenstation heater

Starting/Charging

- Battery charger – UL Listed 10 amp
- Jacket water heater
- Battery heater
- Lube oil sump heater

General

- UL 2200 Listed
- CSA Certified
- Enclosures: sound attenuated, weather protective
- Automatic transfer switches (ATS)
- Suitable for Use as Service Equipment (SUSE)

DG50-2
50 ekW/ 50 kVA/ 60 Hz/ 1800 rpm/ 240V/ 1.0 Power Factor

Rating Type: STANDBY **Emissions: U.S. EPA Certified for Stationary Emergency Application**

Image shown may not reflect actual configuration

DG50-2
50 ekW/ 50 kVA
60 Hz/ 1800 rpm/ 240V

Package Performance		
Fuel	Natural Gas	LP Vapor
Generator Set Power Rating with Fan @ 1.0 Power Factor	50 ekW	50 ekW
Generator Set Power Rating	50 kVA	50 kVA

Fuel Consumption with Natural Gas		
100% Load With Fan	20.9 m^3/hr	738 ft^3/hr
75% Load With Fan	18.1 m^3/hr	640 ft^3/hr
50% Load With Fan	13.9 m^3/hr	490 ft^3/hr

Fuel Consumption with LP Vapor		
100% Load With Fan	8.2 m^3/hr	288 ft^3/hr
75% Load With Fan	7.0 m^3/hr	247 ft^3/hr
50% Load With Fan	5.4 m^3/hr	192 ft^3/hr

Cooling System[1]		
Engine Coolant Capacity	7.8 L	2.1 gal
Radiator Coolant Capacity	8.8 L	2.3 gal
Engine Coolant Capacity with Radiator/Exp Tank	16.6 L	4.4 gal
Air Flow Restriction (System)	0.12 kPa	0.48 in. water

Inlet Air		
Combustion Air Inlet Flow Rate	4.9 m^3/min	173 cfm

Rating Type: STANDBY **Emissions: U.S. EPA Certified for Stationary Emergency Application**

Exhaust System		
Exhaust Stack Gas Temperature	743°C	1369°F
Exhaust Gas Flow Rate	15.8 m³/min	553 cfm
Exhaust System Backpressure (maximum allowable)	10.2 kPa	40.9 in. water

Heat Rejection		
Heat Rejection to Coolant (total)	54.9 kW	3120 Btu/min
Heat Rejection to Atmosphere from Generator	5.1 kW	290 Btu/min

Alternator[2]		
Motor Starting Capability @ 30% Voltage Dip	114 skVA	
Frame	LCB1514P	
Temperature Rise	130°C	234°F
Excitation	Self Excited	

Lube System		
Sump Refill with Filter	4.7 L	1.24 gal

Emissions (Nominal)[3]	
NOx + HC	13.4 g/kW-hr
CO	519 g/kW-hr

[1] For ambient and altitude capabilities consult your Cat dealer. Air flow restriction (system) is added to the existing restriction from the factory.

[2] Generator temperature rise is based on a 40°C (104°F) ambient per NEMA MG1-32.

[3] The nominal emissions data shown is subject to environment, instrumentation, measurement, facility and engine to engine variations.

DG50-2
50 ekW/ 50 kVA/ 60 Hz/ 1800 rpm/ 240V/ 1.0 Power Factor

Rating Type: STANDBY **Emissions: U.S. EPA Certified for Stationary Emergency Application**

DEFINITIONS AND CONDITIONS

Applicable Codes and Standards:
CSA C22.2 No 100-04, UL 489, UL 869, UL 2200, NFPA 37, NFPA 70, NFPA 99, NFPA 110, IBC, IEC60034-1, ISO3046, ISO8528, NEMA MG 1-22, NEMA MG 1-33.

STANDBY: Output available with varying load for the duration of the interruption of the normal source power. Average power output is 70% of the standby power rating. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

Ratings are based on SAE J1349 standard conditions. These ratings also apply at ISO3046 standard conditions.

Fuel Rates are based on heat values of 1015 BTU/SCF for Natural Gas and 2500 BTU/SFC for Propane Vapor @77°F (25°C) and 328 ft (100m) above sea level.

Additional ratings may be available for specific customer requirements, contact your Cat representative for details.

Genset Ratings are based on ambient temperature of 77°F and elevation of 1200 ft above sea level.

For higher temperatures and elevations the following derate specifications are to be used:
Altitude: Derate 3.0% per every 1000ft (305 m.) above 1200ft (365 m.)
Temperature: Derate 1.0% per 10°F (5.55°C) temperature above 77°F (25°C)

Feature Code: 57LGE02
Generator Arrangement: 467-6056
Date: 12/03/2018
Source Country: U.S.

LEHE1005-01

www.Cat-ElectricPower.com

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2018 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Power Solutions International, Inc.**
(U.S. Manufacturer or Importer)

Certificate Number: JPSIB5.702ED-019

Effective Date: 10/03/2017

Expiration Date: 12/31/2018

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 10/03/2017

Revision Date: N/A

Manufacturer: Power Solutions International, Inc.
Engine Family: JPSIB5.702ED
Mobile/Stationary Certification Type: Stationary
Fuel : Natural Gas (CNG/LNG)
LPG/Propane
Emission Standards :
Part 90 Phase 1
NMHC + NOx (g/kW-hr) : 13.4
HC + NOx (g/kW-hr) : 13.4
CO (g/kW-hr) : 519.0
Emergency Use Only : Y

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 60, 1065, 1068, and 60 (stationary only and combined stationary and mobile) and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following nonroad engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new nonroad spark-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60. This certificate of conformity does not cover nonroad engines imported prior to the effective date of the certificate.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.20 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover large nonroad engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

Polic□□ C□RB □mission Factors for CI Diesel □n□ines □ Percent HC in Relation to NMHC □ NO□

Policy

When the non-methane hydrocarbon (NMHC) and nitrogen oxide (NOx) emission factor is combined, assume a breakdown of 5% and 95%, respectively.

Effective date

June 28, 2004

Definitions

The following is a list of associated definitions.

- ***CI Engine*** – Compression Ignition Engine is an internal combustion engine with operating characteristics significantly similar to the theoretical diesel combustion cycle.
- ***HC*** – Organic compound consistently entirely of hydrogen and carbon.
- ***NMHC*** – Non-Methane Hydrocarbon is the sum of all hydrocarbon air pollutants except methane.
- ***NOx*** – Nitrogen Oxides are compounds of nitric oxide (NO), nitrogen dioxide (NO_2), and other oxides of nitrogen, which are typically created during combustion processes.

Contact

Randy Frazier, x4672

Document Control

Version	Revised By	Description	Date
1.1	HL	New Policy: CARB Emission Factors – Percent HC in Relation to NMHC + NOx	06/28/04
1.2	MCL	Mapping of Policy	3/13/08

Approval

Name & Title	Signature	Date
Brian Bateman, Director of Engineering	**Signed by Brian Bateman**	2/28/2008

Section 7

Information Used to Determine Emissions

SX/EW Mixer/Settler Tank and Raffinate Tanks (Units SX/EW-1, SX/EW-3, and SX/EW-4)

- "Quantification of Volatile Organic Compound Emissions from the Solvent Extraction Process" prepared for BHP Copper, July 16, 1997.

QUANTIFICATION OF VOLATILE ORGANIC COMPOUND EMISSIONS FROM THE SOLVENT EXTRACTION PROCESS

SAN MANUEL OPERATIONS

SAN MANUEL, ARIZONA

Prepared for

BHP COPPER

July 15, 1997

Prepared by

EMCON
3922 East University Drive, Suite 7
Phoenix, Arizona 85034-7223

Project 22537-303.003

CONTENTS

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1 INTRODUCTION

BHP Copper (BHP) operates a copper mining facility in the town of San Manuel, Arizona. Operations at the San Manuel Operations (SMO) include an underground block caving system sulfide ore mine and a leach facility for recovery of oxide ores. Sulfide ores are processed at the SMO mill and smelter, and the pregnant leach solution from the oxide ore heaps is processed at the SMO solvent extraction/electrowinning (SXEW) facility.

Over the past two years BHP has made several attempts to quantify the emissions from the solvent extraction (SX) facility. The approaches taken to date include a pan evaporation emissions estimating method, modeling using the U.S. Environmental Protection Agency's TANKS and WATER8 models, and a mass balance over the processing unit. None of these approaches resulted in a reasonable emissions estimate.

Subsequently, BHP has had the headspace in the tankhouse tested to determine the concentrations of volatile organic compounds (VOCs) in general and specific hazardous air pollutants (HAPs) in the air above the solvent extraction solution. Initial testing was performed on the solvent tanks and raffinate pond using gas chromatography - mass spectrometry (GC-MS). Samples were collected in Tedlar® bags and analyzed in an off-site laboratory. In addition, a second technology, Fourier transform infrared spectroscopy (FTIR), was utilized to measure near-real time concentrations above the solution while the GC-MS samples were being collected. The FTIR system employed at BHP San Manuel was an open path configuration consisting of optical components, a computer, special software, and spectral references against which field measurements are compared. Concurrent climatological measurements were taken during the headspace sampling including air temperature (dry bulb), wet bulb temperature, solution temperation, wind speed and direction, and solar radiation. Statistical analyses were performed to determine whether or not the concentrations of VOCs in the tank house were dependent on climatological conditions. This study indicated that no dependence exists and did not result in any more reasonable emission rate from the SX tanks and raffinate pond.

2 OVERALL APPROACH

The overall approach taken in this part of the ongoing solvent extraction study at San Manuel was to estimate the emissions of VOCs from the SX tanks and raffinate pond. A diffusive flux calculation was used to perform the estimate. The results of the FTIR and GC-MS chemical analysis previously conducted were used in the diffusive flux calculation.

3 DIFFUSIVE FLUX CALCULATIONS

In order to estimate the emissions from the SX tanks, the diffusive flux was calculated for three separate scenarios. Since bulk mass transfer is already accounted for in the flows to and from other parts of the process, diffusion is expected to be the only significant contributor to mass removal from the SX tanks remaining. The result of the calculation is a flux with units of g/m^2*s. Given the surface area of each tank, a ton/year emission rate can be calculated.

3.1 Problem Statement

The SX tanks at BHP San Manuel are essentially enclosed by the tank house on the top and three sides and left open on the fourth side. There has been some difficulty in developing an emissions estimating technique for these tanks because of the partial enclosure. In a completely open or completely enclosed configuration, common engineering assumptions could be applied to estimate the emissions from these tanks. However since the tanks fall in between the easily modeled scenarios, concentration data were required in order to make this estimate. Given the concentration data, the diffusive flux calculations described in the following section were performed. Since analytical results of the air above the raffinate pond were available, the same calculations were performed for that area.

3.2 Assumptions and Procedure

3.2.1 Assumptions

Several assumptions were made in the process of performing this calculation. The first was made to narrow down the list of chemicals that can potentially volatilize from the tanks and the pond. Using the chemical details provided by Phillips Petroleum (Phillips), the vapor pressures of the listed chemicals were used to decide which components may volatilize and which are likely to remain in solution. Only those chemicals with a significant vapor pressure were included in the emissions losses calculation. After this analysis, all components except naphthalene were included in the total VOCs calculation.

A second assumption pertains to the concentrations of each compound at the solution surface and in the headspace of the tank house. The driving force for diffusion is the concentration gradient that exists between the surface of the solution and the headspace. The concentrations provided by Phillips were used as the initial concentrations for each volatile component. The headspace concentrations were taken from GC-MS data previously collected at the San Manuel SX tanks. An average concentration reported for the sampling period was used as the headspace concentration for each chemical. The concentration measurements were made at approximately one meter above the liquid surface. This is thought to be reasonable since the samples were collected at various locations in each tank. FTIR data confirms the trends observed in the GC-MS data.

Finally, it was assumed that the partial enclosure of the tanks effectively limits the ventilation of the headspace over each tank. This was confirmed by measurements of little or no wind speed within the enclosed headspace. For this exercise it was conservatively estimated that approximately two-thirds of the headspace in each tank is affected by the tank enclosure and that the enclosure allows only about 50 percent of the affected headspace to vent to the atmosphere. This results in an overall control efficiency of 33 percent.

3.2.2 Procedure

The diffusive flux calculation began with the elimination of naphthalene as a chemical of concern from an emissions perspective. In order to accomplish this, the vapor pressure for each chemical listed by Phillips was found and listed. The list of vapor pressures is presented in Table 1. The Phillips chemical component report is included as Appendix A. Based on this list, it was determined that naphthalene has such a low vapor pressure that any losses due to volatilization would be insignificant relative to the other components considered. The remainder of the list was considered in this analysis.

In order to calculate the diffusive flux of each species, the diffusivity in air, $D_{i\text{-}air}$, must be known for each component (where 'i' is the component of interest). Diffusivities can be calculated using any of several methods. The Fuller, Schettler, and Giddings (FSG) method was used for the calculation in this project. Diffusivities were calculated using the following formula:

$$D_{A\text{-}B} = \frac{10^{-3} * T^{1.75} [(M_A + M_B)/M_A M_B]^{1/2}}{P[(\Sigma v)_A^{1/3} + (\Sigma v)_B^{1/3}]^2}$$

where:

$D_{A\text{-}B}$ = The diffusivity of gas A in gas B (cm^2/s)

T = Temperature (K)
M_i = Molecular weight of the species (g/gmole)
P = Pressure (atm)
ν = Sum of atomic diffusion volume increments by atom and structure

The calculated diffusivity for each component is shown in Table 2. Because the GC-MS did not distinguish between some the larger hydrocarbon species, the analytical results for these components were reported as GC-MS kerosene. For this analysis it was assumed that anything listed by Phillips that was not specifically reported on the GC-MS analysis was in this category. These are noted as 'others' throughout this analysis. The diffusivity for each of the Phillips-listed components in this category was calculated, and a common diffusivity was derived which accounted for each individual contribution based on the concentration in solution.

Typically, single components will behave differently in a mixture than they do in a binary system. The diffusivities for three chemicals were calculated to determine the effects of the mixture on the binary system calculations. The diffusivities in the mixture were not significantly different from those for the binary systems. The previously calculated diffusivities, therefore, were not altered.

The diffusive flux of each component was calculated according to Fick's First Law which can be written as:

$$F = (C_i^0 - C_i^H)D/H$$

where:

F = Diffusive flux of component 'i' in air (g/m^2-s)
Ci^0 = Component concentration at the surface (g/m^3)
Ci^H = Component concentration at the measured height (g/m^3)
D = Diffusivity of the chemical in air (m^2/s)
H = Height at which concentration measurement was taken (m)

The calculated diffusive fluxes and the resulting annual emission rates for the SX tanks are shown in Table 3. Annual emissions rates were calculated by multiplying the flux by the total area of the 12 tanks at San Manuel and the number of seconds per year. The calculated diffusive fluxes and resulting annual emission rates for the raffinate pond are given in Table 4.

REFERENCES

Bird, R. B., W. E. Stewart, and E. N. Lightfoot, *Transport Phenomena*, John Wiley & Sons, New York City, NY, 1960.

Green, D. W., *Perry's Chemical Engineers' Handbook*, 6th ed., McGraw-Hill Inc., San Francisco, CA, 1984.

"Volatile Organics Emission Testing, Solvent Extraction Facility, San Manuel Mining Division," EMCON, 1996.

TABLES

TABLE 1
VAPOR PRESSURES OF CHEMICAL CONSTITUENTS

Component	Vapor Pressure (mm Hg)
benzene	77.2
toluene	22.4
ethylbenzene	7.5
m-xylene	6.4
o-xylene	4.97
p-xylene	6.9
n-octane	10.6
n-heptane	36.4
n-hexane	126.6
pentane	430.7
naphthalene	0.054
1,2,4-trimethylbenzene	2.04
1,3,5-trimethylbenzene	7.34

TABLE 2
CALCULATED CHEMICAL DIFFUSIVITIES

Component	M.W. (g/gmole)	Diffusion Volume (v)	$D_{A\text{-}air}$	C_A (ppmv)
air	28.97	20.1		
benzene	78.11	90.68	0.0894	25
toluene	92.13	111.14	0.0804	350
ethylbenzene	106.16	131.6	0.0736	1400
octane	114.22	167.64	0.0656	2300
m-xylene	106.16	131.6	0.0736	410
o-xylene	106.16	131.6	0.0736	770
p-xylene	106.16	131.6	0.0736	732
heptane	100.2	147.18	0.0705	66.67
hexane	86.17	129.72	0.0758	66.67
pentane	72.15	106.26	0.0846	66.67
1,2,4-trimethylbenzene	120.19	172.26	0.0645	385
1,3,5-trimethylbenzene	120.19	172.26	0.0645	385

TABLE 3
SOLVENT EXTRACTION TANKS DIFFUSIVE FLUXES AND CALCULATED ANNUAL EMISSIONS

Component	$D_{i\text{-}air}$ (cm^2/s)	Molecular Wt. (g/gmole)	C_i^0 (ppmv)	C_i^H (ppmv)	H (m)	C_i^0 (g/m^3)	C_i^H (g/m^3)	Diff F (g/m	Controlled Emission Rate* (ton/yr-tank)	Controlled Emission Rate* (ton/yr)
benzene	0.09	78.11	25	0.0018	1	0.079965	5.76E-06	7.2E-07	0.007475238	0.089702855
toluene	0.08	92.13	350	0.0668	1	1.320453	0.000252	1.06E-05	0.109709274	1.316511282
ethylbenzene	0.07	106.16	1400	0.0568	1	6.086153	0.000247	4.26E-05	0.442523663	5.31028395
xylenes	0.07	106.16	1912	0.0371	1	8.311946	0.000161	5.82E-05	0.604373681	7.252484173
others	0.07	112.06	2500	16.921	1	11.47214	0.077648	7.98E-05	0.828526356	9.942316269
1,2,4-trimethylbenzen	0.06	120.19	385	0.0230	1	1.894885	0.000113	1.14E-05	0.118092279	1.417107343
1,3,5-trimethylbenzen	0.06	120.19	385	0.0101	1	1.894885	4.97E-05	1.14E-05	0.118096236	1.417154828
									2.228796725	26.7455607

* Controlled emission rate is based on the conservative assumption that each tank is 66% enclosed and that the enclosure results in a 50 % control of VOC emissions. The uncontrolled emission rate is, therefore, reduced by 66% x 0.5 = 33%.

TABLE 4
RAFFINATE POND DIFFUSIVE FLUXES AND CALCULATED ANNUAL EMISSIONS

Component	$D_{i\text{-}air}$ (cm^2/s)	Molecular Wt. (g/gmole)	C_i^0 (ppmv)	CiH (ppmv)	H (m)	Ci0 (g/m^3)	CiH (g/m^3)	Diff. F (g/m^2-s)	Uncontrolled Emission Rate (ton/yr)
benzene	0.09	78.11	25	0.0011	1	0.08014086	3.5262E-06	7.21236E-07	0.011181906
toluene	0.08	92.13	350	0.00645	1	1.32335532	2.43875E-05	1.05866E-05	0.164133366
ethylbenzene	0.07	106.16	1400	0.001	1	6.09952896	4.35681E-06	4.26967E-05	0.661961073
xylenes	0.07	106.16	1912	0.00198	1	8.33021384	8.62648E-06	5.83114E-05	0.904049404
others	0.07	112.06	2500	3.983	1	11.497356	0.018317588	8.03533E-05	1.245781775
1,2,4-trimethylbenzene	0.06	120.19	385	0.0022	1	1.89905008	1.08517E-05	1.13942E-05	0.176654054
1,3,5-trimethylbenzene	0.06	120.19	385	0.00103	1	1.89905008	5.08058E-06	1.13943E-05	0.176654591
									3.34041617

APPENDIX A

PHILLIPS CHEMICAL REPORT

PHILLIPS 66 MINING CHEMICALS

309 Short Street
Bartlesville Oklahoma 74004
Telephone 918-661-8617
Telex 49-2455
TWX 910-841-2560

July 19, 1996

Mr. John Kline
BHP Copper
Florence Project
14605 E. Hunt Highway
Florence, AZ 85232

Facsimile #: 520-868-0463

Dear Mr. Kline:

We have reviewed the July 15, 1992, list of chemicals shown in Arizona Ambient Air Quality Guidelines. This list is the most recent we have avaliable and was supplied to us on February 13, 1996. The following compounds are listed in the Guidelines and are present in Orfom® SX 7 solvent extraction diluent.

Substance Name	CAS #	Formula	Typical Concentration
Benzene	71-43-2	C_6H_6	20 - 30 ppm
Ethylbenzene	100-41-4	C_8H_{10}	1400 ppm
Naphthalene	91-20-3	$C_{10}H_8$	3100 ppm
Octane	111-65-9	C_8H_{18}	0.23%
Toluene	108-88-3	C_7H_8	350 ppm
Xylene (meta)	108-38-3	C_8H_{10}	410 ppm
Xylene (ortho)	95-47-6	C_8H_{10}	770 ppm
Xylene (para)	106-42-3	C_8H_{10}	732 ppm

Although the Guidelines did not specify the octane isomer in question, the CAS number indicates n-octane is the specific chemical substance. We have not analyzed specifically for n-octane. The typical concentration of all C_8 isomers is 0.23%. SX 7 is likely to contain some n-octane, but the concentration would be expected to be significantly less than the total C_8 concentration.

We have not specifically analyzed for the following chemical substances:

n-Heptane	142-82-5	C_7H_{14}
n-Hexane	110-54-3	C_6H_{14}
Pentane	109-66-0	C_5H_{12}

We do, however, have information on the hydrocarbon distribution. The total combined concentration of C_7 and lower hydrocarbons is less than 200 ppm. This would indicate that the concentration of n-heptane, n-hexane, and pentane would be very low. The CAS number listed in the guidelines for pentane is specific to n-pentane.

Neither have we analyzed for the following specific chemical substances:

1,2,4 trimethylbenzene	95-63-6	C_9H_{12}
1,3,5 trimethylbenzene	108-67-8	C_9H_{12}

Again, referring to the hydrocarbon distribution, the total C_9 concentration is about 0.5%. Therefore, we would expect the levels of these two substances to be very low, if they are present at all.

A copy of the carbon number distribution for your information is attached.

The molecular formulas, shown in the Guidelines, for n-heptane, n-hexane, and octane are incorrect. The correct formulas are provided above.

I hope this information proves helpful. Please do not hesitate to call either Tom Young at 520-742-3440, or me at 800-221-1956, if you have any questions or require additional information.

Sincerely,

Marshall D. Bishop

Marshall D. Bishop
MiningChemicalsDirector

MDB:lja

cc: T. L. Young

ORFOM® SX 7 SOLVENT EXTRACTION DILUENT

TYPICAL CARBON NUMBER DISTRIBUTION

CARBON NUMBER	WEIGHT PERCENT
< OR = C_7	0.02
C_8	0.12
C_9	0.56
C_{10}	2.76
C_{11}	8.06
C_{12}	17.11
C_{13}	22.89
C_{14}	19.52
C_{15}	15.25
C_{16}	10.29
C_{17}	2.72
C_{18}	0.65
> or = C_{19}	0.05

APPENDIX B

SAN MANUEL ANALYTICAL RESULTS AND FLOW DATA

BHP

ENVIRONMENTAL
BHP Copper

Facsimile Communication

DATE. 11/20/96

TO: EMCON

ATTENTION: Illa Amerson

FACSIMILE NUMBER: (602) 470-0567

FROM. Brent Fletcher

TOTAL NUMBER OF PAGES INCLUDING THIS HEADER. 1

If there are any problems with this transmission please telephone (520) 385-3699

OUR FAX NUMBER IS SAN MANUEL. (520) 385-3349

Illa, It is my understanding that the flow rates listed below are the most current. Any additional flow information you may need for the SX mass balance can be obtained from Wendy Gort at ext. 8665 or myself at ext. 3699.

SX feed - 18,500 gpm
Lean Electrolyte - 1,250 gpm
Raffinate in - 18,500
Raffinate out to leach dumps - 11,000 gpm
Raffinate out to in-situ - 8,000 gpm
Leachate - 3 to 3.5 million gallons per month

Brent R. Fletcher
Environmental Engineer

Del Mar Analytical

2852 Alton Ave., Irvine, CA 92714 (714) 261-1022 FAX (714) 261-
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1
19545 Sherman Way, Suite C-1, Van Nuys, CA 91406 (818) 779-1844 FAX (818) 779-1
2465 W. 12th St., Suite 1, Tempe, AZ 85281 (602) 968-8272 FAX (602) 968-1

per Co.-San Manuel
eddington Rd
el, AZ 85631
Brent Fletcher

Client Project ID: SXEW Mass Balance
Analysis Method: EPA 418.1 (I.R. with clean-up)
First Sample #: 6110323

Sampled: Nov 5, 1996
Received: Nov 7, 1996
Extracted: Nov 8, 1996
Analyzed: Nov 8, 1996
Reported: Nov 12, 1996

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (EPA 418.1)

atory her	Sample Description Liquid	Petroleum Hydrocarbons mg/L (ppm)
23	Lean Electrolyte	N.D.
24	SX-Feed	N.D.
25	Raffinate	1.2
26	Leachate	N.D.

imit:	1.0

ed as N.D. were not present above the stated limit of detection.

ANALYTICAL, PHOENIX (AZ0426)

ndez
ager

Del Mar Analytical

2852 Alton Ave., Irvine, CA 92714 (714) 261-1022 FAX (714) 261-1...
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1...
6525 Sherman Way, Suite C-11, Van Nuys, CA 91405 (818) 779-1844 FAX (818) 779-1...
2465 W. 12th St., Suite 1, Tempe, AZ 85281 (602) 968-8272 FAX (602) 968-1...

Copper Co.-San Manuel
Reddington Rd
Manuel, AZ 85631
on: Brent Fletcher

Client Project ID: SXEW Mass Balance
Analysis Method: EPA 418.1 (I.R. with clean-up)
First Sample #: 3110319

Sampled: Nov 6, 1996
Received: Nov 7, 1996
Extracted: Nov 12, 1996
Analyzed: Nov 12, 1996
Reported: Nov 12, 1996

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (EPA 418.1)

oratory umber	Sample Description Water	Petroleum Hydrocarbons mg/L (ppm)
10319	Lean Electrolyte	N.D.
0320	SX-Feed	N.D.
0321	Raffinate	2.1
0322	Leachate	N.D.

n Limit:	1.0

ported as N.D. were not present above the stated limit of detection.

R ANALYTICAL, PHOENIX (AZ0426)

snendez
Manager

Del Mar Analytical

2852 Alton Ave., Irvine, CA 92714 (714) 261-1022 FAX (714) 261-1228
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
16525 Sherman Way, Suite C-11, Van Nuys, CA 91406 (818) 779-1844 FAX (818) 779-1843
2465 W. 12th St., Suite E, Tempe, AZ 85281 (602) 968-8272 FAX (602) 968-1331

per Co.-San Manuel
eddington Rd
el, AZ 85631
Brent Fletcher

Client Project ID: SXEW Mass Balance
Analysis Method: EPA 418.1 (I.R. with clean-up)
First Sample #: 6110315

Sampled: Nov 4, 1996
Received: Nov 7, 1996
Extracted: Nov 8, 1996
Analyzed: Nov 8, 1996
Reported: Nov 12, 1996

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (EPA 418.1)

tory ber	Sample Description Water	Petroleum Hydrocarbons mg/L (ppm)
15	Lean Electrolyte	N.D.
16	SX-Feed	N.D.
17	Raffinate	N.D.
18	Leachate	N.D.

Limit:	1.0

orted as N.D. were not present above the stated limit of detection.

ANALYTICAL, PHOENIX (AZ0426)

nendez
nager

Del Mar Analytical

[illegible] Alton Ave., Irvine, CA 92714 (714) 261-1022 FAX (714) 261-1228
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
16639 Sherman Way, Suite C-11, Van Nuys, CA 91406 (818) 779-1844 FAX (818) 779-1843
2465 W. 12th St., Suite 1, Tempe, AZ 85281 (602) 968-8272 FAX (602) 968-8539

per Co.-San Manuel
eddington Rd
Del, AZ 85631
Brent Fletcher

Client Project ID: SXEW Mass Balance
Sample Descript: Water
First Sample #: 8110315

Sampled: Nov 4, 1996
Received: Nov 7, 1996
Extracted: Nov 13, 1996
Analyzed: Nov 13 1996
Reported: Nov 14 1996

TOTAL ORGANIC CARBON (EPA 415.2)

atory nber	Sample Description	Detection Limit mg/L (ppm)	Sample Result mg/L (ppm)
315	Lean Electrolyte	1.0	6.1
316	SX-Feed	1.0	5.1
317	Raffinate	1.0	6.3
318	Leachate	1.0	90

ompleted at Del Mar Analytical-IRVINE (AZ0428)

ported as N.D. were not present above the stated limit of detection.

AR ANALYTICAL, PHOENIX (AZ0428)

mendez
anager

el Mar Analytical

2852 Alton Ave. Irvine, CA 92714 (714) 261-1022 FAX (714) 261-1228
1014 E. Cooley Dr. Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
16520 Sherman Way, Suite C-1, Van Nuys, CA 91406 (818) 779-1844 FAX (818) 779-1843
2466 W. 12th St. Suite 1, Tempe, AZ 85281 (602) 968-8272 FAX (602) 968-1358

r Co.-San Manuel	Client Project ID: SXEW Mass Balance	Sampled:	Nov 5, 1996
ington Rd		Received:	Nov 7, 1996
, AZ 85631	Sample Descript: Liquid	Extracted:	Nov 13, 1996
rent Fletcher	First Sample #: 6110323	Analyzed:	Nov 13, 1996
		Reported:	Nov 14, 1996

TOTAL ORGANIC CARBON (EPA 415.2)

ory / Qr	Sample Description	Detection Limit mg/L (ppm)	Sample Result mg/L (ppm)
	Lean Electrolyte	1.0	4.8
	SX-Feed	1.0	5.1
	Raffinate	1.0	6.8
	Leachate	10	92

pleted at Del Mar Analytical-IRVINE (AZ9426)

rted as N.D. were not present above the stated limit of detection.

ANALYTICAL, PHOENIX (AZ0426)

endez
nager

Del Mar Analytical

2852 Alton Ave., Irvine, CA 92714 (714) 261-1022 FAX (714) 261-1
1014 E. Cooley Dr. Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1
16520 Sherman Way, Suite C-11, Van Nuys, CA 91406 (818) 779-1844 FAX (818) 779-1
2465 W. 12th St., Suite 1, Tempe, AZ 85281 (602) 968-8272 FAX (602) 968-1

per Co.-San Manuel
ddington Rd
el, AZ 85631
Brent Fletcher

Client Project ID: SXEW Mass Balance
Sample Descript: Water
First Sample #: 6110319

Sampled: Nov 6, 1996
Received: Nov 7, 1996
Extracted: Nov 13, 1996
Analyzed: Nov 13, 1996
Reported: Nov 14, 1996

TOTAL ORGANIC CARBON (EPA 415.2)

tory per	Sample Description	Detection Limit mg/L (ppm)	Sample Result mg/L (ppm)
19	Lean Electrolyte	2.0	3.9
20	SX-Feed	2.0	3.7
21	Raffinate	2.0	4.4
22	Leachate	10	110

pleted at Del Mar Analytical-IRVINE (AZ0428)

ted as N.D. were not present above the stated limit of detection.

ANALYTICAL, PHOENIX (AZ0428)

ndez
ager

Del Mar Analytical

[illegible] Acton Ave., Irvine, CA 92714 (714) 261-1022 FAX (714) 261-1228
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
16525 Sherman Way, suite C-11, Van Nuys, CA 91406 (818) 779-1844 FAX (818) 779-1843
2655 W. 12th St., Suite 1, Tempe, AZ 85281 (602) 968-8272 FAX (602) 968-4539

per Co.-San Manuel
oddington Rd
el, AZ 85631
Brent Fletcher

Client Project ID: SXEW Mass Balance
Sample Descript: Water
First Sample #: 6110315

Sampled: Nov 4, 1996
Received: Nov 7, 1996
Extracted: Nov 13, 1996
Analyzed: Nov 13 1996
Reported: Nov 14 1996

TOTAL ORGANIC CARBON (EPA 415.2)

atory nber	Sample Description	Detection Limit mg/L (ppm)	Sample Result mg/L (ppm)
315	Lean Electrolyte	1.0	6.1
16	SX-Feed	1.0	5.1
17	Raffinate	1.0	6.3
18	Leachate	1.0	90

ompleted at Del Mar Analytical-IRVINE (AZ0428)

ported as N.D. were not present above the stated limit of detection.

R ANALYTICAL, PHOENIX (AZ0426)

mendez
anager

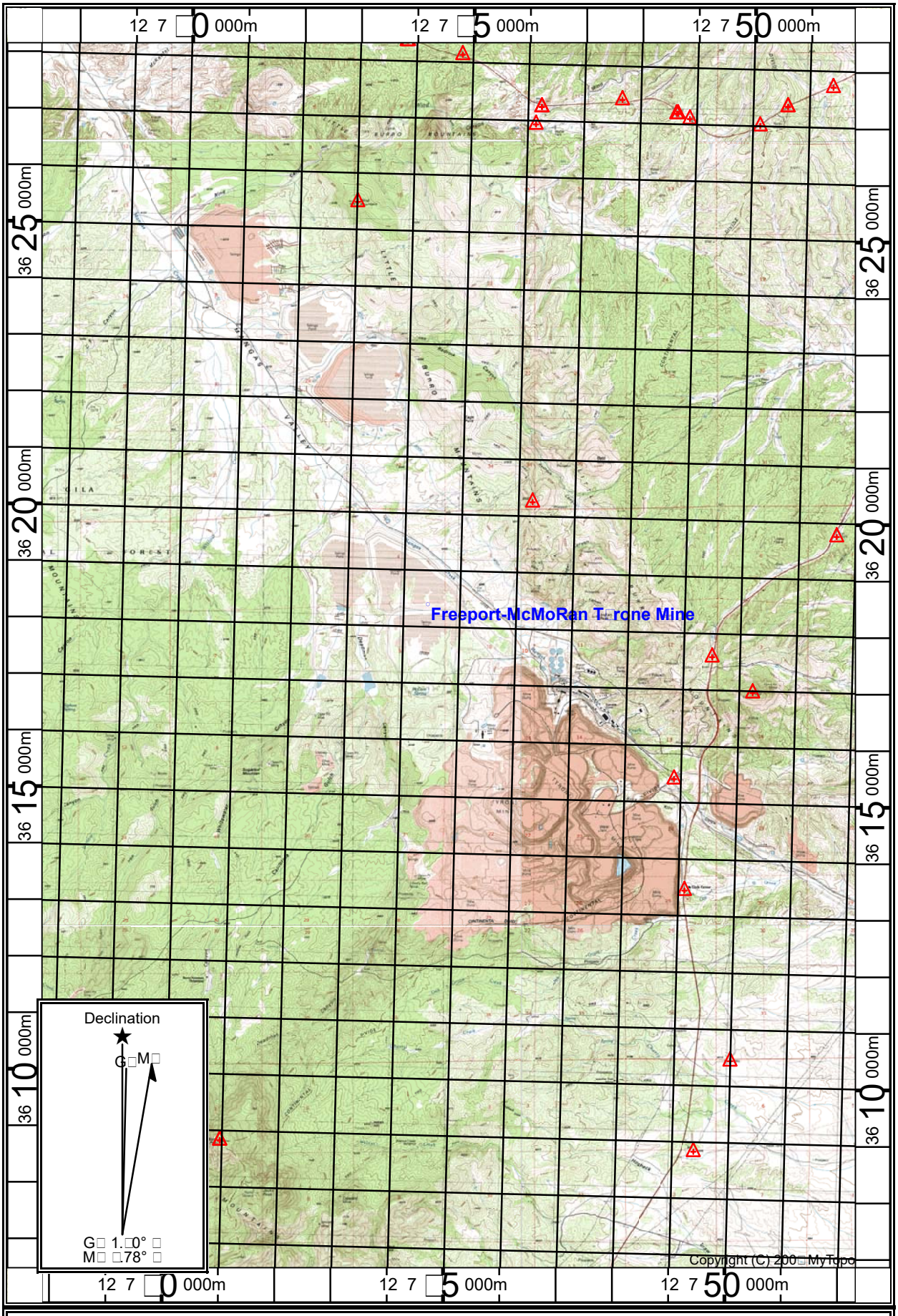
Section 8

Map(s)

A map such as a 7.5 minute topographic quadrangle showing the exact location of the source. The map shall also include the following:

The UTM or Longitudinal coordinate system on both axes	An indicator showing which direction is north
A minimum radius around the plant of 0.8km (0.5 miles)	Access and haul roads
Topographic features of the area	Facility property boundaries
The name of the map	The area which will be restricted to public access
A graphical scale	

Please see the enclosed quad map.



Map □ame: WI□D MT
Print Date: 06/06/2019

Scale: 1 inch □ 8□000 ft.
Map Center: 12 07□□818 □ 3617[illegible]

Hori□ontal Datum: WGS8□

Section 9

Proof of Public Notice

(for NSR applications submitting under 20.2.72 or 20.2.74 NMAC)
(This proof is required by: 20.2.72.203.A.14 NMAC "Documentary Proof of applicant's public notice")

☑ **I have read the AQB "Guidelines for Public Notification for Air Quality Permit Applications"**
This document provides detailed instructions about public notice requirements for various permitting actions. It also provides public notice examples and certification forms. Material mistakes in the public notice will require a re-notice before issuance of the permit.

Unless otherwise allowed elsewhere in this document, the following items document proof of the applicant's Public Notification. Please include this page in your proof of public notice submittal with checkmarks indicating which documents are being submitted with the application.

New Permit and **Significant Permit Revision** public notices must include all items in this list.

Technical Revision public notices require only items 1, 5, 9, and 10.

Per the Guidelines for Public Notification document mentioned above, include:

1. ☑ A copy of the certified letter receipts with post marks (20.2.72.203.B NMAC)
2. ☑ A list of the places where the public notice has been posted in at least four publicly accessible and conspicuous places, including the proposed or existing facility entrance. (e.g: post office, library, grocery, etc.)
3. ☑ A copy of the property tax record (20.2.72.203.B NMAC).
4. ☑ A sample of the letters sent to the owners of record.
5. ☑ A sample of the letters sent to counties, municipalities, and Indian tribes.
6. ☑ A sample of the public notice posted and a verification of the local postings.
7. ☑ A table of the noticed citizens, counties, municipalities and tribes and to whom the notices were sent in each group.
8. ☑ A copy of the public service announcement (PSA) sent to a local radio station and documentary proof of submittal.
9. ☑ A copy of the classified or legal ad including the page header (date and newspaper title) or its affidavit of publication stating the ad date, and a copy of the ad. When appropriate, this ad shall be printed in both English and Spanish.
10. ☑ A copy of the display ad including the page header (date and newspaper title) or its affidavit of publication stating the ad date, and a copy of the ad. When appropriate, this ad shall be printed in both English and Spanish.
11. ☑ A map with a graphic scale showing the facility boundary and the surrounding area in which owners of record were notified by mail. This is necessary for verification that the correct facility boundary was used in determining distance for notifying land owners of record.

Please see the enclosed proof of public notice.

Section 9 - Public Notice

Property Owners

Recipient	Address		City	State	Zip Code
Pacific Western Land Company		PO Box 571	Tyrone	NM	88065
U Bar Ranch	HCR 88061-Box 10199	Hwy 180 W.	Silver City	NM	88061
Las Cruces District Office	Bureau of Land Management	1800 Marquess Street	Las Cruces	NM	88005
Mr. George Bender & Diana L. Bender		PO Box 1126	Silver City	NM	88062
US Forest Service		3005 Camino del Bosque	Silver City	NM	88061
Annie A. Brown Estate Trust c/o James McCauley		PO Box 1497	Silver City	NM	88062
Mr. David C. & Mary Dee Estes		215 E. 7th Street	Safford	AZ	85546
Cordova Associates		1039 E. Badillo St.	Covina	CA	91724
Mr. David R. Woodward		PO Box 231	Tyrone	NM	88065
Mr. Jason & Julie Turner		PO Box 2222	Silver City	NM	88062
LT Ranch LLC		PO Box 1497	Silver City	NM	88062

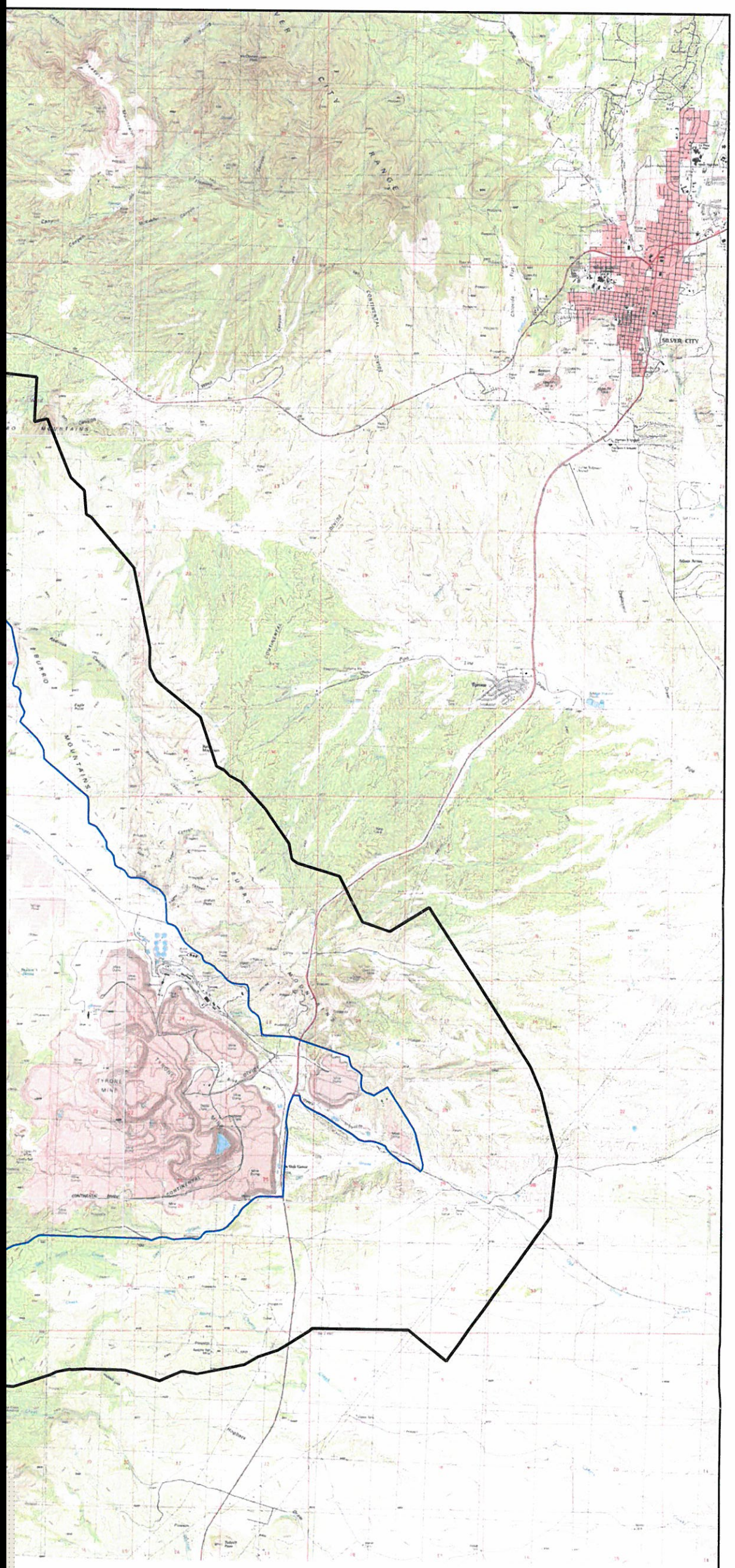
Municipalities

Recipient	Address		City	State	Zip Code
Mr. Alex Brown	Manager, Town of Silver City	PO Box 1188	Silver City	NM	88062
The Honorable Ken Ladner	Mayor, Town of Silver City	PO Box 1188	Silver City	NM	88062

Counties

Recipient	Address		City	State	Zip Code
Ms. Charlene Webb	Manager, County of Grant	PO Box 898	Silver City	NM	88062

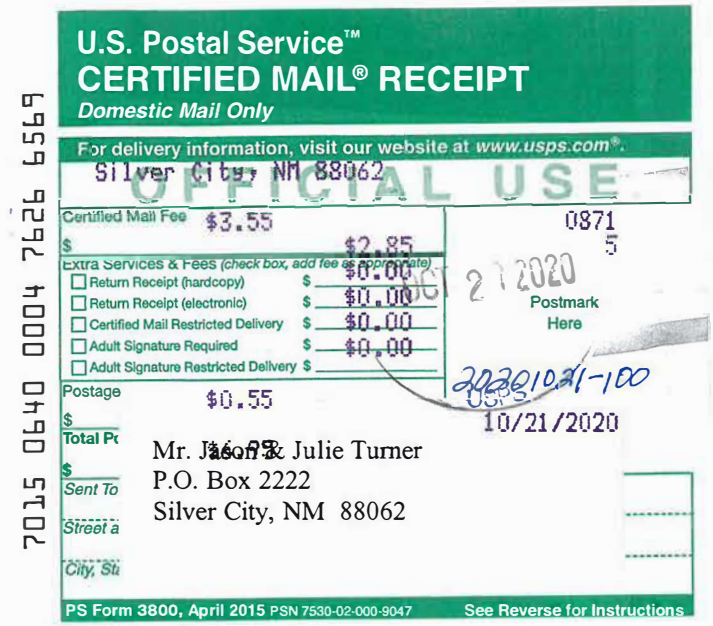
There are no Indian Tribes within a 10 mile radius of the facility boundary.



FREEPORT-McMoRan COPPER & GOLD

Public Notice Property Boundary

Scale: As Noted	Date:	Notes:
Dept. Environmental Services		
Drawn By: mm	Checked By: cm	



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Silver City, NM 88062

OFFICIAL USE

Certified Mail Fee $3.55
Extra Services & Fees (check box, add fee as appropriate)
- Return Receipt (hardcopy) $2.85
- Return Receipt (electronic) $0.00
- Certified Mail Restricted Delivery $0.00
- Adult Signature Required $0.00
- Adult Signature Restricted Delivery $

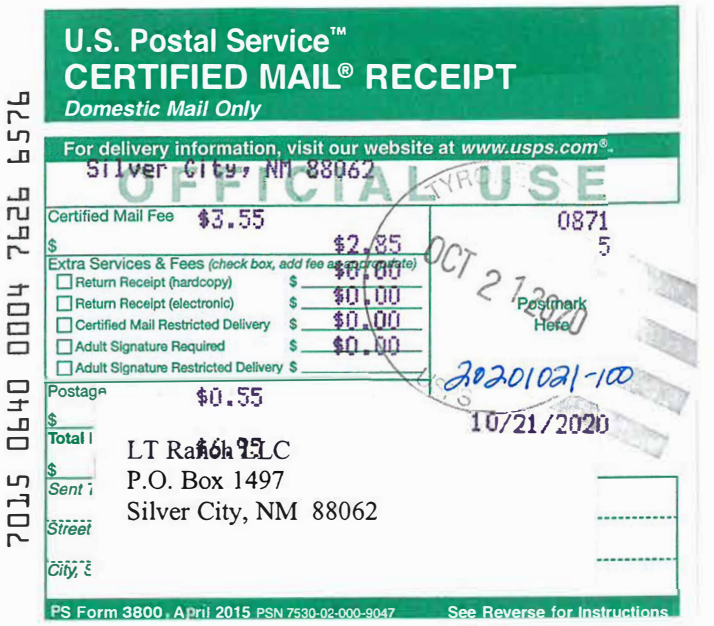
Postage $0.55
Total Postage & Fees $6.95

0871 5
OCT 21 2020
Postmark Here
20201021-100
10/21/2020

Sent To: Mr. Jason & Julie Turner
Street and Apt. No.: P.O. Box 2222
City, State, ZIP+4®: Silver City, NM 88062

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

7015 0640 0004 7626 6569



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- Adult Signature Required $0.00
- Adult Signature Restricted Delivery $

Postage $0.55
Total Postage & Fees $6.95

0871 5
OCT 21 2020
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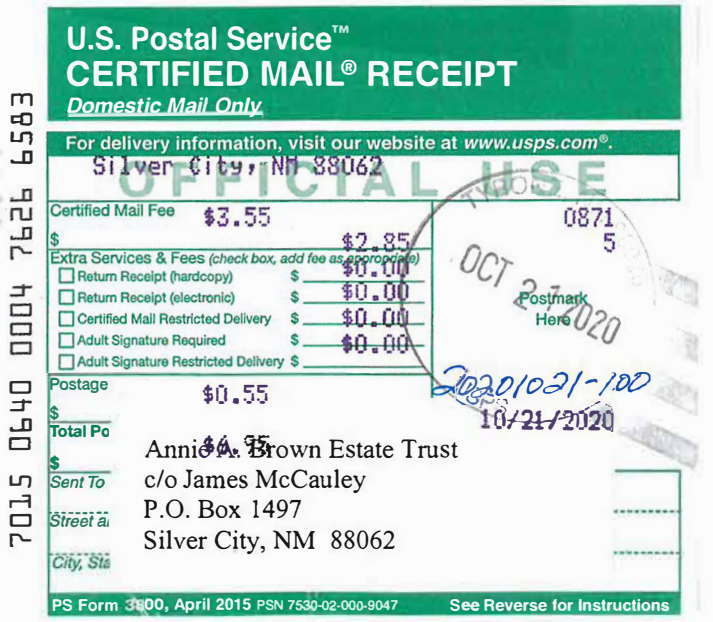
10/21/2020

Sent To: LT Ranch LLC
Street and Apt. No.: P.O. Box 1497
City, State, ZIP+4®: Silver City, NM 88062

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

7015 0640 0004 7626 6576



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- Adult Signature Required $0.00
- Adult Signature Restricted Delivery $

Postage $0.55
Total Postage & Fees $6.95

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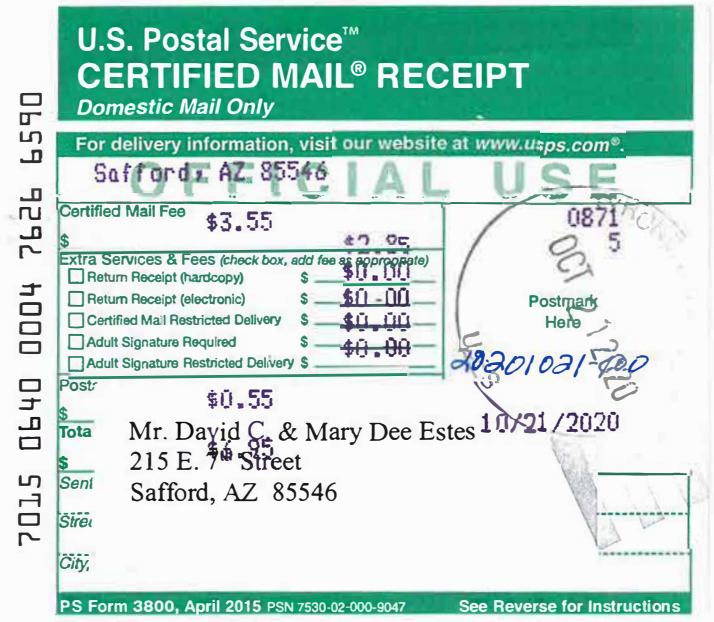
10/21/2020

Sent To: Annie A. Brown Estate Trust
Street and Apt. No.: c/o James McCauley, P.O. Box 1497
City, State, ZIP+4®: Silver City, NM 88062

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

7015 0640 0004 7626 6583



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- Return Receipt (electronic) $0.00
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- Adult Signature Restricted Delivery $

Postage $0.55
Total Postage & Fees $6.95

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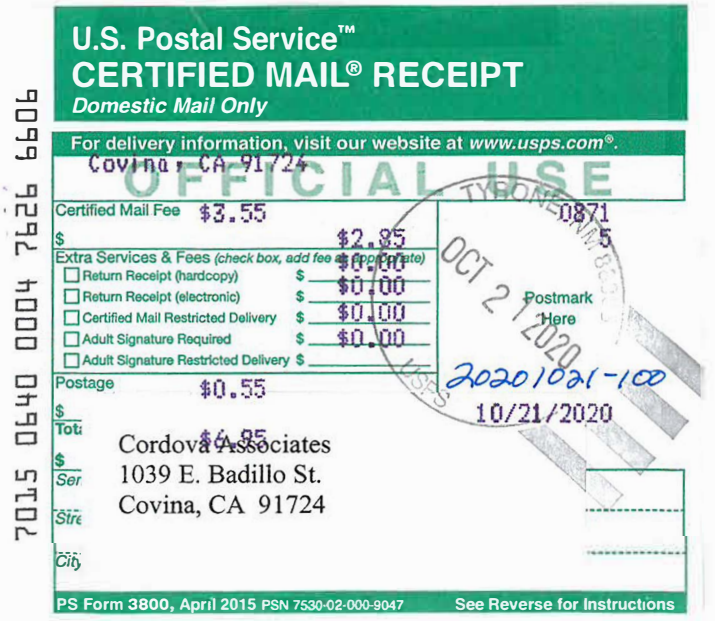
10/21/2020

Sent To: Mr. David C. & Mary Dee Estes
Street and Apt. No.: 215 E. 7th Street
City, State, ZIP+4®: Safford, AZ 85546

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

7015 0640 0004 7626 6590



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Covina, CA 91724

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- Return Receipt (hardcopy) $2.85
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- Certified Mail Restricted Delivery $0.00
- Adult Signature Required $0.00
- Adult Signature Restricted Delivery $

Postage $0.55
Total Postage & Fees $6.95

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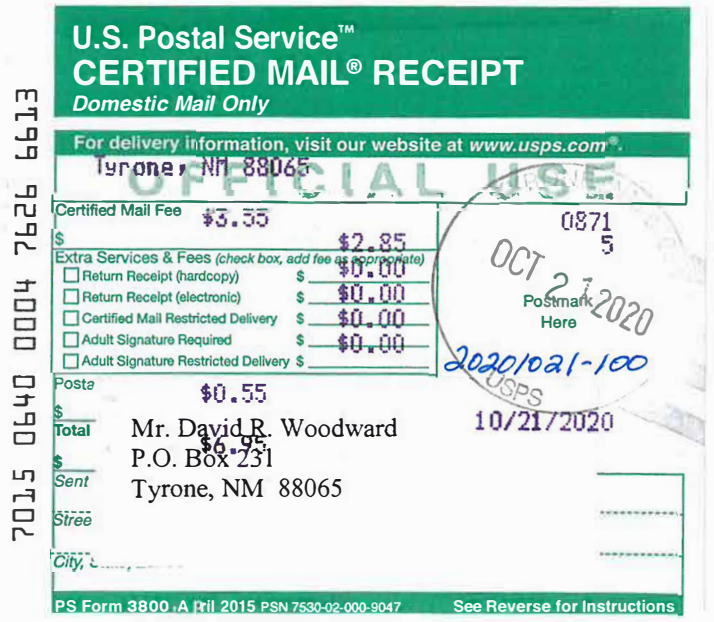
Sent To: Cordova Associates
Street and Apt. No.: 1039 E. Badillo St.
City, State, ZIP+4®: Covina, CA 91724

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

7015 0640 0004 7626 6606



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- Adult Signature Restricted Delivery $

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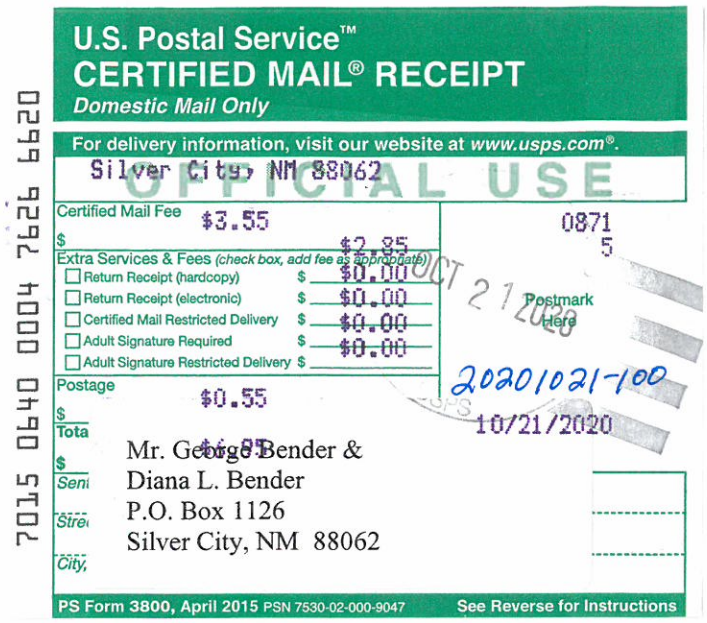
Sent To: Mr. David R. Woodward
Street and Apt. No.: P.O. Box 231
City, State, ZIP+4®: Tyrone, NM 88065

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

7015 0640 0004 7626 6613



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Mr. George Bender &
Diana L. Bender
P.O. Box 1126
Silver City, NM 88062

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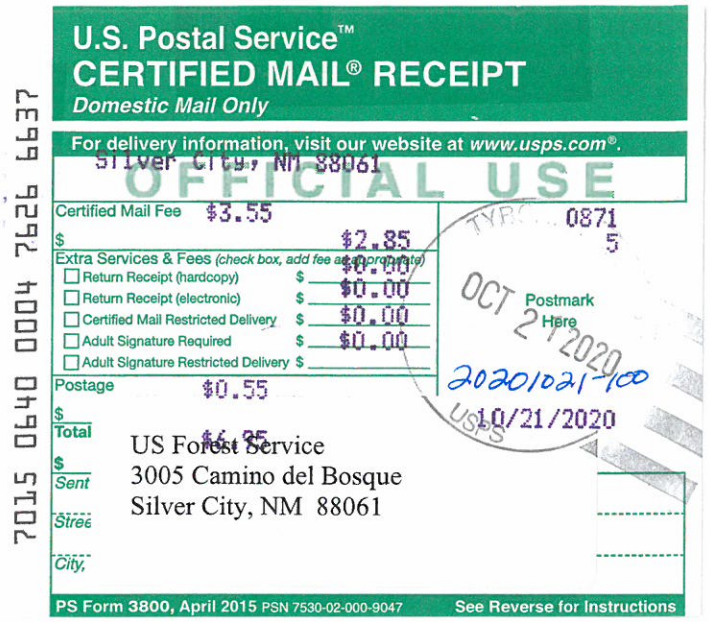
7015 0640 0004 7626 6620



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- Adult Signature Restricted Delivery $

Postage $0.55
Total $6.95

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US Forest Service
3005 Camino del Bosque
Silver City, NM 88061

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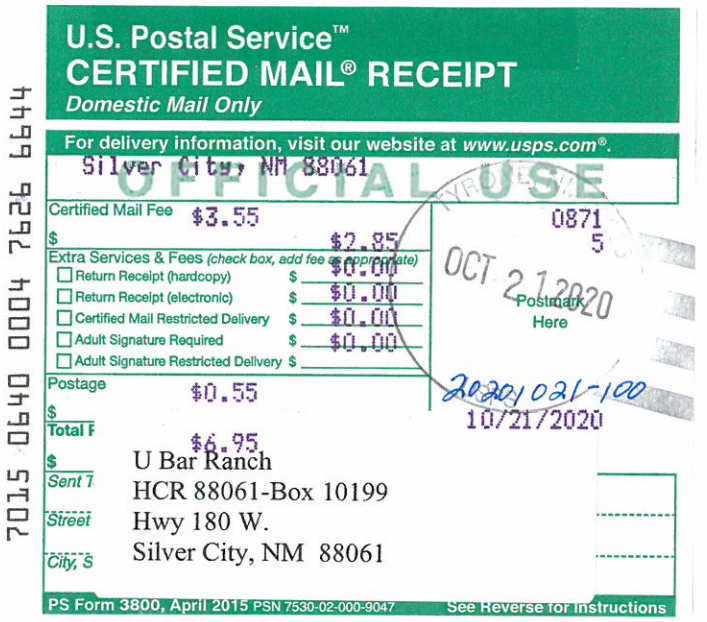
7015 0640 0004 7626 6637



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- Adult Signature Required $0.00
- Adult Signature Restricted Delivery $

Postage $0.55
Total $6.95

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U Bar Ranch
HCR 88061-Box 10199
Hwy 180 W.
Silver City, NM 88061

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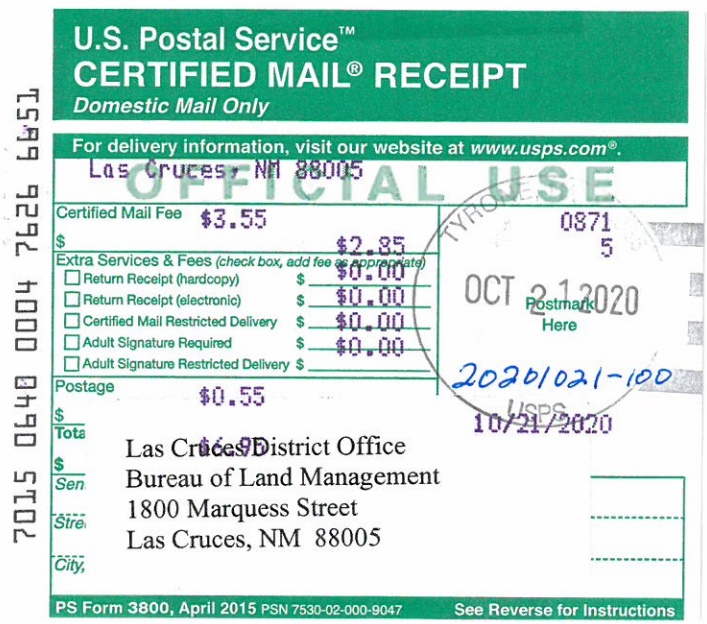
7015 0640 0004 7626 6644



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Las Cruces, NM 88005

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- Return Receipt (electronic) $0.00
- Certified Mail Restricted Delivery $0.00
- Adult Signature Required $0.00
- Adult Signature Restricted Delivery $

Postage $0.55
Total $6.95

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Las Cruces District Office
Bureau of Land Management
1800 Marquess Street
Las Cruces, NM 88005

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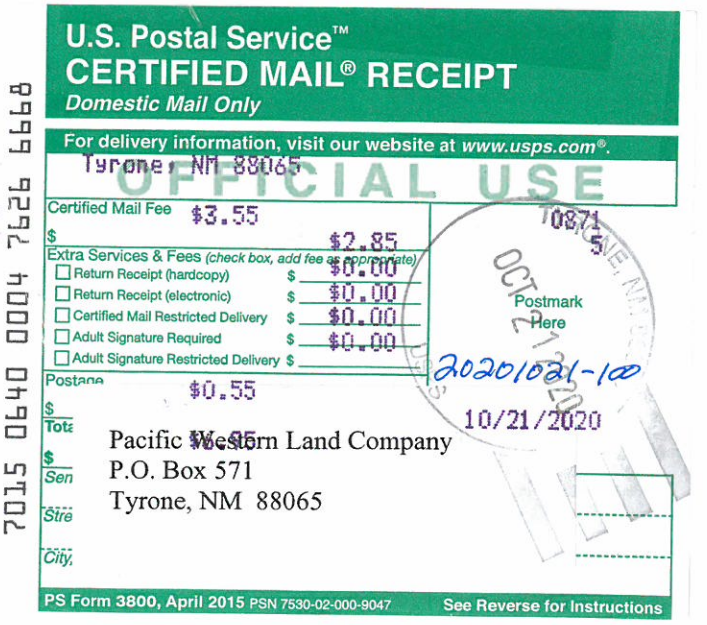
7015 0640 0004 7626 6651



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Tyrone, NM 88065

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Extra Services & Fees (check box, add fee as appropriate)
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- Return Receipt (electronic) $0.00
- Certified Mail Restricted Delivery $0.00
- Adult Signature Required $0.00
- Adult Signature Restricted Delivery $

Postage $0.55
Total $6.95

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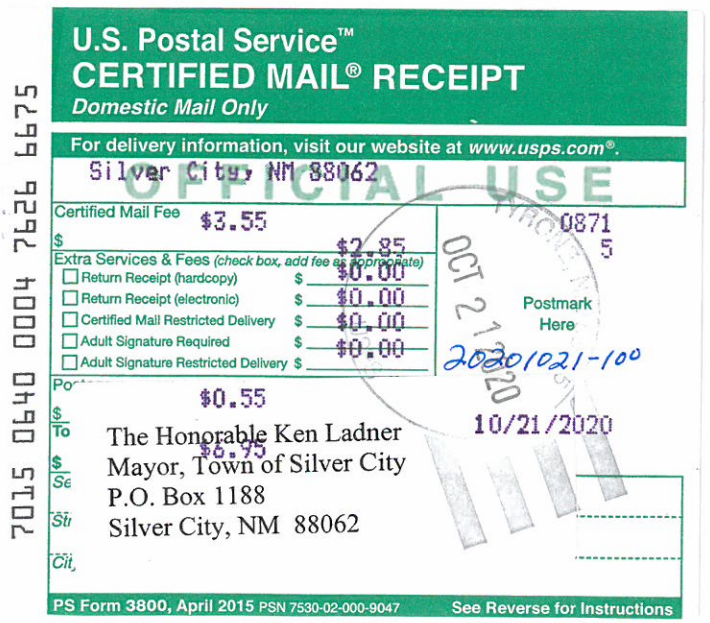
OCT 21 2020
20201021-100
10/21/2020

Pacific Western Land Company
P.O. Box 571
Tyrone, NM 88065

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

7015 0640 0004 7626 6668



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Silver City, NM 88062

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Extra Services & Fees (check box, add fee as appropriate)
- Return Receipt (hardcopy) $0.00
- Return Receipt (electronic) $0.00
- Certified Mail Restricted Delivery $0.00
- Adult Signature Required $0.00
- Adult Signature Restricted Delivery $

Postage $0.55
Total $6.95

0871 5
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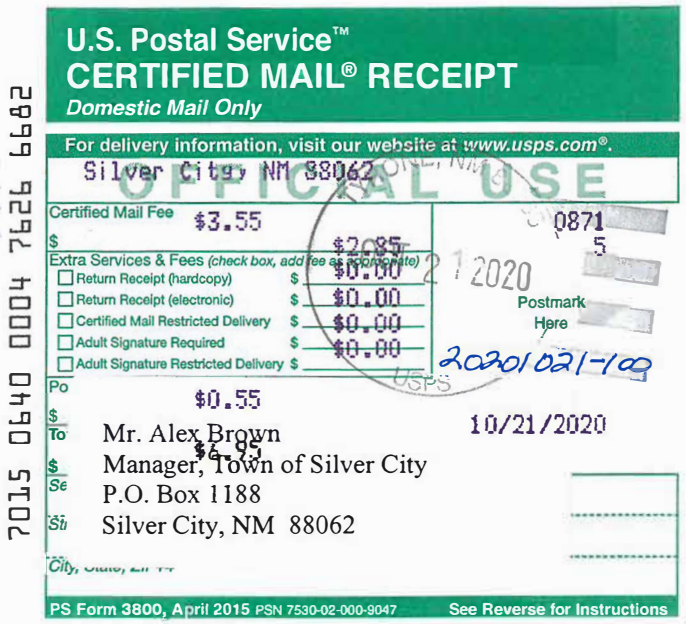
OCT 21 2020
20201021-100
10/21/2020

The Honorable Ken Ladner
Mayor, Town of Silver City
P.O. Box 1188
Silver City, NM 88062

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

7015 0640 0004 7626 6675



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- Return Receipt (electronic) $0.00
- Certified Mail Restricted Delivery $0.00
- Adult Signature Required $0.00
- Adult Signature Restricted Delivery $

Postage $0.55
Total Postage and Fees $6.95

0871
5
OCT 21 2020
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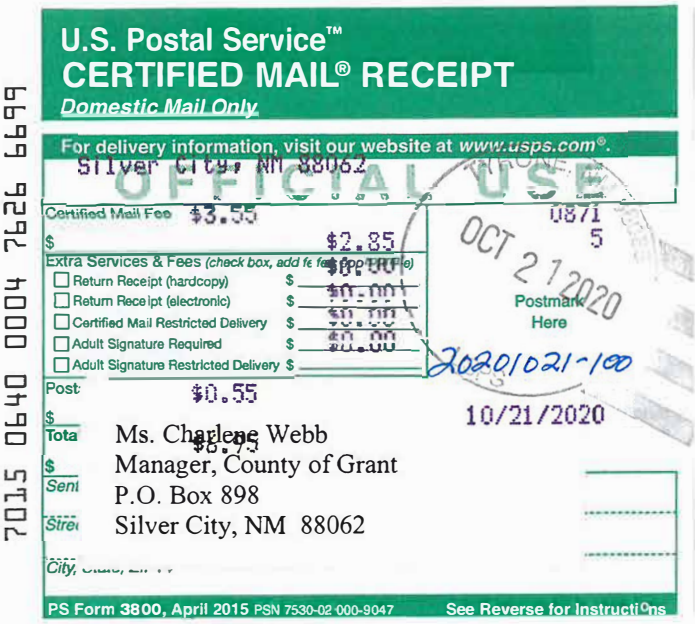
20201021-100
10/21/2020

Sent To: Mr. Alex Brown
Manager, Town of Silver City
Street and Apt. No., or PO Box No.: P.O. Box 1188
City, State, ZIP+4: Silver City, NM 88062

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions



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Silver City, NM 88062

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- Adult Signature Restricted Delivery $

Postage $0.55
Total Postage and Fees $8.75

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10/21/2020

Sent To: Ms. Charlene Webb
Manager, County of Grant
Street and Apt. No., or PO Box No.: P.O. Box 898
City, State, ZIP+4: Silver City, NM 88062

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

Tax Account

Summary

Account Id	P000229
Parcel Number	
Owners	TURNER JASON & TURNER JULIE
Address	PO BOX 2222 SILVER CITY, NM 88062
Situs Address	
Legal	

Inquiry

As Of 02/15/2018

Payment Type ○ First
◉ Full

Total Due $0.00

Value

		Area Id	Taxes
Special Assessment		DCLPEN	$37.60
Area Id			**Mill Levy**
01O_NR - 01O_NR			20.8240000
		Actual	**Assessed**
CATTLE-COWS - 500		66,774	22,258
CATTLE-HEIFERS CALVES - 530		14,975	4,992
CATTLE-STEER CALVES - 540		19,578	6,526
CATTLE-BULLS - 550		7,062	2,354
Total Value		108,389	36,130
Taxes			$752.36
		Area Id	**Taxes**
Special Assessment	951 - CATTLE INDEMNITY		$361.30
Total Billed			**$1,151.26**

The amounts of taxes due on this page are based on **last year's** property value assesments.

Tax Account

Summary

Account Id	R085738
Parcel Number	3086114330264
Owners	LT RANCH LLC
Address	PO BOX 1497 SILVER CITY, NM 88062
Situs Address	
Legal	Quarter: NE S: 35 T: 19S R: 15W GOV LOT 2 GOV LOT 4 GOV LOT 5 (PT NEQ) NWQNEQ Quarter: SE S: 35 T: 19S R: 15W GOV LOT 6 GOV LOT 7 (PT EHSEQ) WHSEQ Quarter: SW S: 35 T: 19S R: 15W SWQ Quarter: NW S: 35 T: 19S R: 15W GOV LOT 1 GOV LOT 3 (PT WHNWQ) EHNWQ 571.200 AC, SELF GRAZED P066643

Inquiry

As Of 02/15/2018

Payment Type ○ First
◉ Full

Total Due $0.00

Value

Area Id		Mill Levy
01O_NR - 01O_NR		20.8240000
	Actual	**Assessed**
GRAZING - ALL ONE CLASS - 0010	3.084	1.028
Taxes		$21.40

The amounts of taxes due on this page are based on **last year's** property value assesments.

Tax Account

Summary

Account Id	R087845
Parcel Number	3087114185238
Owners	BROWN ANNIE A ESTATE TRUST
Address	PO BOX 1497 SILVER CITY, NM 88062
Situs Address	
Legal	Quarter: NE S: 34 T: 19S R: 15W Quarter: SE S: 34 T: 19S R: 15W MINE: CHERRY CREEK - MS 1782 13.96 MineAcres 13.960 AC, LEASE LT RANCH P066643

Inquiry

As Of 02/15/2018

Payment Type ○ First
◉ Full

Total Due $0.00

Value

	Area Id	**Taxes**
Special Assessment	MINTAX	$0.00
	Area Id	**Taxes**
Special Assessment	ADMINFEE	$4.48
Area Id		**Mill Levy**
01O_NR - 01O_NR		20.8240000
	Actual	**Assessed**
GRAZING - ALL ONE CLASS - 0010	75	25
Taxes		$0.52

Original Taxes	$5.00
Adjustments	$0.00
Total Billed	**$5.00**

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Tax Account

Summary

Account Id	R088189
Parcel Number	3088113376071
Owners	ESTES ROCKY
Address	215 E 7TH ST SAFFORD, AZ 85546
Situs Address	
Legal	Quarter: NW S: 28 T: 19S R: 15W GOV LOT 2 (PT EHNWQ) 18.190 AC, NOTE: PROCESSED WITH RECOGNIZED DEED ERROR - CHAIN OF TITLE

Inquiry

As Of 02/15/2018

Payment Type ○ First ◉ Full

Total Due $0.00

Value

Area Id		Mill Levy
01O_NR - 01O_NR		20.8240000
	Actual	**Assessed**
MISC N/R LAND - 0081	72,760	24,253
Taxes		$505.04

The amounts of taxes due on this page are based on **last year's** property value assesments.

Tax Account

Summary

Account Id	R087987
Parcel Number	3085110010400
Owners	CORDOVA ASSOCIATES
Address	1039 E BADILLO ST COVINA, CA 91724
Situs Address	
Legal	Quarter: SE S: 12 T: 19S R: 15W PT GOV LOTS 1, 6 LYING E OF NM HWY 90 R/W 5.786 AC

Inquiry

As Of 02/15/2018

Payment Type ○ First
◉ Second

Taxes Due $11.04

Total Due $11.04

Value

Area Id		Mill Levy
01O_NR - 01O_NR		20.8240000
	Actual	**Assessed**
MISC N/R LAND - 0081	3,182	1,061
Taxes		$22.08

The amounts of taxes due on this page are based on **last year's** property value assesments.

Tax Account

Summary

Account Id	R087488
Parcel Number	3084109396132
Owners	WOODWARD DAVID R WOODWARD JOAN M
Address	PO BOX 231 TYRONE, NM 88065
Situs Address	190 BALD MTN RANCH RD
Legal	Quarter: NW S: 06 T: 19S R: 14W GOV LOT 3 (NEQNWQ) GOV LOT 4 (NWQNWQ) GOV LOT 5 (SWQNWQ) SEQNWQ 165.600 AC, SELF GRAZED P066921

Inquiry

As Of 02/1 52018

Payment Type ○ First
◉ Full

Total Due $0.00

Value

Area Id		Mill Levy
01O_NR - 01O_NR		20.8240000
	Actual	**Assessed**
GRAZING - ALL ONE CLASS - 0010	894	298
Taxes		$6.20

The amounts of taxes due on this page are based on **last year's** property value assesments.

Tax Account

Summary

Account Id	P065988
Parcel Number	L00363540508D154548
Owners	U BAR RANCH PARTNERSHIP
Address	PO BOX 10 GILA, NM 88038
Situs Address	
Legal	

Inquiry

As Of 02/15/2018

Payment Type ○ First
◉ Full

Total Due $0.00

Value

Area Id		Mill Levy
01O_NR - 01O_NR		20.8240000
	Actual	**Assessed**
CATTLE-COWS - 500	809,186	269,729
CATTLE-HEIFERS CALVES - 530	99,434	33,145
CATTLE-BULLS - 550	153,010	51,003
CATTLE-HEIFER (REPLACEMENT) - 551	122,464	40,821
CATTLE-REG. COWS - 560	210,092	70,031
CATTLE-REG. HEIFER CALVES - 580	33,040	11,013
CATTLE-REG.BULLS - 590	11,368	3,789
CATTLE-REG. HEIFER (REPLACEMENT) - 591	41,244	13,748
HORSES-HORSES - 900	15,300	5,100
Total Value	1,495,138	498,379
Taxes		$10,378.24
	Area Id	**Taxes**
Special Assessment	951 - CATTLE INDEMNITY	$4,932.80
	Area Id	**Taxes**
Special Assessment	954 - EQUINE	$35.52
Total Billed		**$15,346.56**

The amounts of taxes due on this page are based on **last year's** property value assesments.

Tax Account

Summary

Account Id	R087725
Parcel Number	3088109099033
Owners	PACIFIC WESTERN LAND COMPANY
Address	PO BOX 571 TYRONE, NM 88065
Situs Address	
Legal	Quarter: NE S: 04 T: 19S R: 15W GOV LOT 1 (NEQNEQ) PT GOV LOT 2 (NWQNEQ) 71.460 AC

Inquiry

As Of 02/15/2018

Payment Type ○ First
◉ Full

Total Due $0.00

Value

	Area Id	Taxes
Special Assessment	MINTAX	$0.00
	Area Id	**Taxes**
Special Assessment	ADMINFEE	$2.32
Area Id		**Mill Levy**
01O_NR - 01O_NR		20.8240000
	Actual	**Assessed**
GRAZING - ALL ONE CLASS - 0010	386	129
Taxes		$2.68

Original Taxes	$5.00
Adjustments	$0.00
Total Billed	**$5.00**

The amounts of taxes due on this page are based on **last year's** property value assesments.

FREEPORT-McMoRan

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

October 21, 2020

Certified Mail #70150640000476266569
Return Receipt Requested

Dear Neighbor:

Freeport-McMoRan Tyrone Inc. announces its application to the New Mexico Environment Department for an air quality permit for the **modification** of its **mine** facility. The expected date of application submittal to the Air Quality Bureau is **October 30, 2020.**

The exact location for the facility known as, **Tyrone Mine** is at latitude **32** deg, **40** min, **34.5** sec and longitude **-108** deg, **23** min, **35.8** sec. The approximate location of this facility is **4.5** miles **southwest** of **Tyrone, NM** in **Grant County.**

The proposed **significant revision** consists of updating emissions associated with new mine operating scenarios, updating emissions associated with reclamation activities, updating emissions associated with the crushing and screening plant, adding two new boilers, updating emissions associated with the currently permitted engines, and updating emissions associated with the currently permitted gasoline tanks in accordance with EPA's updated calculation methodologies.

The estimated maximum quantities of the **fugitive + stack** regulated air contaminants will be as follows in pound per hour (pph) and tons per year (tpy). These reported emissions could change slightly during the course of the Department's review:

Pollutant:	**Pounds per hour**	**Tons per year**
Particulate Matter (PM)	1,660 pph	4,660 tpy
PM_{10}	640 pph	1,350 tpy
$PM_{2.5}$	70 pph	140 tpy
Sulfur Dioxide (SO_2)	30 pph	30 tpy
Nitrogen Oxides (NO_x)	860 pph	360 tpy
Carbon Monoxide (CO)	5,210 pph	3,260 tpy
Volatile Organic Compounds (VOC)	50 pph	70 tpy
Total sum of all Hazardous Air Pollutants (HAPs)	10 pph	20 tpy
Toxic Air Pollutant (TAP)	N/A	N/A
Green House Gas Emissions as Total CO_2e	N/A	57,720 tpy

The standard and maximum operating schedule of the facility will be continuous: **24 hours a day for everything but blasting and the screening and crushing plant; 7 days a week; and 52 weeks per year.**

The owner and/or operator of the Facility is:

Freeport-McMoRan Tyrone Inc.
P.O. Box 571, Tyrone, NM 88065

If you have any comments about the construction or operation of this facility, and you want your comments to be made as part of the permit review process, you must submit your comments in writing to this address: Permit Programs Manager; New Mexico Environment Department; Air Quality Bureau; 525 Camino de los Marquez, Suite 1; Santa Fe, New Mexico; 87505-1816; (505) 476-4300; 1 800 224-7009; https://www.env.nm.gov/aqb/permit/aqb_draft_permits.html. Other comments and questions may be submitted verbally.

Please refer to the company name and facility name, or send a copy of this notice along with your comments, since the Department may have not yet received the permit application. Please include a legible return mailing address with your comments. Once the Department has performed a preliminary review of the application and its air quality impacts, the Department's notice will be published in the legal section of a newspaper circulated near the facility location.

Attención
Este es un aviso de la oficina de Calidad del Aire del Departamento del Medio Ambiente de Nuevo México, acerca de las emisiones producidas por un establecimiento en esta área. Si usted desea información en español, por favor comuníquese con esa oficina al teléfono 505-476-5557.

Sincerely,

Erich J. Bower
President; General Manager
Freeport-McMoRan Tyrone Inc.

20201021-100

Notice of Non-Discrimination
NMED does not discriminate on the basis of race, color, national origin, disability, age or sex in the administration of its programs or activities, as required by applicable laws and regulations. NMED is responsible for coordination of compliance efforts and receipt of inquiries concerning non-discrimination requirements implemented by 40 C.F.R. Part 7, including Title VI of the Civil Rights Act of 1964, as amended; Section 504 of the Rehabilitation Act of 1973; the Age Discrimination Act of 1975, Title IX of the Education Amendments of 1972, and Section 13 of the Federal Water Pollution Control Act Amendments of 1972. If you have any questions about this notice or any of NMED's non-discrimination programs, policies or procedures, or if you believe that you have been discriminated against with respect to a NMED program or activity, you may contact: Kristine Yurdin, Non-Discrimination Coordinator, NMED, 1190 St. Francis Dr., Suite N4050, P.O. Box 5469, Santa Fe, NM 87502, (505) 827-2855, nd.coordinator@state.nm.us. You may also visit our website at https://www.env.nm.gov/non-employee-discrimination-complaint-page/ to learn how and where to file a complaint of discrimination.

FREEPORT-McMoRan

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

October 21, 2020

Certified Mail #70150640000476266576
Return Receipt Requested

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PM_{10}	640 pph	1,350 tpy
$PM_{2.5}$	70 pph	140 tpy
Sulfur Dioxide (SO_2)	30 pph	30 tpy
Nitrogen Oxides (NO_x)	860 pph	360 tpy
Carbon Monoxide (CO)	5,210 pph	3,260 tpy
Volatile Organic Compounds (VOC)	50 pph	70 tpy
Total sum of all Hazardous Air Pollutants (HAPs)	10 pph	20 tpy
Toxic Air Pollutant (TAP)	N/A	N/A
Green House Gas Emissions as Total CO_2e	N/A	57,720 tpy

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P.O. Box 571, Tyrone, NM 88065

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Sincerely,

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20201021-100

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FREEPORT-McMoRan

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

October 21, 2020

Certified Mail #70150640000476266583
Return Receipt Requested

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Sincerely,

Erich J. Bower
President; General Manager
Freeport-McMoRan Tyrone Inc.

20201021-100

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FREEPORT-McMoRan

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

October 21, 2020

Certified Mail #70150640000476266590
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Erich J. Bower
President; General Manager
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FREEPORT-McMoRan

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

October 21, 2020

Certified Mail #70150640000476266606
Return Receipt Requested

Dear Neighbor:

Freeport-McMoRan Tyrone Inc. announces its application to the New Mexico Environment Department for an air quality permit for the **modification** of its **mine** facility. The expected date of application submittal to the Air Quality Bureau is **October 30, 2020.**

The exact location for the facility known as, **Tyrone Mine** is at latitude **32** deg, **40** min, **34.5** sec and longitude **-108** deg, **23** min, **35.8** sec. The approximate location of this facility is **4.5** miles **southwest** of **Tyrone, NM** in **Grant County.**

The proposed **significant revision** consists of updating emissions associated with new mine operating scenarios, updating emissions associated with reclamation activities, updating emissions associated with the crushing and screening plant, adding two new boilers, updating emissions associated with the currently permitted engines, and updating emissions associated with the currently permitted gasoline tanks in accordance with EPA's updated calculation methodologies.

The estimated maximum quantities of the **fugitive + stack** regulated air contaminants will be as follows in pound per hour (pph) and tons per year (tpy). These reported emissions could change slightly during the course of the Department's review:

Pollutant:	**Pounds per hour**	**Tons per year**
Particulate Matter (PM)	1,660 pph	4,660 tpy
PM_{10}	640 pph	1,350 tpy
$PM_{2.5}$	70 pph	140 tpy
Sulfur Dioxide (SO_2)	30 pph	30 tpy
Nitrogen Oxides (NO_x)	860 pph	360 tpy
Carbon Monoxide (CO)	5,210 pph	3,260 tpy
Volatile Organic Compounds (VOC)	50 pph	70 tpy
Total sum of all Hazardous Air Pollutants (HAPs)	10 pph	20 tpy
Toxic Air Pollutant (TAP)	N/A	N/A
Green House Gas Emissions as Total CO_2e	N/A	57,720 tpy

The standard and maximum operating schedule of the facility will be continuous: **24 hours a day for everything but blasting and the screening and crushing plant; 7 days a week; and 52 weeks per year.**

The owner and/or operator of the Facility is:

Freeport-McMoRan Tyrone Inc.
P.O. Box 571, Tyrone, NM 88065

If you have any comments about the construction or operation of this facility, and you want your comments to be made as part of the permit review process, you must submit your comments in writing to this address: Permit Programs Manager; New Mexico Environment Department; Air Quality Bureau; 525 Camino de los Marquez, Suite 1; Santa Fe, New Mexico; 87505-1816; (505) 476-4300; 1 800 224-7009; https://www.env.nm.gov/aqb/permit/aqb_draft_permits.html. Other comments and questions may be submitted verbally.

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Sincerely,

Erich J. Bower
President; General Manager
Freeport-McMoRan Tyrone Inc.

20201021-100

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FREEPORT-MCMORAN

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

October 21, 2020

Certified Mail #70150640000476266613
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FREEPORT-McMoRan

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

October 21, 2020

Certified Mail #70150640000476266620
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FREEPORT-McMoRan

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

October 21, 2020

Certified Mail #70150640000476266637
Return Receipt Requested

US Forest Service
3005 Camino de Bosque
Silver City, NM 88061

To Whom It Concerns:

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FREEPORT-MCMORAN

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

October 21, 2020

Certified Mail #70150640000476266644
Return Receipt Requested

U Bar Ranch
HCR 88061-Box 10199
Hwy 180 W.
Silver City, NM 88061

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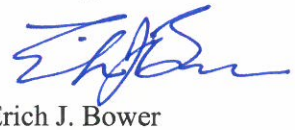

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FREEPORT-McMoRan

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Certified Mail #70150640000476266651
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Las Cruces District Office
Bureau of Land Management
1800 Marquess Street
Las Cruces, NM 88005

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FREEPORT-MCMORAN

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

October 21, 2020

Certified Mail #7015064000047626668
Return Receipt Requested

Pacific Western Land Company
P.O. Box 571
Tyrone, NM 88065

To Whom It Concerns:

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The exact location for the facility known as, **Tyrone Mine** is at latitude **32** deg, **40** min, **34.5** sec and longitude **-108** deg, **23** min, **35.8** sec. The approximate location of this facility is **4.5** miles **southwest** of **Tyrone, NM** in **Grant County.**

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Total sum of all Hazardous Air Pollutants (HAPs)	10 pph	20 tpy
Toxic Air Pollutant (TAP)	N/A	N/A
Green House Gas Emissions as Total CO_2e	N/A	57,720 tpy

The standard and maximum operating schedule of the facility will be continuous: **24 hours a day for everything but blasting and the screening and crushing plant; 7 days a week; and 52 weeks per year.**

The owner and/or operator of the Facility is:

Freeport-McMoRan Tyrone Inc.
P.O. Box 571, Tyrone, NM 88065

If you have any comments about the construction or operation of this facility, and you want your comments to be made as part of the permit review process, you must submit your comments in writing to this address: Permit Programs Manager; New Mexico Environment Department; Air Quality Bureau; 525 Camino de los Marquez, Suite 1; Santa Fe, New Mexico; 87505-1816; (505) 476-4300; 1 800 224-7009; https://www.env.nm.gov/aqb/permit/aqb_draft_permits.html. Other comments and questions may be submitted verbally.

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Sincerely,

Erich J. Bower
President; General Manager
Freeport-McMoRan Tyrone Inc.

20201021-100

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FREEPORT-McMoRan

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

October 21, 2020

Certified Mail #7015064000047626675
Return Receipt Requested

The Honorable Ken Ladner
Mayor, Town of Silver City
P.O. Box 1188
Silver City, NM 88062

Dear Mr. Ladner:

Freeport-McMoRan Tyrone Inc. announces its application to the New Mexico Environment Department for an air quality permit for the **modification** of its **mine** facility. The expected date of application submittal to the Air Quality Bureau is **October 30, 2020.**

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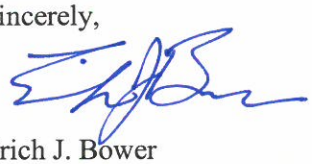

Erich J. Bower
President; General Manager
Freeport-McMoRan Tyrone Inc.

20201021-100

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FREEPORT-McMoRan

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

October 21, 2020

Certified Mail #7015064000047626682
Return Receipt Requested

Mr. Alex Brown
Manager, Town of Silver City
P.O. Box 1188
Silver City, NM 88062

Dear Mr. Brown:

Freeport-McMoRan Tyrone Inc. announces its application to the New Mexico Environment Department for an air quality permit for the **modification** of its **mine** facility. The expected date of application submittal to the Air Quality Bureau is **October 30, 2020.**

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President; General Manager
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FREEPORT-McMoRan

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

October 21, 2020

Certified Mail #70150640000047626699
Return Receipt Requested

Ms. Charlene Webb
Manager, County of Grant
P.O. Box 898
Silver City, NM 88062

Dear Ms. Webb:

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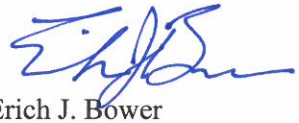

Erich J. Bower
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General Posting of Notices – Certification

I, Erich J. Bower, the undersigned, certify that on October 21, 2020, posted a true and correct copy of the attached Public Notice in the following publicly accessible and conspicuous places in the towns of Tyrone and Silver City in Grant County, State of New Mexico on the following dates:

1. Tyrone Property Boundary; October 21, 2020
2. Tyrone Security Gate; October 21, 2020
3. Tyrone Post Office/Community Center; October 21, 2020
4. Silver City Public Library; October 21, 2020
5. Grant County Administration Building; October 21, 2020

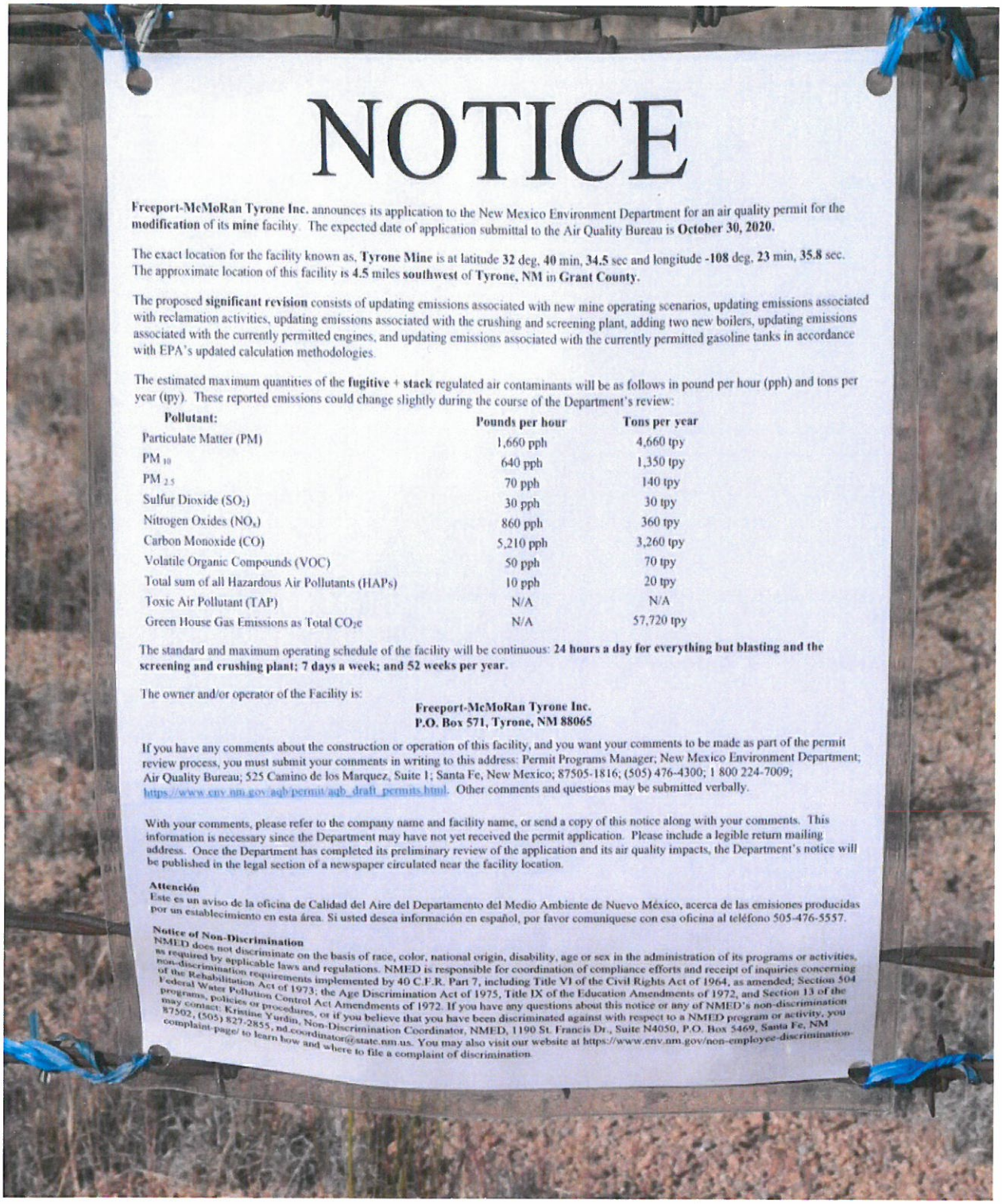
Signed this 21 day of October 2020

Signature

10/21/2020
Date

Erich J. Bower
Printed Name

President; General Manager, Freeport-McMoRan Tyrone Inc.
Title {APPLICANT OR RELATIONSHIP TO APPLICANT}



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Public Notice Posted at the Tyrone Security Gate 10/21/2020

NOTICE

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Volatile Organic Compounds (VOC)	50 pph	70 tpy
Total sum of all Hazardous Air Pollutants (HAPs)	10 pph	20 tpy
Toxic Air Pollutant (TAP)	N/A	N/A
Green House Gas Emissions as Total CO_2e	N/A	57,720 tpy

The standard and maximum operating schedule of the facility will be continuous: **24 hours a day for everything but blasting and the screening and crushing plant; 7 days a week; and 52 weeks per year.**

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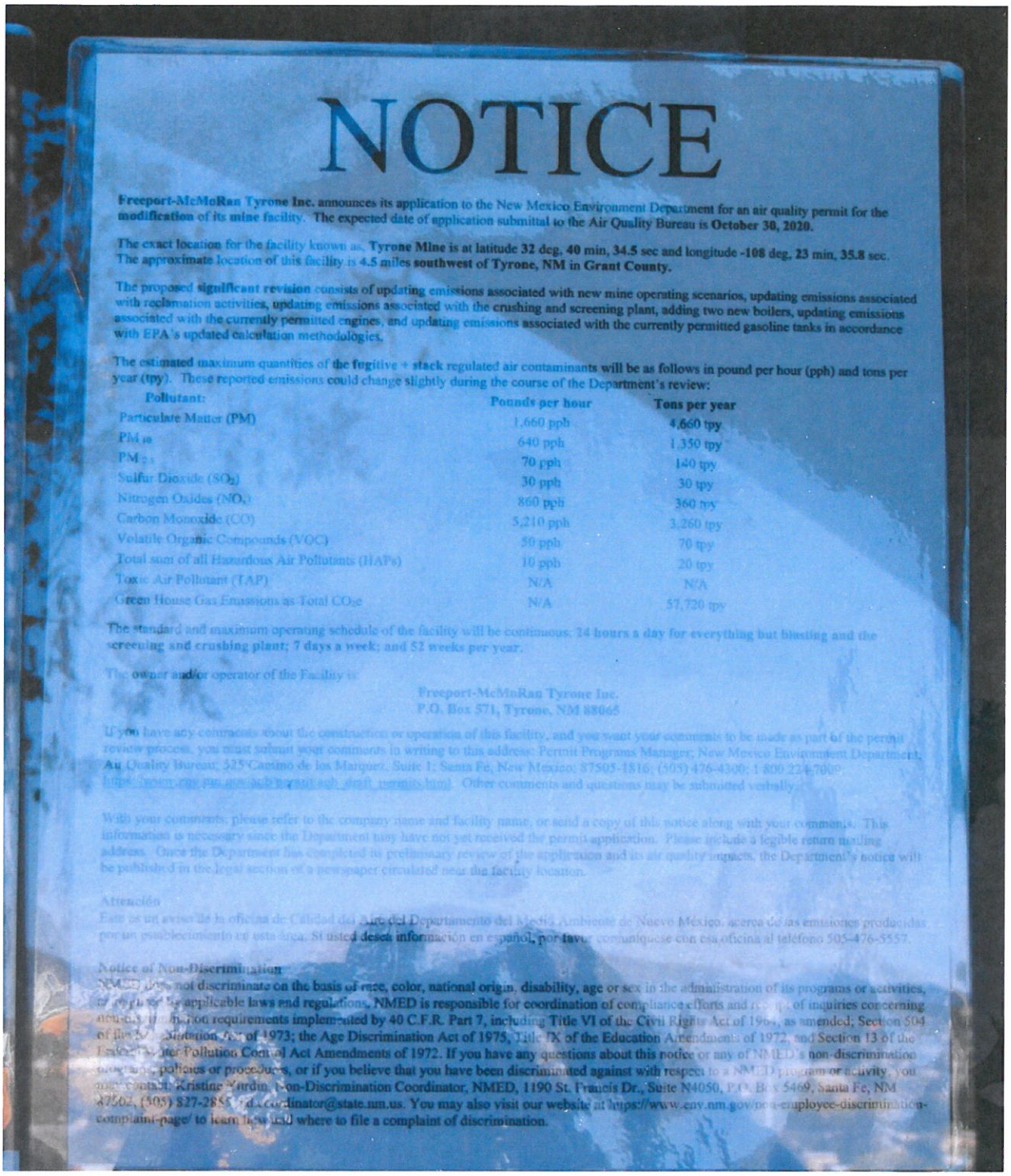
Public Notice Posted at the Silver City Public Library 10/21/2020



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Public Notice Posted at the Grant County Administration Building 10/21/2020

PFLAG awards two scholarships

PFLAG Silver City has announced two recipients of the Nancy Kailing Memorial Scholarship at Western New Mexico University — Lisa Origlio and Hannah Cothran.

Origlio, a graduate student seeking a master's in social work, is from Brighton, Colo. Upon accepting the scholarship, Origlio said, "As a school social worker, I will work with family members and teachers to show them that bringing the LGBTQ+ community to children's attention is not harmful, and can create welcoming environments and self-acceptance."

LISA ORIGLIO

HANNAH COTHRAN

Cothran, a graduate student working on a master's in special education, plus an endorsement in TESOL, lives in Albuquerque. "A quote I love is, 'To plant a garden is to believe in tomorrow.' I'm a special education teacher, and I believe so strongly in growth! I always feel that I am helping a beautiful garden of learners grow," Cothran said when she learned she was selected.

The Nancy Kailing Memorial Scholarship is given to WNMU students who have demonstrated work toward securing equality for lesbian, gay, bisexual, and transgender people, according to a news release. Kailing was the founder of PFLAG Fairbanks, Alaska, and a former president of PFLAG Silver City. She was a public school teacher and a fierce advocate for LGBTQ+ people.

Founded in 1973 after the simple act of a mother publicly supporting her gay son, PFLAG is the nation's largest family and ally organization, the release stated.

For more information, call PFLAG Silver City at 590-8797 or go to pflagsilver.org.

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(Photo Courtesy of Cary Hamilton)

Proper application of pesticides training is required by law. New Mexico State University has moved its pesticide safety education online with two ways for people with applicator licenses to earn continuing education units.

New Mexico State University Extension to provide pesticide applicator training online

The pesticide safety education program at New Mexico State University is offering workshops two ways online.

Pesticide applicators may earn continuing education units by attending a webinar series or prerecorded presentations, according to a news release.

"Because of the COVID-19 social distancing requirements, we have developed two ways for public and private pesticide applicators to earn their CEU requirements," said Phillip Lujan, NMSU Extension pesticide safety education program manager. "They may attend weekly live two-hour webinars or view prerecorded one-hour workshop sessions at their convenience."

The five-part webinar series will be from 6:30-8:30 p.m. every Wednesday, beginning Oct. 28. The session will be hosted by the NMSU Cooperative Extension Service and presented by Extension specialists and New Mexico Department of Agriculture specialists.

To register, visit pesticide.nmsu.edu. Two CEUs per week are available for participation.

Session topics will be:

• Oct. 28: "Rangeland IPM and Rodent Control Part 1," presented by Casey Sparkman, NMSU Extension range specialist, and Sam Smallidge, NMSU Extension wildlife specialist.

• Nov. 4: "Yard and Garden," presented by Marisa Thompson, NMSU Extension urban horticulture specialist, and Carol Sutherland, NMSU Extension entomologist.

• Nov. 11: "Irrigated Pasture," presented by Mark Marsalis, NMSU Extension forage specialist, and Jane Breen Pierce, NMSU Extension entomologist.

• Nov. 18: "IPM for Urban and Small Farms and Rodent Control, Part 2," presented by Smallidge and Amanda Skidmore, NMSU Extension integrated pest management specialist.

• Dec. 2: "Pesticide Management," presented by Steve Baca, NMDA pesticide compliance program manager, and Cary Hamilton, NMSU Extension IR-4 Program.

Eight prerecorded presentations for one CEU credit each are available on the pesticide safety education website.

"A person can pick the sessions that are appropriate for their needs," Lujan said. "They can access the training at their convenience up until November 15."

To access the sessions, visit pesticide.nmsu.edu, click on upcoming workshops and follow the directions.

CEU credit courses for individuals already licensed include:

• "Weed Control in Alfalfa and Other Forage Crops," presented by Marsalis.

• "Pesticides in Aquatic Systems: Best Management Practices for Protecting Water Quality," presented by Rossana Sallenave, NMSU Extension aquatic ecology specialist.

• "Weed Updates for 2020 and Beyond," presented by Leslie Beck, NMSU Extension weed specialist.

• "Disease and Disorder Management in Chile Pepper," presented by Stephanie Walker, NMSU Extension vegetable specialist.

• "Tree Selection and Care: Avoiding Probable Pests and Disasters," presented by Thompson.

• "2020 Insect Update from NMSU," presented by Sutherland.

• "Introduction to Integrated Pest Management," presented by Skidmore.

• "Assessment-Based Prevention, Control and Management of Vertebrate Pests in New Mexico," presented by Smallidge.

Four sessions for pre-license training are also available through the pesticide education website. Topics of the sessions are:

• "Principles of Herbicides," presented by Beck.

• "Basic Entomology, Ornamentals, and Turf, Category 3A, Part 1 and 2," presented by Sutherland.

• "New Mexico Pesticide Laws and Regulations," presented by Matteo Serena, NMSU Extension plant sciences.

• "Pesticide Safety and Labeling, Part 1, and Personal Protective Equipment, Part 2," presented by Serena.

Legal

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community college in Las Vegas in San Miguel county; (l) seven hundred thousand dollars ($700,000) to plan, design, construct, renovate, equip and for other infrastructure upgrades at the institute of American Indian arts in Santa Fe county; and (m) two million dollars ($2,000,000) to plan, design, construct, renovate and equip infrastructure improvements, including fencing and stucco, at Santa Fe community college in Santa Fe county; (3) to the Indian affairs department, seven hundred thousand dollars ($700,000) to plan, design, construct and upgrade infrastructure, including entry boundary fencing and storm water drainage and mitigation, at Santa Fe Indian school in Santa Fe in Santa Fe county; (4) to the board of regents of the New Mexico school for the blind and visually impaired, nine hundred thirty-eight thousand nine hundred sixty-seven dollars ($938,967) to plan, design, construct, renovate, furnish and equip the Tapia building at the New Mexico school for the blind and visually impaired in Alamogordo in Otero county; (5) to the board of regents of New Mexico highlands university, seven million dollars ($7,000,000) to plan, design, construct, renovate, furnish and equip Sininger hall at New Mexico highlands university in Las Vegas in San Miguel county; (6) to the board of regents of the New Mexico institute of mining and technology, ten million dollars ($10,000,000) to plan, design, construct, furnish and equip Kelly hall at the New Mexico institute of mining and technology in Socorro in Socorro county; (7) to the board of regents of the New Mexico military institute, three million dollars ($3,000,000) to plan, design, construct and renovate roofs at Wilson hall, Godfrey athletic center and Toles learning center and for barracks bathrooms at the New Mexico military institute in Roswell in Chaves county; (8) to the board of regents of the New Mexico school for the deaf, five million three hundred thousand dollars ($5,300,000) to plan, design, construct, renovate, furnish and equip the dining hall at the New Mexico school for the deaf in Santa Fe in Santa Fe county; (9) to the board of regents of New Mexico state university: (a) one million three hundred thousand dollars ($1,300,000) to plan, design, construct, furnish and equip upgrades, including exterior stucco and site improvements, to Martinez hall at the Grants branch campus of New Mexico state university in Cibola county; (b) eighteen million dollars ($18,000,000) to plan, design, construct, renovate, furnish and equip improvements to the science and engineering facilities for agricultural research, including abatement and demolition, at New Mexico state university in Las Cruces in Dona Ana county; (c) three million dollars ($3,000,000) to plan, design, construct, renovate, furnish and equip information technology infrastructure upgrades and replacement and a new infrastructure and information technology building at New Mexico state university in Las Cruces in Dona Ana county; (d) one million eight hundred sixty thousand dollars ($1,860,000) to plan, design, construct, furnish and equip a creative campus media building and to plan, design, construct, furnish, equip, repair and renovate classroom improvements, security and surveillance site infrastructure, exterior locks and lighting and information technology upgrades at the Dona Ana branch community college of New Mexico state university in Dona Ana county; (e) one million five hundred thousand dollars ($1,500,000) to plan, design, construct, furnish and equip campuswide infrastructure, parking lot and site improvements, including roofs and accessibility compliance, at the Carlsbad branch campus of New Mexico state university in Eddy county; (f) nine hundred thousand dollars ($900,000) to plan, design, construct, renovate and repair duct work and boiler feed lines in classroom buildings at the Alamogordo branch campus of New Mexico state university in Otero county; (g) nine hundred thousand dollars ($900,000) to plan, design, construct, renovate, furnish and equip the physical plant building at the Alamogordo branch campus of New Mexico state university in Otero county; and (h) three million dollars ($3,000,000) to plan, design, construct, renovate, furnish and equip improvements, including abatement and demolition, to New Mexico state university agricultural science centers statewide; (10) to the board of regents of northern New Mexico state school, two million five hundred thousand dollars ($2,500,000) to plan, design, construct, renovate and improve infrastructure, drainage and storm water systems at the Espanola campus of northern New Mexico state school in Rio Arriba county; (11) to the board of regents of the university of New Mexico: (a) thirteen million two hundred thousand dollars ($13,200,000) to plan, design, construct, renovate and equip infrastructure upgrades, including wireless internet, at the university of New Mexico in Albuquerque in Bernalillo county; (b) thirty million dollars ($30,000,000) to plan, design, construct, furnish and equip a nursing and population health building for the health sciences center at the university of New Mexico in Albuquerque in Bernalillo county; (c) one million five hundred thousand dollars ($1,500,000) to plan, design, construct, renovate and equip fire safety infrastructure upgrades at the Los Lunas branch campus of the university of New Mexico in Valencia county; (d) one million seven hundred thousand dollars ($1,700,000) to plan, design, construct and renovate the workforce development and continuing technical education laboratory at the Los Alamos branch campus of the university of New Mexico in Los Alamos county; (e) three million dollars ($3,000,000) to plan, design, furnish and equip renovations campuswide, including renovations to the existing center for career technologies facility, at the Gallup branch campus of the university of New Mexico in McKinley county; and (f) two million dollars ($2,000,000) to plan, design and construct site improvements, including roadways and parking lots, at the Klauer campus of the Taos branch campus of the university of New Mexico in Taos county; and (12) to the board of regents of western New Mexico university, four million dollars ($4,000,000) to plan, design, construct, renovate and equip the Harlan and Fleming commons area and for other improvements, including demolition and abatement, campuswide at western New Mexico university in Silver City in Grant county.

SECTION 11. ELECTION.—

A. Bonds issued pursuant to the 2020 Capital Projects General Obligation Bond Act shall be submitted to the registered voters of the state at the general election to be held in November 2020, and, if they receive a majority of all the votes cast thereon at such election, shall take effect upon certification of the state canvassing board announcing the results of the election. No bonds shall be issued or sold under that act until the registered voters of this state have voted upon and approved the bonds and property tax as provided in this section. Any bonds issued under that act shall be issued within thirty months from the date of such election.

B. The ballots used at the 2020 general election shall contain substantially the following language: (1) "The 2020 Capital Projects General Obligation Bond Act authorizes the issuance and sale of senior citizen facility improvement, construction and equipment acquisition bonds. Shall the state be authorized to issue general obligation bonds in an amount not to exceed thirty-three million two hundred ninety-two thousand one hundred forty-one dollars ($33,292,141) to make capital expenditures for certain senior citizen facility improvement, construction and equipment acquisition projects and provide for a general property tax imposition and levy for the payment of principal of, interest on and expenses incurred in connection with the issuance of the bonds and the collection of the tax as permitted by law? For_____ Against_____"; (2) "The 2020 Capital Projects General Obligation Bond Act authorizes the issuance and sale of library acquisition bonds. Shall the state be authorized to issue general obligation bonds in an amount not to exceed nine million seven hundred fifty-one thousand four hundred thirty-three dollars ($9,751,433) to make capital expenditures for academic, public school, tribal and public library resource acquisitions and provide for a general property tax imposition and levy for the payment of principal of, interest on and expenses incurred in connection with the issuance of the bonds and the collection of the tax as permitted by law? For_____ Against_____"; and (3) "The 2020 Capital Projects General Obligation Bond Act authorizes the issuance and sale of higher education, special schools and tribal schools capital improvement and acquisition bonds. Shall the state be authorized to issue general obligation bonds in an amount not to exceed one hundred fifty-six million three hundred fiftyeight thousand four hundred seventy-five dollars ($156,358,475) to make capital expenditures for certain higher education, special schools and tribal schools capital improvements and acquisitions and provide for a general property tax imposition and levy for the payment of principal of, interest on and expenses incurred in connection with the issuance of the bonds and the collection of the tax as permitted by law? For_____ Against_____".

C. Each question set forth in this section includes a specific work or object to be financed by the bonds. If any such question is not approved by a majority vote of the electorate at the state's 2020 general election, the issuance of bonds for the work or object specified by the question shall be excluded from and shall not be part of the 2020 Capital Projects General Obligation Bond Act. The failure of a question to be approved by the electorate at the 2020 general election shall not affect those questions that are approved at the election.

D. The secretary of state shall include the submission of the capital projects general obligation bonds to the people at the 2020 general election, and it shall be included in the general election proclamation. The secretary of state shall cause the 2020 Capital Projects General Obligation Bond Act to be published in full in at least one newspaper in each county of the state if one be published therein, once each week, for four successive weeks next preceding the general election as required by the constitution of New Mexico.

SECTION 12. ART IN PUBLIC PLACES.--Pursuant to Section 13-4A-4 NMSA 1978 and where applicable, the appropriations authorized in the 2020 Capital Projects General Obligation Bond Act include money for the art in public places fund.

SECTION 13. PROJECT SCOPE--EXPENDITURES--REVERSION.—

A. If an appropriation for a project authorized in the 2020 Capital Projects General Obligation Bond Act is not sufficient to complete all the purposes specified, the appropriation may be expended for any portion of the purposes specified in the appropriation. Expenditures shall not be made for purposes other than those specified in the appropriation.

B. The state agencies and state institutions to which money has been appropriated in the 2020 Capital Projects General Obligation Bond Act shall be responsible for monitoring the projects funded in that act to ensure compliance with the constitution and laws of New Mexico and shall cause to be reverted any unexpended or unencumbered balance remaining at the earlier of the third full fiscal year after issuance of the bonds or the termination or completion of the specific project. Reverted funds shall be deposited in the debt service fund established by the state treasurer for the purpose of paying the principal of and interest on the state's general obligation bonds.

SECTION 14. SEVERABILITY.--If any part or application of the 2020 Capital Projects General Obligation Bond Act is held invalid, the remainder or its application to other situations or persons shall not be affected.

SECTION 15. EMERGENCY.--It is necessary for the public peace, health and safety that this act take effect immediately.

O7,14,21,28

Legal

NOTICE

Freeport-McMoRan Tyrone Inc. announces its application to the New Mexico Environment Department for an air quality permit for the **modification** of its **mine** facility. The expected date of application submittal to the Air Quality Bureau is **October 30, 2020.**

The exact location for the facility known as, **Tyrone Mine** is at latitude **32** deg, **40** min, **34.5** sec and longitude **-108** deg, **23** min, **35.8** sec.

The approximate location of this facility is **4.5** miles **southwest** of **Tyrone, NM** in **Grant County.**

The proposed **significant revision** consists of updating emissions associated with new mine operating scenarios, updating emissions associated with reclamation activities, updating emissions associated with the crushing and screening plant, adding two new boilers, updating emissions associated with the currently permitted engines, and updating emissions associated with the currently permitted gasoline tanks in accordance with EPA's updated calculation methodologies.

The estimated maximum quantities of the **fugitive + stack** regulated air contaminants will be as follows in pound per hour (pph) and tons per year (tpy). These reported emissions could change slightly during the course of the Department's review:

Pollutant:	Pounds per hour	Tons per year
Particulate Matter (PM)	1,660 pph	4,660 tpy
PM_{10}	640 pph	1,350 tpy
$PM_{2.5}$	70 pph	140 tpy
Sulfur Dioxide (SO_2)	30 pph	30 tpy
Nitrogen Oxides (NO_x)	860 pph	360 tpy
Carbon Monoxide (CO)	5,210 pph	3,260 tpy
Volatile Organic Compounds (VOC)	50 pph	70 tpy
Total sum of all Hazardous Air Pollutants (HAPs)	10 pph	20 tpy
Toxic Air Pollutant (TAP)	N/A	N/A
Green House Gas Emissions as Total CO_2e	N/A	57,720 tpy

The standard and maximum operating schedule of the facility will be continuous: **24 hours a day for everything but blasting and the screening and crushing plant; 7 days a week; and 52 weeks per year.**

The owner and/or operator of the Facility is:

Freeport-McMoRan Tyrone Inc.
P.O. Box 571, Tyrone, NM 88065

If you have any comments about the construction or operation of this facility, and you want your comments to be made as part of the permit review process, you must submit your comments in writing to this address: Permit Programs Manager; New Mexico Environment Department; Air Quality Bureau; 525 Camino de los Marquez, Suite 1; Santa Fe, New Mexico; 87505-1816; (505) 476-4300; 1 800 224-7009; https://www.env.nm.gov/aqb/permit/aqb_draft_permits.html. Other comments and questions may be submitted verbally.

With your comments, please refer to the company name and facility name, or send a copy of this notice along with your comments. This information is necessary since the Department may have not yet received the permit application. Please include a legible return mailing address. Once the Department has completed its preliminary review of the application and its air quality impacts, the Department's notice will be published in the legal section of a newspaper circulated near the facility location.

Atención

Este es un aviso de la oficina de Calidad del Aire del Departamento del Medio Ambiente de Nuevo México, acerca de las emisiones producidas por un establecimiento en esta área. Si usted desea información en español, por favor comuníquese con esa oficina al teléfono 505-476-5557.

Notice of Non-Discrimination

NMED does not discriminate on the basis of race, color, national origin, disability, age or sex in the administration of its programs or activities, as required by applicable laws and regulations. NMED is responsible for coordination of compliance efforts and receipt of inquiries concerning non-discrimination requirements implemented by 40 C.F.R. Part 7, including Title VI of the Civil Rights Act of 1964, as amended; Section 504 of the Rehabilitation Act of 1973; the Age Discrimination Act of 1975, Title IX of the Education Amendments of 1972, and Section 13 of the Federal Water Pollution Control Act Amendments of 1972. If you have any questions about this notice or any of NMED's non-discrimination programs, policies or procedures, or if you believe that you have been discriminated against with respect to a NMED program or activity, you may contact: Kristine Yurdin, Non-Discrimination Coordinator, NMED, 1190 St. Francis Dr., Suite N4050, P.O. Box 5469, Santa Fe, NM 87502, (505) 827-2855, nd.coordinator@state.nm.us. You may also visit our website at https://www.env.nm.gov/non-employee-discrimination-complaint-page/ to learn how and where to file a complaint of discrimination.

O21

Legal

STATE OF NEW MEXICO
IN THE PROBATE COURT
GRANT COUNTY

No. 4610

IN THE MATTER OF
THE ESTATE OF
JOHN MOORE, DECEASED.

NOTICE TO CREDITORS

NOTICE IS HEREBY GIVEN that John D. Moore has been appointed Personal Representative of the Estate of the Decedent. All persons having claims against the Estate of the Decedent are required to present their claims within four (4) months after the date of the first publication of any published Notice to Creditors or sixty (60) days after the date of mailing or other delivery of this notice, whichever is later, or the claims will be forever barred. Claims must be presented either to the undersigned Personal Representative at the address listed below, or filed with the Probate Court of Grant County, New Mexico, located at the following address: P.O. Box 898, Silver City, New Mexico 88062.

Dated: October 19, 2020.

Prepared and Submitted by:
Lopez, Dietzel, Perkins
& Wallace, P.C.

/s/ William Perkins
William J. Perkins
P.O. Box 1289
Silver City, NM 88062
(575) 538-2925
Attorney for John D. Moore

O21,28,N4

Submittal of Public Service Announcement – Certification

I, Claire Booth, the undersigned, certify that on **October 22, 2020**, submitted a public service announcement to **Silver City Radio (SkyWest Media, LLC) for KNFT-AM** that serves **Silver City, Grant County**, New Mexico, in which the source is or is proposed to be located and that **Silver City Radio responded that it would air the announcement.**

Signed this 22 day of October, 2020.

Claire Booth
Signature

10/22/2020
Date

Claire Booth
Printed Name

Principle, Array Environmental (consultant)
Title {APPLICANT OR RELATIONSHIP TO APPLICANT}

claire@arrayenvironmental.com

From: Sabrina Pack <sabrina@silvercityradio.com>
Sent: Thursday, October 22, 2020 11:26 AM
To: claire@arrayenvironmental.com
Subject: Re: FW: PSA Request for Air Quality Permit - Tyrone Mine

Thank you.

We will get produced.

Sabrina

On Thu, Oct 22, 2020 at 11:24 AM <claire@arrayenvironmental.com> wrote:

> Hi Sabrina,
>
> Here is the script for the Tyrone Mine's Silver City Radio PSA:
>
> > Freeport McMoRan Tyrone, Inc. principal owner and operator of the Tyrone Mine is submitting an air permit application to the New Mexico Environment Department Air Quality Bureau. Tyrone Mine is a copper mine located 4.5 miles southwest of Tyrone, New Mexico in Grant County. The air permit application is being submitted to update emissions associated with new mine operating scenarios, update emissions associated with reclamation activities, update emissions associated with a crushing and screening plant, incorporate two new boilers, update emissions associated with the currently permitted engines, and update emissions associated with the currently permitted gasoline tanks in accordance with EPA's updated calculation methodologies. Notices have been posted at the Tyrone Mine Property Boundary, Tyrone Mine Security Gate, Tyrone Post Office/Community Center, Silver City Public Library, and the Grant County Administration Building. Comments may be directed to the New Mexico Environment Department, Air Quality Bureau, Permitting Section via mail at 525 Camino de los Marquez, Suite 1, Santa Fe, New Mexico, 87505-1816 or via phone at (505) 476-4300.
>
> Thank you!
>
> Claire

Claire Booth, PE // Array Environmental, LLC

720.316.9935 (o) // 352.328.5764 (m) // claire@arrayenvironmental.com

From: claire@arrayenvironmental.com <claire@arrayenvironmental.com>
Sent: Tuesday, October 20, 2020 1:19 PM
To: events@silvercityradio.com
Subject: PSA Request for Air Quality Permit - Tyrone Mine

Dear Silver City Radio,

Per New Mexico Administrative Code 20.2.72.203.B NMAC and according to the Guidance for Public Notice for Air Quality Permit Applications - **(5) Notifications: Submittal of Public Service Announcement (PSA):** A public service announcement required for permits or significant permit revisions must be submitted to at least one radio or television station, which services the municipality, or county which the facility is or will be located. **Therefore, based on the above, werespectfullyask you to air the information shown below as a Public Service Announcement**.

The public service announcement request must contain the following information about the facility or proposed facility

(20.2.72.203.D NMAC).

(a) The name: **Tyrone Mine**, location: **4.5 miles southwest of Tyrone, NM; P.O. Box 571, Tyrone, NM 88065** and type of business: **Mine.**

(b) The name of the principal owner or operator: **Freeport-McMoRan Tyrone Inc.**. – owner & operator.

(c) The type of process or change for which the permit is sought: **NSR Significant Revision – updating emissions associated with new mine operating scenarios, updating emissions associated with reclamation activities, updating emissions associated with the crushing and screening plant, adding two new boilers, updating emissions associated with the currently permitted engines, and updating emissions associated with the currently permitted gasoline tanks in accordance with EPA's updated calculation methodologies.**

(d) Locations where the notices have been posted**: (1) Tyrone Mine Property Boundary; (2) Tyrone Mine Security Gate; (3) Tyrone Post Office/Community Center; (4) Silver City Public Library; (5) Grant County Administration Building**

(e) The Department's address or telephone number to which comments may be directed: **Permit Programs Manager; New Mexico Environment Department; Air Quality Bureau; 525 Camino de los Marquez, Suite 1, Santa Fe, New Mexico; 87505-1816; (505) 476-4300**

Please let me know if you need anything else to process this request. For documentation purposes, can you send me an email acknowledging receipt of the request to read the PSA?

Thank you!

Claire

Claire Booth, PE // Array Environmental, LLC

720.316.9935 (o) // 352.328.5764 (m) // claire@arrayenvironmental.com

Steamboat Springs, Colorado // www.arrayenvironmental.com

--

Sabrina Pack--PCM
Principal and COO SkyWest Media
p 575.342.1000 | m 575.956.5428
www.skywestmedia.com

New Mexico Broadcast Operations:
KNFT-FM, KNFT-AM, KSCQ-FM, KPSA-FM
p 575.538.3396 | f 575.388.1759
www.silvercityradio.com
NMBA Executive Board Member

SkyWest Media, LLC
P.O. Box 2577
Silver City, NM 88062
(575) 538-3396

KNFT-AM Order Confirmation

OrderID: 1038-001

Sponsor:	Array Environmental, LLC
Product:	Array Environmental, LLC
Estimate/PO:	PSA Air Permit Application Tyrone Mine
AccountRep:	House Accounts
BillingCycle:	Calendar Month
InvoiceType:	Detail
Run Dates:	10/23/2020 - 10/23/2020
Items Ordered:	01
Ordered Amount:	$250.00
+State, County, City Tax as of 7-1-15	$20.00
Total Amount:	$270.00

ARRAY ENVIRONMENTAL, LLC
1496 CONESTOGA CIRCLE
STEAMBOAT SPRINGS, CO 80487

Scheduled Station(s): KNFT-AM

Array Environmental, LLC

Printed 10/22/2020 11:16:51 AM **Page 1**

	Run Dates	Run Weeks	Run Times	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Week Total	Length	Description	Avail Type	Copy ID	Qty	Item Cost	Total Cost
01	10/23/2020 - 10/23/2020	All Weeks	06:00 AM - 07:00 PM					1			1	2:00	Public Affairs		6633	1	250.00	250.00

Calendar Month Projected Billing:

Oct-20	250.00	Nov-20	0.00	Dec-20	0.00	Q4-2020	250.00

Net due 30 after receipt of invoice

Accepted for KNFT-AM

Confirmed Correct; Payment Guaranteed

Section 10

Written Description of the Routine Operations of the Facility

---

A written description of the routine operations of the facility. Include a description of how each piece of equipment will be operated, how controls will be used, and the fate of both the products and waste generated. For modifications and/or revisions, explain how the changes will affect the existing process. In a separate paragraph describe the major process bottlenecks that limit production. The purpose of this description is to provide sufficient information about plant operations for the permit writer to determine appropriate emission sources.

Mining Activities

Mine operations begin with drilling, blasting, and loading copper bearing ore or waste rock within the active areas of the open pit mine. Drilling is performed with electric mobile drills. Blast holes are drilled to depth and are partially filled with blasting agents. The remaining top portion of each blast hole is filled with stemming material, which is a sand and gravel mixture. Blast holes are drilled on a variable spacing but most often are drilled on a spacing of approximately 24 to 30 feet. Once the rock is blasted, electric shovels and/or loaders load haul trucks that deliver rock to stockpiles for leaching or waste.

The following operational scenarios are included in this permit application and are based on pit-specific throughputs. Note that the scenario numbering begins with "2" because these scenarios are intended to be added to the Gettysburg + Mohawk operating scenario approved in NSR Permit No. PSD2448-M5.

Operating Scenario	Pit Name	Maximum Blasting Agent Usage per Blast (lbs/blast)	Maximum No. of Blasts per Day	Maximum Daily Blasting Agent Usage (lbs/day)	Maximum Blast Area per Blast (ft^2/blast)	Maximum Mining Rates (tons/day)
Scenario 2	Mohawk	150,000	2	300,000	125,000	200,000
	Copper Mountain	100,000	1	100,000	125,000	200,000
Scenario 3	Mohawk	150,000	2	300,000	125,000	200,000
	Little Rock 6	100,000	1	100,000	125,000	90,000
Scenario 4	Mohawk	150,000	2	300,000	125,000	200,000
	Copper Leach	50,000	1	50,000	125,000	90,000
Scenario 5	Burro Chief	200,000	2	400,000	125,000	200,000
	Little Rock 6	100,000	1	100,000	125,000	90,000
Scenario 6	Burro Chief	200,000	2	400,000	125,000	200,000
	Copper Leach	50,000	1	50,000	125,000	90,000
Scenario 7	Mohawk	150,000	2	300,000	125,000	200,000
	Burro Chief	200,000	2	400,000	125,000	200,000

The main assumptions that go into the operational scenario emission calculations are that two pits can be blasted in a day but only one pit can be blasted in an hour. Therefore, it is assumed that the emissions from one blast are equivalent to the maximum hourly emissions. In addition, the operations associated with the two pits in a given scenario can occur at the same time, but no more than one scenario can operate in a day.

Maximum emissions associated with each pit's worst-case stockpiles (leach and/or waste) and worst-case haul roads operating simultaneously within each scenario were assessed in the model.

Reclamation Activities

Reclamation is done under the multi-year reclamation plan approved by the New Mexico Environment Department and the New Mexico Energy, Minerals and Natural Resources Department – Mining and Minerals Division. Reclamation activities may entail the crushing and screening of material, loading, hauling, and unloading of material for various reclamation purposes. The following reclamation projects are included in this permit application:

Reclamation Area	Maximum Reclamation Rates (tons/day)
Launder Line	5,000
Thickener	15,000
P-Plant	15,000
1A/1B Stockpile	20,000
2A/2B Stockpile	20,000
CLW Stockpile	15,000

Maximum emissions associated with the worst-case small and large truck projects operating simultaneously within each mining scenario were assessed in the model.

Leaching

Collected ore is delivered to stockpiles where a slightly acidic solution called raffinate is sprinkled on its surface. The solution percolates through the copper bearing ore, dissolving copper minerals contained in it. The resulting copper-laden solution, referred to in the mining industry as pregnant leach solution (PLS), exits the bottom of the stockpile where it is collected and pumped to storage ponds. The PLS is gravity fed to the solution extraction/electrowinning (SX/EW) plant for further processing.

SX/EW Plant

The SX/EW Plant consists of a series of ten mixer-settler tanks followed by a series of two EW tankhouses. The SX/EW Plant has two circuits of mixer-settler tanks with a flow capacity of approximately 32,000 gallons per minute (gpm). In the SX tanks, PLS is mixed vigorously with an equal volume of an organic solution that consists of approximately 90 percent diluent, which is a highly refined petroleum-based solvent. It is also mixed with 10 percent extraction reagent, which is a specialty chemical that selectively extracts copper from aqueous solutions under specific conditions.

Once the PLS and organic solution are sufficiently mixed, settling occurs. During this process, the less-dense organic solution extracts copper ions while the now barren leach solution settles to the bottom of the tank. The organic solution, now called "loaded" since it contains copper ions, floats to the top of the tank and is pumped to the next component of the plant. The settled solution is called "raffinate", and since it is barren of copper, is sent to an organic recovery tank to recycle any carryover organic solution back to the extraction tanks. The raffinate is sent back to the leach stockpiles for another leach cycle.

The loaded organic solution is mixed with a strong aqueous solution of sulfuric acid, called "electrolyte", which strips copper ions from the organic solution. The mixed solutions are sent to a settling tank where the copper-rich electrolyte solution settles to the bottom and the organic solution floats to the top. The organic solution is recycled back to the extraction process. The copper-rich electrolyte solution is pumped to the EW tankhouse where it is routed through a series of tanks, or cells. Insoluble lead plates are hung in the cells and serve as an anode. Copper "starter sheets" are placed in the cells as cathodes. An electric current in the solution causes the copper ions from the electrolyte solution to plate onto the cathodes. Once the sheets contain enough copper, they are removed from the EW cells and shipped to off-site facilities for further processing into copper products. The remaining "lean" electrolyte solution is pumped back to the SX/EW Plant and the entire process is repeated.

Crushing & Screening Plant

Routine operations for the Tyrone Mine include the periodic use of a portable crushing and/or screening plant for reclamation purposes or to support mining activities, such as road base. Crushing and/or screening activities are operated by a contractor under GCP-2. The crushing and/or screening plant will be powered by facility electric power.

Insignificant Sources

Insignificant sources at the Tyrone Mine include natural gas or propane-fired water heaters, space heaters, small engines for welders, portable pumps, and mixing tanks. A comprehensive list of sources is provided in Table 2-B of this application.

Power Plant

The Tyrone Mine and related facilities rely on power purchased from PNM Electric. During unavoidable loss of commercial power, a power plant is available to provide backup power. The power plant consists of ten (10) Nordberg compression-ignition internal combustion engines, combusting dual-fuel – a mixture of mostly natural gas and diesel – to initiate ignition.

The only exception is the Engine 15 (PPG-15), which runs on diesel only. Each engine drives a 2 MW (approximate) generator that provides power to the mine and related facilities. The Nordberg engines each operate less than 500 hours per year.

Alternate Operating Scenario

The alternate operating scenarios (AOS) proposed in this permit application will be utilized with the AOS authorized under NSR Permit No. PSD2448-M5. However, no scenario, either existing or proposed, will occur simultaneously with another scenario. With this permit application, Freeport is requesting to list all scenarios from NSR Permit No. PSD2448-M5 and this permit application as AOS's in NSR Permit No. PSD2448-M6.

The active mining scenarios authorized in NSR Permit Nos. PSD2448-M2 and -M3 are no longer needed.

Section 11
Source Determination

Source submitting under 20.2.70, 20.2.72, 20.2.73, and 20.2.74 NMAC

Sources applying for a construction permit, PSD permit, or operating permit shall evaluate surrounding and/or associated sources (including those sources directly connected to this source for business reasons) and complete this section. Responses to the following questions shall be consistent with the Air Quality Bureau's permitting guidance, Single Source Determination Guidance, which may be found on the Applications Page in the Permitting Section of the Air Quality Bureau website.

Typically, buildings, structures, installations, or facilities that have the same SIC code, that are under common ownership or control, and that are contiguous or adjacent constitute a single stationary source for 20.2.70, 20.2.72, 20.2.73, and 20.2.74 NMAC applicability purposes. Submission of your analysis of these factors in support of the responses below is optional, unless requested by NMED.

A. Identify the emission sources evaluated in this section (list and describe)**:**

See Table 2-A in Section 2 of this application.

B. Apply the 3 criteria for determining a single source:

SIC Code: Surrounding or associated sources belong to the same 2-digit industrial grouping (2-digit SIC code) as this facility, OR surrounding or associated sources that belong to different 2-digit SIC codes are support facilities for this source.

☑ **Yes** ☐ **No**

Common Ownership or Control: Surrounding or associated sources are under common ownership or control as this source.

☑ **Yes** ☐ **No**

Contiguous or Adjacent: Surrounding or associated sources are contiguous or adjacent with this source.

☑ **Yes** ☐ **No**

C. Make a determination:

☑ The source, as described in this application, constitutes the entire source for 20.2.70, 20.2.72, 20.2.73, or 20.2.74 NMAC applicability purposes. If in "A" above you evaluated only the source that is the subject of this application, all "**YES**" boxes should be checked. If in "A" above you evaluated other sources as well, you must check **AT LEAST ONE** of the boxes "**NO**" to conclude that the source, as described in the application, is the entire source for 20.2.70, 20.2.72, 20.2.73, and 20.2.74 NMAC applicability purposes.

☐ The source, as described in this application, **does not** constitute the entire source for 20.2.70, 20.2.72, 20.2.73, or 20.2.74 NMAC applicability purposes (A permit may be issued for a portion of a source). The entire source consists of the following facilities or emissions sources (list and describe):

There are no other industrial facilities outside the Tyrone Mine property boundary that could be considered part of the Tyrone Mine stationary source for air quality permitting purposes.

Section 12

Section 12.A
PSD Applicability Determination for All Sources

(Submitting under 20.2.72, 20.2.74 NMAC)

A PSD applicability determination for all sources. For sources applying for a significant permit revision, apply the applicable requirements of 20.2.74.AG and 20.2.74.200 NMAC and to determine whether this facility is a major or minor PSD source, and whether this modification is a major or a minor PSD modification. It may be helpful to refer to the procedures for Determining the Net Emissions Change at a Source as specified by Table A-5 (Page A.45) of the EPA New Source Review Workshop Manual to determine if the revision is subject to PSD review.

A. This facility is:

- ☑ **a minor PSD source before and after this modification (if so, delete C and D below).**
- ☐ **a major PSD source before this modification. This modification will make this a PSD minor source.**
- ☐ **an existing PSD Major Source that has never had a major modification requiring a BACT analysis.**
- ☐ **an existing PSD Major Source that has had a major modification requiring a BACT analysis**
- ☐ **a new PSD Major Source after this modification.**

B. **This facility is not one of the listed 20.2.74.501 Table I – PSD Source Categories. The "project" emissions for this modification are not significant. The "project" emissions listed below only result from changes described in this permit application and represent potential emissions for the new sources only since the new sources are the only sources undergoing a "physical change" with this project. The project emissions (before netting) for this project are as follows [see Table 2 in 20.2.74.502 NMAC for a complete list of significance levels]:**

a. **NOx: 4.5 TPY**
b. **CO: 2.6 TPY**
c. **VOC: 0.3 TPY**
d. **SOx: 0.6 TPY**
e. **PM: 0.2 TPY**
f. **PM10: 0.2 TPY**
g. **PM2.5: 0.2 TPY**
h. **Fluorides: N/A**
i. **Lead: N/A**
j. **Sulfur compounds (listed in Table 2): 0 TPY**
k. **GHG: 4,379.5 TPY**

The Tyrone Mine is currently a PSD minor source and will remain a PSD minor source after this application since potential emissions from the two (2) new non-fugitive sources (Water Boilers B-3891 and B-1454) are less than 250 tons per year. All other changes mentioned in this permit application for non-fugitive sources are not physical modifications or changes in the method of operation and do not constitute a "modification" under PSD.

Section 13

Determination of State & Federal Air Quality Regulations

This section lists each state and federal air quality regulation that may apply to your facility and/or equipment that are stationary sources of regulated air pollutants.

Not all state and federal air quality regulations are included in this list. Go to the Code of Federal Regulations (CFR) or to the Air Quality Bureau's regulation page to see the full set of air quality regulations.

Required Information for Specific Equipment:
For regulations that apply to specific source types, in the 'Justification' column **provide any information needed to determine if the regulation does or does not apply**. **For example**, to determine if emissions standards at 40 CFR 60, Subpart IIII apply to your three identical stationary engines, we need to know the construction date as defined in that regulation; the manufacturer date; the date of reconstruction or modification, if any; if they are or are not fire pump engines; if they are or are not emergency engines as defined in that regulation; their site ratings; and the cylinder displacement.

Required Information for Regulations that Apply to the Entire Facility:
See instructions in the 'Justification' column for the information that is needed to determine if an 'Entire Facility' type of regulation applies (e.g. 20.2.70 or 20.2.73 NMAC).

Regulatory Citations for Regulations That Do Not, but Could Apply:
If there is a state or federal air quality regulation that does not apply, but you have a piece of equipment in a source category for which a regulation has been promulgated, you must **provide the low level regulatory citation showing why your piece of equipment is not subject to or exempt from the regulation. For example** if you have a stationary internal combustion engine that is not subject to 40 CFR 63, Subpart ZZZZ because it is an existing 2 stroke lean burn stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions, your citation would be 40 CFR 63.6590(b)(3)(i). **We don't want a discussion of every non-applicable regulation, but if it is possible a regulation could apply, explain why it does not. For example,** if your facility is a power plant, you do not need to include a citation to show that 40 CFR 60, Subpart OOO does not apply to your non-existent rock crusher.

Regulatory Citations for Emission Standards:
For each unit that is subject to an emission standard in a source specific regulation, such as 40 CFR 60, Subpart OOO or 40 CFR 63, Subpart HH, include the low level regulatory citation of that emission standard. Emission standards can be numerical emission limits, work practice standards, or other requirements such as maintenance. **Here are examples:** a glycol dehydrator is subject to the general standards at 63.764C(1)(i) through (iii); an engine is subject to 63.6601, Tables 2a and 2b; a crusher is subject to 60.672(b), Table 3 and all transfer points are subject to 60.672(e)(1)

Federally Enforceable Conditions:
All federal regulations are federally enforceable. All Air Quality Bureau State regulations are federally enforceable except for the following: affirmative defense portions at 20.2.7.6.B, 20.2.7.110(B)(15), 20.2.7.11 through 20.2.7.113, 20.2.7.115, and 20.2.7.116; 20.2.37; 20.2.42; 20.2.43; 20.2.62; 20.2.63; 20.2.86; 20.2.89; and 20.2.90 NMAC. Federally enforceable means that EPA can enforce the regulation as well as the Air Quality Bureau and federally enforceable regulations can count toward determining a facility's potential to emit (PTE) for the Title V, PSD, and nonattainment permit regulations.

INCLUDE ANY OTHER INFORMATION NEEDED TO COMPLETE AN APPLICABILITY DETERMINATION OR THAT IS RELEVENT TO YOUR FACILITY'S NOTICE OF INTENT OR PERMIT.

EPA Applicability Determination Index for 40 CFR 60, 61, 63, etc: http://cfpub.epa.gov/adi/

Table for STATE REGULATIONS:

STATE REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION: (You may delete instructions or statements that do not apply in the justification column to shorten the document.)
20.2.1 NMAC	General Provisions	**Yes**	**Facility**	General Provisions apply to Notice of Intent, Construction, and Title V permit applications.
20.2.3 NMAC	Ambient Air Quality Standards NMAAQS	**Yes**	**Facility**	20.2.3 NMAC is a State Implementation Plan (SIP) approved regulation that limits the maximum allowable concentration of Total Suspended Particulates, Sulfur Compounds, Carbon Monoxide and Nitrogen Dioxide. The facility is subject to this regulation.
20.2.7 NMAC	Excess Emissions	**Yes**	**Facility**	If your entire facility or individual pieces of equipment are subject to emissions limits in a permit or numerical emissions standards in a federal or state regulation, this applies.
20.2.33 NMAC	Gas Burning Equipment - Nitrogen Dioxide	No	N/A	This facility does not have new gas burning equipment having a heat input of greater than 1,000,000 million British Thermal Units per year per unit. This regulation does not apply. Note: "New gas burning equipment" means gas burning equipment, the construction or modification of which is commenced after February 17, 1972.
20.2.34 NMAC	Oil Burning Equipment: NO_2	No	N/A	This facility does not have oil burning equipment having a heat input of greater than 1,000,000 million British Thermal Units per year per unit, therefore this regulation does not apply.
20.2.35 NMAC	Natural Gas Processing Plant – Sulfur	No	N/A	This regulation could apply to existing (prior to July 1, 1974) or new (on or after July 1, 1974) natural gas processing plants that use a Sulfur Recovery Unit to reduce sulfur emissions. This facility does not operate a sulfur recovery unit. This regulation does not apply.
20.2.37 and 20.2.36 NMAC	Petroleum Processing Facilities and Petroleum Refineries	N/A	N/A	These regulations were repealed by the Environmental Improvement Board. If you had equipment subject to 20.2.37 NMAC before the repeal, your combustion emission sources are now subject to 20.2.61 NMAC.
20.2.38 NMAC	Hydrocarbon Storage Facility	No	N/A	This regulation could apply to storage tanks at petroleum production facilities, processing facilities, tanks batteries, or hydrocarbon storage facilities. This facility is not covered under this regulation. This regulation does not apply.
20.2.39 NMAC	Sulfur Recovery Plant - Sulfur	No	N/A	This regulation could apply to sulfur recovery plants that are not part of petroleum or natural gas processing facilities. This facility does not contain a sulfur recovery plant. This regulation does not apply.
20.2.61.109 NMAC	Smoke & Visible Emissions	**Yes**	**Stationary Combustion Equipment**	This regulation applies to Stationary Combustion Equipment, such as engines, boilers, heaters, and flares unless your equipment is subject to another state regulation that limits particulate matter such as 20.2.19 NMAC (see 20.2.61.109 NMAC). Facility stationary combustion equipment are subject to this regulation.
20.2.70 NMAC	Operating Permits	**Yes**	**Facility**	This regulation applies as the facility's potential to emit (PTE) is 100 tpy or more of any regulated air pollutant other than HAPs; and/or a HAPs PTE of 10 tpy or more for a single HAP or 25 or more tpy for combined HAPs. This facility is permitted under Title V Permit No. P147-R2M1.
20.2.71 NMAC	Operating Permit Fees	**Yes**	**Facility**	If subject to 20.2.70 NMAC and your permit includes numerical ton per year emission limits, you are subject to 20.2.71 NMAC and normally applies to the entire facility.
20.2.72 NMAC	Construction Permits	**Yes**	**Facility**	This applies as the facility's potential emission rate (PER) is greater than 10 pph and greater than 25 tpy for any pollutant subject to a state or federal ambient air quality standard. This facility is currently permitted under NSR Permit No. PSD2448-M5.

STATE REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION: (You may delete instructions or statements that do not apply in the justification column to shorten the document.)
20.2.73 NMAC	NOI & Emissions Inventory Requirements	**Yes**	**Facility**	All facilities that are a Title V Major Source as defined at 20.2.70.7.R NMAC, are subject to Emissions Inventory Reporting. This facility is a Title V major source. This regulation applies.
20.2.74 NMAC	Permits – Prevention of Significant Deterioration (PSD)	No	N/A	This facility is a stationary source not listed in Table 1 of this Part (20.2.74.501 NMAC) and which emits or has the potential to emit stack emissions of less than two hundred fifty (250) tons per year of any regulated pollutant. This regulation therefore does not apply.
20.2.74.302 NMAC	Prevention of Significant Deterioration (PSD) CONTROL TECHNOLOGY REQUIREMENTS	**Yes**	**PPG-1, 3, 4, 7, 8, 11-15**	Only this portion of 20.2.74 NMAC applies to the Nordberg engines at the facility (units PPG-1, 3, 4, 7, 8, 11-15) as historical BACT requirements apply to these engines.
20.2.75 NMAC	Construction Permit Fees	**Yes**	**Facility**	This regulation applies if you are submitting an application pursuant to 20.2.72, 20.2.73, 20.2.74, and/or 20.2.79 NMAC. If this is a 20.2.72, 20.2.74, and/or 20.2.79 NMAC application it is subject to 20.2.75.10, 11 permit fee, and 11.E annual fees. This regulation applies.
20.2.77 NMAC	New Source Performance	**Yes**	**Units subject to 40 CFR 60**	This is a stationary source which is subject to the requirements of 40 CFR Part 60. This regulation applies as 40 CFR 60 Subparts IIII and JJJJ apply.
20.2.78 NMAC	Emission Standards for HAPS	No	Units Subject to 40 CFR 61	This facility does not emit hazardous air pollutants which are subject to the requirements of 40 CFR Part 61. This regulation does not apply.
20.2.79 NMAC	Permits – Nonattainment Areas	No	Facility	This facility is not located within a non-attainment area. This regulation does not apply.
20.2.80 NMAC	Stack Heights	No	N/A	Stacks at this facility follow good engineering practice.
20.2.82 NMAC	MACT Standards for source categories of HAPS	**Yes**	**Units Subject to 40 CFR 63**	This regulation applies to all sources emitting hazardous air pollutants, which are subject to the requirements of 40 CFR Part 63. This regulation applies as 40 CFR 63 Subparts A, ZZZZ, and CCCCCC apply.

Table for Applicable FEDERAL REGULATIONS:

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
40 CFR 50	NAAQS	**Yes**	**Facility**	This applies if you are subject to 20.2.70, 20.2.72, 20.2.74, and/or 20.2.79 NMAC.
NSPS 40 CFR 60, Subpart A	General Provisions	**Yes**	**Units subject to 40 CFR 60**	Applies if any other Subpart in 40 CFR 60 applies. This regulation applies as 40 CFR 60 Subparts IIII and JJJJ apply.

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
NSPS 40 CFR60.40a, Subpart Da	Subpart Da, Performance Standards for **Electric Utility Steam Generating Units**	No	N/A	Establishes PM, SO_2 and NOx emission limits/standards of performance for electric utility steam generating units. This facility does not contain the affected source. This regulation does not apply.
NSPS 40 CFR60.40b Subpart Db	Performance Standards for **Industrial-Commercial-Institutional Steam Generating Units**	No	N/A	(a) The affected facility to which this subpart applies is each steam generating unit that commences construction, modification, or reconstruction after June 19, 1984, and that has a heat input capacity from fuels combusted in the steam generating unit of greater than 29 MW (100 million Btu/hour). This facility does not contain the affected source. This regulation does not apply.
40 CFR 60.40c, Subpart Dc	Standards of Performance for **Small Industrial-Commercial-Institutional Steam Generating Units**	No	N/A	Applicability: facility has steam generating units for which construction, modification or reconstruction is commenced after June 9, 1989 and that have a maximum design heat input capacity of 29 MW (100 MMBtu/hr) or less, but greater than or equal to 2.9 MW (10 MMBtu/hr). This facility does not contain the affected source. This regulation does not apply.
NSPS 40 CFR 60, Subpart Ka	Standards of Performance for **Storage Vessels for Petroleum Liquids** for which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and **Prior** to July 23, 1984	No	N/A	Except as provided in paragraph (b) of this section, the affected facility to which this subpart applies is each storage vessel with a storage capacity greater than 151,416 liters (40,000 gallons) that is used to store petroleum liquids for which construction is commenced after May 18, 1978. This facility does not contain the affected source. This regulation does not apply.
NSPS 40 CFR 60, Subpart Kb	Standards of Performance for **Volatile Organic Liquid Storage Vessels** (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced **After** July 23, 1984	No	N/A	Except as provided in paragraph (b) of this section, the affected facility to which this subpart applies is each storage vessel with a capacity greater than or equal to 75 cubic meters (m3) that is used to store volatile organic liquids (VOL) for which construction, reconstruction, or modification is commenced after July 23, 1984. This facility does not contain the affected source. This regulation does not apply.
NSPS 40 CFR 60.330 Subpart GG	**Stationary Gas Turbines**	No	N/A	The provisions of this subpart are applicable to the following affected facilities: All stationary gas turbines with a heat input at peak load equal to or greater than 10.7 gigajoules (10 million Btu) per hour, based on the lower heating value of the fuel fired. This facility does not contain the affected source. This regulation does not apply.

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
NSPS 40 CFR 60, Subpart KKK	Leaks of VOC from **Onshore Gas Plants**	No	N/A	Affected Facility with Leaks of VOC from Onshore Gas Plants. Any affected facility under paragraph (a) of this section that commences construction, reconstruction, or modification after January 20, 1984, is subject to the requirements of this subpart. The group of all equipment (each pump, pressure relief device, open-ended valve or line, valve, compressor, and flange or other connector that is in VOC service or in wet gas service, and any device or system required by this subpart) except compressors (defined in § 60.631) within a process unit is an affected facility. A compressor station, dehydration unit, sweetening unit, underground storage tank, field gas gathering system, or liquefied natural gas unit is covered by this subpart if it is located at an onshore natural gas processing plant. This facility does not contain the affected source. This regulation does not apply.
NSPS 40 CFR Part 60 Subpart LL	Standards of performance for **Metallic Mineral Processing Plants**	No	N/A	The provisions of this subpart are applicable to the following affected facilities in metallic mineral processing plants: Each crusher and screen in open-pit mines; each crusher, screen, bucket elevator, conveyor belt transfer point, thermal dryer, product packaging station, storage bin, enclosed storage area, truck loading station, truck unloading station, railcar loading station, and railcar unloading station at the mill or concentrator with the following exceptions. This facility does not operate an affected facility under this subpart. This facility does not have a crusher or screen in the open-pit mine area and does not have a concentrator, mill, or conveyor belts in its process. The portable crusher and screener (GCP-2) will only be used to process aggregate and not copper-containing ores. This regulation does not apply.
NSPS 40 Part 60 Subpart OOO	Standards of Performance for **Nonmetallic Mineral Processing Plants**	No	N/A	This regulation establishes standards for the following affected facilities in fixed or portable nonmetallic mineral processing plants: each crusher, grinding mill, screening operation, bucket elevator, belt conveyor, bagging operation, storage bin, enclosed truck or railcar loading station is an applicable unit. Tyrone has no operations subject to Subpart OOO. Portable contractor crushing and screening plants that may be on-site may be subject to Subpart OOO, but that applicability is to the Contractor's plant.
NSPS 40 CFR Part 60 Subpart LLL	Standards of Performance for **Onshore Natural Gas Processing**: SO_2 Emissions	No	N/A	The facility is not a natural gas processing plant, including a sweetening unit followed by a sulfur recovery unit. This regulation does not apply.
NSPS 40 CFR Part 60 Subpart OOOO	Standards of Performance for **Crude Oil and Natural Gas Production, Transmission, and Distribution** for which construction, modification or reconstruction commenced after August 23, 2011 and before September 18, 2015	No	N/A	The rule applies to "affected" facilities that are constructed, modified, or reconstructed after Aug 23, 2011 (40 CFR 60.5365): gas wells, including fractured and hydraulically refractured wells, centrifugal compressors, reciprocating compressors, pneumatic controllers, certain equipment at natural gas processing plants, sweetening units at natural gas processing plants, and storage vessels. This facility does not contain the affected source. This regulation does not apply.

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
NSPS 40 CFR Part 60 Subpart OOOOa	Standards of Performance for **Crude Oil and Natural Gas Facilities** for which Construction, Modification or Reconstruction Commenced After September 18, 2015	No	N/A	This facility does not contain the affected source. This regulation does not apply.
NSPS 40 CFR 60 Subpart IIII	Standards of performance for **Stationary Compression Ignition Internal Combustion Engines**	**Yes**	**OP-4, OP-7, OP-8, SD-1, SD-2, ENV-120**	The provisions of this subpart are applicable to manufacturers, owners, and operators of stationary compression ignition (CI) internal combustion engines (ICE) and other persons as specified in paragraphs (a)(1) through (4) of this section. This facility contains several CI ICE which commenced construction after July 11, 2005 and were manufactured after April 1, 2006.
NSPS 40 CFR Part 60 Subpart JJJJ	Standards of Performance for **Stationary Spark Ignition Internal Combustion Engines**	**Yes**	**Generac Emergency Generators 1-4, IPG, SX Tankhouse Emergency Generator**	The provisions of this subpart are applicable to manufacturers, owners, and operators of stationary spark ignition (SI) internal combustion engines (ICE) as specified in paragraphs (a)(1) through (6) of this section. The Generac Emergency Generators (units Generac Emergency Generator 1 through 4), unit IPG, and the SX Tankhouse Emergency Generator are subject to NSPS JJJJ.
NSPS 40 CFR 60 Subpart TTTT	Standards of Performance for Greenhouse Gas Emissions for **Electric Generating Units**	No	N/A	This subpart establishes emission standards and compliance schedules for the control of greenhouse gas (GHG) emissions from a steam generating unit, IGCC, or a stationary combustion turbine that commences construction after January 8, 2014 or commences modification or reconstruction after June 18, 2014. This facility does not contain the affected source. This regulation does not apply.
NSPS 40 CFR 60 Subpart UUUU	Emissions Guidelines for Greenhouse Gas Emissions and Compliance Times for **Electric Utility Generating Units**	No	N/A	This subpart establishes emission guidelines and approval criteria for State or multi-State plans that establish emission standards limiting greenhouse gas (GHG) emissions from an affected steam generating unit, integrated gasification combined cycle (IGCC), or stationary combustion turbine. This facility does not contain the affected source. This regulation does not apply.
NSPS 40 CFR 60, Subparts WWW, XXX, Cc, and Cf	Standards of performance for **Municipal Solid Waste (MSW) Landfills**	No	N/A	This facility is not a municipal solid waste landfill. This regulation does not apply
NESHAP 40 CFR 61 Subpart A	General Provisions	No	Units Subject to 40 CFR 61	Applies if any other Subpart in 40 CFR 61 applies. As no subparts apply, this regulation does not apply.
NESHAP 40 CFR 61 Subpart E	National Emission Standards for **Mercury**	No	N/A	The provisions of this subpart are applicable to those stationary sources which process mercury ore to recover mercury, use mercury chlor-alkali cells to produce chlorine gas and alkali metal hydroxide, and incinerate or dry wastewater treatment plant sludge. This facility does not contain the affected activity. This regulation does not

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
				apply.
NESHAP 40 CFR 61 Subpart V	National Emission Standards for **Equipment Leaks** (Fugitive Emission Sources)	No	N/A	The provisions of this subpart apply to each of the following sources that are intended to operate in volatile hazardous air pollutant (VHAP) service: pumps, compressors, pressure relief devices, sampling connection systems, open-ended valves or lines, valves, connectors, surge control vessels, bottoms receivers, and control devices or systems required by this subpart. VHAP service means a piece of equipment either contains or contacts a fluid (liquid or gas) that is at least 10 percent by weight of VHAP. VHAP means a substance regulated under this subpart for which a standard for equipment leaks of the substance has been promulgated. Benzene is a VHAP (See 40 CFR 61 Subpart J). Link to 40 CFR 61 Subpart V This facility does not contain the affected source. This regulation does not apply.
MACT 40 CFR 63, Subpart A	General Provisions	**Yes**	**Units Subject to 40 CFR 63**	This regulation applies as 40 CFR 63 Subparts A, ZZZZ, and CCCCCC apply.
MACT 40 CFR 63.760 Subpart HH	**Oil and Natural Gas Production Facilities**	No	N/A	This subpart applies to the owners and operators of the emission points, specified in paragraph (b) of this section that are located at oil and natural gas production facilities that meet the specified criteria in paragraphs (a)(1) and either (a)(2) or (a)(3) of this section. This facility is not an oil or natural gas production facility. This regulation does not apply.
MACT 40 CFR 63 Subpart HHH	National Emission Standards for Hazardous Air Pollutants From **Natural Gas Transmission and Storage Facilities**	No	N/A	This subpart applies to owners and operators of natural gas transmission and storage facilities that transport or store natural gas prior to entering the pipeline to a local distribution company or to a final end user (if there is no local distribution company), and that are major sources of hazardous air pollutants (HAP) emissions as defined in §63.1271. This facility does not contain the affected source. This regulation does not apply.
MACT 40 CFR 63 Subpart DDDDD	National Emission Standards for Hazardous Air Pollutants for **Major Industrial, Commercial, and Institutional Boilers & Process Heaters**	No	N/A	This subpart establishes national emission limitations and work practice standards for hazardous air pollutants (HAP) emitted from industrial, commercial, and institutional boilers and process heaters located at major sources of HAP. This facility does not contain the affected source. This regulation does not apply.
MACT 40 CFR 63 Subpart UUUUU	National Emission Standards for Hazardous Air Pollutants **Coal & Oil Fire Electric Utility Steam Generating Unit**	No	N/A	This subpart establishes national emission limitations and work practice standards for hazardous air pollutants (HAP) emitted from coal- and oil-fired electric utility steam generating units (EGUs) as defined in §63.10042 of this subpart. This facility does not contain the affected source. This regulation does not apply.

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
MACT 40 CFR 63 Subpart ZZZZ	National Emissions Standards for Hazardous Air Pollutants for **Stationary Reciprocating Internal Combustion Engines (RICE MACT**)	**Yes**	**PPG-1, 3, 4, 7, 8, 11, 12, 13, 14, 15 ENV-101, ENV-111, ENV-117, ENV-122, ENV-123, Generac Emergency Generators 1-4, GO Generator Backup E1-128, SX/EW Fire Water Pump, OP-2, OP-4, OP-7, OP-8, EMP-1, EMP-2, ENV-120, SD-1, SD-2, IPG, CE-1 SX Tankhouse Emergency Generator**	You are subject to this subpart if you own or operate a stationary RICE at a major or area source of HAP emissions. This facility contains the affected RICE sources listed here.
MACT 40 CFR 63 Subpart CCCCCC	National Emission Standards for Hazardous Air Pollutants for Source Category: Gasoline Dispensing Facilities	**Yes**	**SPCC-TYR-061 (GDF1) SPCC-TYR-119 (GDF2)**	This subpart establishes national emission limitations and management practices for hazardous air pollutants (HAP) emitted from the loading of gasoline storage tanks at gasoline dispensing facilities (GDF). This subpart also establishes requirements to demonstrate compliance with the emission limitations and management practices. The affected source to which this subpart applies is each GDF that is located at an area source. The affected source includes each gasoline cargo tank during the delivery of product to a GDF and also includes each storage tank. **The gasoline dispensing units at this facility are subject. Per the regulation, because each GDF has a monthly throughput of less than 10,000 gallons of gasoline, the requirements in §63.11116 apply.**
40 CFR 64	**Compliance Assurance Monitoring**	No	N/A	The facility does not operate any pollutant-specific emissions unit that uses a control device to achieve compliance with a standard and the unit has potential pre-control device emissions of the applicable regulated air pollutant that are equal to or greater than 100 percent of the amount required for the source to be classified as a major source. As such, a CAM plan is not required.
40 CFR 68	**Chemical Accident Prevention**	No	N/A	This regulation applies to an owner or operator of a stationary source that has more than a threshold quantity of a regulated substance in a process, as determined under §68.115. This facility is not subject.
Title IV – Acid Rain 40 CFR 72	**Acid Rain**	No	N/A	See 40 CFR 72.6. This may apply if your facility generates commercial electric power or electric power for sale. The facility does not engage in the regulated activities. This regulation does not apply.
Title IV – Acid Rain 40 CFR 73	**Sulfur Dioxide** Allowance Emissions	No	N/A	See 40 CFR 73.2. This may apply if your facility generates commercial electric power or electric power for sale. The facility does not engage in the regulated activities. This regulation does not apply.
Title IV-Acid Rain 40 CFR 75	**Continuous Emissions Monitoring**	No	N/A	See 40 CFR 75.2. This may apply if your facility generates commercial electric power or electric power for sale. The facility does not engage in the regulated activities. This regulation does not apply.
Title IV –	**Acid Rain**	No	N/A	See 40 CFR 76.1. This may apply if your facility generates commercial

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
Acid Rain 40 CFR 76	Nitrogen Oxides **Emission Reduction Program**			electric power or electric power for sale. The facility does not engage in the regulated activities. This regulation does not apply.
Title VI – 40 CFR 82	Protection of **Stratospheric Ozone**	**Yes**	**N/A**	This regulation applies under the following citation: **(82.150)** if you service, maintain, or repair appliances, dispose of appliances, refrigerant reclaimers, **if you are an owner or operator of an appliance**, if you are a manufacturer of appliances or of recycling and recovery equipment, if you are an approved recycling and recovery equipment testing organization, and/or if you sell or offer for sell or purchase class I or class I refrigerants.

Section 14

Operational Plan to Mitigate Emissions

(Submitting under 20.2.70, 20.2.72, 20.2.74 NMAC)

☑ **Title V Sources** (20.2.70 NMAC)**:** By checking this box and certifying this application the permittee certifies that it has developed an **Operational Plan to Mitigate Emissions During Startups, Shutdowns, and Emergencies** defining the measures to be taken to mitigate source emissions during startups, shutdowns, and emergencies as required by 20.2.70.300.D.5(f) and (g) NMAC. This plan shall be kept on site to be made available to the Department upon request. This plan should not be submitted with this application.

☑ **NSR** (20.2.72 NMAC)**, PSD** (20.2.74 NMAC) **& Nonattainment** (20.2.79 NMAC) **Sources:** By checking this box and certifying this application the permittee certifies that it has developed an **Operational Plan to Mitigate Source Emissions During Malfunction, Startup, or Shutdown** defining the measures to be taken to mitigate source emissions during malfunction, startup, or shutdown as required by 20.2.72.203.A.5 NMAC. This plan shall be kept on site to be made available to the Department upon request. This plan should not be submitted with this application.

☑ **Title V** (20.2.70 NMAC)**, NSR** (20.2.72 NMAC)**, PSD** (20.2.74 NMAC) **& Nonattainment** (20.2.79 NMAC) **Sources:** By checking this box and certifying this application the permittee certifies that it has established and implemented a Plan to Minimize Emissions During Routine or Predictable Startup, Shutdown, and Scheduled Maintenance through work practice standards and good air pollution control practices as required by 20.2.7.14.A and B NMAC. This plan shall be kept on site or at the nearest field office to be made available to the Department upon request. This plan should not be submitted with this application.

Freeport-McMoRan Tyrone Inc. maintains the required operational plans to mitigate emissions.

Section 15

Alternative Operating Scenarios

(Submitting under 20.2.70, 20.2.72, 20.2.74 NMAC)

Alternative Operating Scenarios: Provide all information required by the department to define alternative operating scenarios. This includes process, material and product changes; facility emissions information; air pollution control equipment requirements; any applicable requirements; monitoring, recordkeeping, and reporting requirements; and compliance certification requirements. Please ensure applicable Tables in this application are clearly marked to show alternative operating scenario.

Construction Scenarios: When a permit is modified authorizing new construction to an existing facility, NMED includes a condition to clearly address which permit condition(s) (from the previous permit and the new permit) govern during the interval between the date of issuance of the modification permit and the completion of construction of the modification(s). There are many possible variables that need to be addressed such as: Is simultaneous operation of the old and new units permitted and, if so for example, for how long and under what restraints? In general, these types of requirements will be addressed in Section A100 of the permit, but additional requirements may be added elsewhere. Look in A100 of our NSR and/or TV permit template for sample language dealing with these requirements. Find these permit templates at: https://www.env.nm.gov/aqb/permit/aqb_pol.html. Compliance with standards must be maintained during construction, which should not usually be a problem unless simultaneous operation of old and new equipment is requested.

In this section, under the bolded title "Construction Scenarios", specify any information necessary to write these conditions, such as: conservative-realistic estimated time for completion of construction of the various units, whether simultaneous operation of old and new units is being requested (and, if so, modeled), whether the old units will be removed or decommissioned, any PSD ramifications, any temporary limits requested during phased construction, whether any increase in emissions is being requested as SSM emissions or will instead be handled as a separate Construction Scenario (with corresponding emission limits and conditions, etc.

Tyrone Mine currently operates under the alternate operating scenario (AOS) approved in NSR Permit No. PSD2448-M5 and is requesting to have the mining scenario associated with NSR Permit No. PSD2448-M5 and in this permit application listed as AOS's in NSR Permit No. PSD2448-M6. The AOS's associated with NSR Permit Nos. PSD2448-M3 and -M2 can be removed from the permit. Please see below for simplified operating and throughput limit tables that are being proposed to replace Tables 108.A.1 and 108.A.2 in the permit.

Table 108.A.1:Allowable Mining Operating and Throughput Limits (Fugitives)

Mining Operating Scenario[1]	Pit Name[2]	Maximum Blasting Agent Usage per Blast (lbs/blast)	Maximum No. of Blasts per Day[3]	Maximum Daily Blasting Agent Usage (lbs/day)	Maximum Blast Area per Blast (ft^2/blast)	Maximum Mining Rates[4] (tons/day)
Scenario 1	Gettysburg	160,000	2	200,000	85,000	200,000
	Mohawk	160,000	2	200,000	125,000	200,000
Scenario 2	Mohawk	150,000	2	300,000	125,000	200,000
	Copper Mountain	100,000	1	100,000	125,000	200,000
Scenario 3	Mohawk	150,000	2	300,000	125,000	200,000
	Little Rock 6	100,000	1	100,000	125,000	90,000
Scenario 4	Mohawk	150,000	2	300,000	125,000	200,000
	Copper Leach	50,000	1	50,000	125,000	90,000
Scenario 5	Burro Chief	200,000	2	400,000	125,000	200,000
	Little Rock 6	100,000	1	100,000	125,000	90,000
Scenario 6	Burro Chief	200,000	2	400,000	125,000	200,000
	Copper Leach	50,000	1	50,000	125,000	90,000
Scenario 7	Mohawk	150,000	2	300,000	125,000	200,000
	Burro Chief	200,000	2	400,000	125,000	200,000

Footnotes:
[1] Only one scenario can be operated during a given day.
[2] Both pits within a scenario can be operated simultaneously.
[3] Blasting can only occur during daylight hours.
[4] The movement of material (waste rock, overburden, and ore) from the pits to the waste or leach piles (handling and hauling) can occur 24 hours/day.

Table 108.A.2:Allowable Reclamation Operating and Throughput Limits (Fugitives)

Reclamation Area	Maximum Reclamation Rates[1] (tons/day)
Launder Line	5,000
Thickener	15,000
P-Plant	15,000
1A/1B Stockpile	20,000
2A/2B Stockpile	20,000
CLW Stockpile	15,000

Footnotes:
[1] The movement of reclamation material (handling and hauling) can occur 24 hours/day.

Table 108.A.3:Allowable Crushing & Screening Plant Operating and Throughput Limits (Fugitives)

Emission Unit	Operating Schedule	Maximum Throughput[1] (tons/hour)
Crushing & Screening Plant	12 hrs/day	600

Footnotes:
[1] Material includes ore and waste rock. Waste rock includes overburden. Activities include handling and hauling.

Section 16

Air Dispersion Modeling

1) Minor Source Construction (20.2.72 NMAC) and Prevention of Significant Deterioration (PSD) (20.2.74 NMAC) ambient impact analysis (modeling): Provide an ambient impact analysis as required at 20.2.72.203.A(4) and/or 20.2.74.303 NMAC and as outlined in the Air Quality Bureau's Dispersion Modeling Guidelines found on the Planning Section's modeling website. If air dispersion modeling has been waived for one or more pollutants, attach the AQB Modeling Section modeling waiver approval documentation.
2) SSM Modeling: Applicants must conduct dispersion modeling for the total short term emissions during routine or predictable startup, shutdown, or maintenance (SSM) using realistic worst case scenarios following guidance from the Air Quality Bureau's dispersion modeling section. Refer to "Guidance for Submittal of Startup, Shutdown, Maintenance Emissions in Permit Applications (http://www.env.nm.gov/aqb/permit/app_form.html) for more detailed instructions on SSM emissions modeling requirements.
3) Title V (20.2.70 NMAC) ambient impact analysis: Title V applications must specify the construction permit and/or Title V Permit number(s) for which air quality dispersion modeling was last approved. Facilities that have only a Title V permit, such as landfills and air curtain incinerators, are subject to the same modeling required for preconstruction permits required by 20.2.72 and 20.2.74 NMAC.

What is the purpose of this application?	Enter an X for each purpose that applies
New PSD major source or PSD major modification (20.2.74 NMAC). See #1 above.	
New Minor Source or significant permit revision under 20.2.72 NMAC (20.2.72.219.D NMAC). See #1 above. **Note:** Neither modeling nor a modeling waiver is required for VOC emissions.	X
Reporting existing pollutants that were not previously reported.	
Reporting existing pollutants where the ambient impact is being addressed for the first time.	
Title V application (new, renewal, significant, or minor modification. 20.2.70 NMAC). See #3 above.	
Relocation (20.2.72.202.B.4 or 72.202.D.3.c NMAC)	
Minor Source Technical Permit Revision 20.2.72.219.B.1.d.vi NMAC for like-kind unit replacements.	
Other: i.e. SSM modeling. See #2 above.	
This application does not require modeling since this is a No Permit Required (NPR) application.	
This application does not require modeling since this is a Notice of Intent (NOI) application (20.2.73 NMAC).	
This application does not require modeling according to 20.2.70.7.E(11), 20.2.72.203.A(4), 20.2.74.303, 20.2.79.109.D NMAC and in accordance with the Air Quality Bureau's Modeling Guidelines.	

Check each box that applies:

☐ See attached, approved modeling **waiver for all** pollutants from the facility.
☐ See attached, approved modeling **waiver for some** pollutants from the facility.
☑ Attached in Universal Application Form 4 (UA4) is a **modeling report for all** pollutants from the facility.
☐ Attached in UA4 is a **modeling report for some** pollutants from the facility.
☐ No modeling is required.

Universal Application 4

Air Dispersion Modeling Report

Refer to and complete Section 16 of the Universal Application form (UA3) to assist your determination as to whether modeling is required. If, after filling out Section 16, you are still unsure if modeling is required, e-mail the completed Section 16 to the AQB Modeling Manager for assistance in making this determination. If modeling is required, a modeling protocol would be submitted and approved prior to an application submittal. The protocol should be emailed to the modeling manager. A protocol is recommended but optional for minor sources and is required for new PSD sources or PSD major modifications. Fill out and submit this portion of the Universal Application form (UA4), the "Air Dispersion Modeling Report", only if air dispersion modeling is required for this application submittal. This serves as your modeling report submittal and should contain all the information needed to describe the modeling. No other modeling report or modeling protocol should be submitted with this permit application.

16-A: Identification

1	Name of facility:	**Tyrone Mine**
2	Name of company:	**Freeport-McMoRan Tyrone Inc.**
3	Current Permit number:	**PSD2448-M5; P147-R2M1**
4	Name of applicant's modeler:	**Miriam Hacker, Aspen Outlook LLC**
5	Phone number of modeler:	**720-839-5461**
6	E-mail of modeler:	**miriamhacker@aspenoutlook.com**

16-B: Brief

1	Was a modeling protocol submitted and approved?	**Yes☒**	No☐
2	Why is the modeling being done? **To show compliance with the NAAQS, NMAAQS, and PSD Increment associated with new alternate operating scenarios.**	Other (describe below)	
3	Describe the permit changes relevant to the modeling.		
	The proposed action in this permit application will allow for mining and hauling activities in six (6) new operating scenarios that encompass the following pits in various combinations: Mohawk, Copper Mountain, Copper Leach, Burro Chief, and Little Rock 6. Each scenario contains two pits in operation at a time. **The existing operating scenario in the Gettysburg and Mohawk pits, as approved in NSR Permit No. PSD2448-M5, will continue to be utilized, so the new scenarios in this permit application will be in addition to the existing scenario. No other operating scenarios are currently needed by the Tyrone Mine, including the previously permitted scenarios in NSR Permit Nos. PSD2448-M2 and -M3.**		

	New reclamation hauling and material handling activities are also represented in this permit application, which will supersede the reclamation activities allowed by NSR Permit Nos. PSD2448-M5, -M3, and -M2. **Other changes requested in this permit application include:** • **The addition of two new boilers that will serve as the SX heat exchanger hot water heaters.** • **Updates to the Crushing & Screening Plant (C&S Plant; formerly "SP-7A") emissions due to the planned activities. The C&S Plant will be owned and operated by a contractor that has an approved registration to operate under a General Construction Permit-2 (GCP-2), Revision 3, dated 9/12/2006, an approved Relocation Notice, and an approved equipment list. The C&S Plant will be powered by facility-provided electric power.** • **Updates to the existing Gasoline Dispensing Facilities (GDF1, GDF2) VOC emission calculations based on the June 2020 updated AP-42 Chapter 7 (Liquid Storage Tanks). The HAP emission calculations were also updated to reflect accurate gasoline HAP constituents. The throughput of each GDF was increased to a maximum of 9,900 gal/month.** • **Updates to the SO_2 and VOC emission factors for the two existing cathode washing hot water heaters. The SO_2 emission factor was updated to reflect the correct sulfur content of propane and the VOC emission factor was updated to reflect only the non-methane portion of the TOC emission factor.** • **Various updates to the diesel engine/pump emissions, which include some engine horsepower changes, emission factor changes, fuel usage rate changes, and greenhouse gas calculation changes.** **For all of the other existing equipment, no changes are being requested.** **The facility will remain a Title V major and PSD minor source with the proposed changes.**		
4	What geodetic datum was used in the modeling?	**WGS84**	
5	How long will the facility be at this location?	**Greater than one year**	
6	Is the facility a major source with respect to Prevention of Significant Deterioration (PSD)?	Yes☐	**No☒**
7	Identify the Air Quality Control Region (AQCR) in which the facility is located	**012**	
8	List the PSD baseline dates for this region (minor or major, as appropriate).		
	NO_2	**Minor - 8/10/1995**	
	SO_2	**Minor - 8/10/1995**	
	PM_{10}	**Minor - 8/10/1995**	
	$PM_{2.5}$	**Minor - Not Applicable**	
9	Provide the name and distance to Class I areas within 50 km of the facility (300 km for PSD permits). **Gila Wilderness; 37 km**		
10	Is the facility located in a non-attainment area? If so describe below	Yes☐	**No☒**
	Not Applicable		
11	Describe any special modeling requirements, such as streamline permit requirements.		
	Not Applicable – no special modeling requirements have been applied.		

16-C: Modeling History of Facility

1 Describe the modeling history of the facility, including the air permit numbers, the pollutants modeled, the National Ambient Air Quality Standards (NAAQS), New Mexico AAQS (NMAAQS), and PSD increments modeled. (Do not include modeling waivers).

Pollutant	Latest permit and modification number that modeled the pollutant facility-wide.	Date of Permit	Comments
CO	**NSR 2448-M5**	**July 2020**	**NAAQS/NMAAQS**
NO_2	**NSR 2448-M5**	**July 2020**	**NAAQS/NMAAQS/PSD Class I and II Increment**
SO_2	**NSR 2448-M5**	**July 2020**	**SIL**
H_2S	**Not applicable**		
PM2.5	**NSR 2448-M5**	**July 2020**	**NAAQS**
PM10	**NSR 2448-M5**	**July 2020**	**NAAQS /PSD Class I and II Increment**
Lead	**Not applicable**		
Ozone (PSD only)	**Not applicable**		
NM Toxic Air Pollutants (20.2.72.402 NMAC)	**Not applicable**		

16-D: Modeling performed for this application

1 For each pollutant, indicate the modeling performed and submitted with this application.
Choose the most complicated modeling applicable for that pollutant, i.e., culpability analysis assumes ROI and cumulative analysis were also performed.

Pollutant	ROI	Cumulative analysis	Culpability analysis	Waiver approved	Pollutant not emitted or not changed.
CO	☐	☒	☐	☐	☐
NO_2	☐	☒	☐	☐	☐
SO_2	☒	☐	☐	☐	☐
H_2S	☐	☐	☐	☐	☒
PM2.5	☐	☒	☐	☐	☐
PM10	☐	☒	☐	☐	☐
Lead	☐	☐	☐	☐	☒
Ozone	☐	☐	☐	☐	☒
State air toxic(s) (20.2.72.402 NMAC)	☐	☐	☐	☐	☒

16-E: New Mexico toxic air pollutants modeling

1 List any New Mexico toxic air pollutants (NMTAPs) from Tables A and B in 20.2.72.502 NMAC that are modeled for this application.
Not Applicable

2 List any NMTAPs that are emitted but not modeled because stack height correction factor. Add additional rows to the table below, if required. **Not Applicable**

Pollutant	Emission Rate (pounds/hour)	Emission Rate Screening Level (pounds/hour)	Stack Height (meters)	Correction Factor	Emission Rate/ Correction Factor

16-F: Modeling options

1	Was the latest version of AERMOD used with regulatory default options? If not explain below.	**Yes☒**	No☐
	AERMOD Version 19191, with dry deposition		

16-G: Surrounding source modeling

1	Date of surrounding source retrieval	**January 8, 2020 – confirmed by Eric Peters August 25, 2020**
2	If the surrounding source inventory provided by the Air Quality Bureau was believed to be inaccurate, describe how the sources modeled differ from the inventory provided. If changes to the surrounding source inventory were made, use the table below to describe them. Add rows as needed.	
	AQB Source ID	Description of Corrections
	N/A	**N/A**

16-H: Building and structure downwash

1	How many buildings are present at the facility?	**There are several buildings located at the facility.**	
2	How many above ground storage tanks are present at the facility?	**There are several above ground storage tanks located at the facility**.	
3	Was building downwash modeled for all buildings and tanks? If not explain why below.	Yes☐	**No☒**
	Due to the expansive size of the facility and the location of the point sources relative to boundary receptors, any building downwash that may occur would have sufficient space to disperse prior to reaching the boundary.		
4	Building comments	**No comments**	

16-I: Receptors and modeled property boundary

1	"Restricted Area" is an area to which public entry is effectively precluded. Effective barriers include continuous fencing, continuous walls, or other continuous barriers approved by the Department, such as rugged physical terrain with a steep grade that would require special equipment to traverse. If a large property is completely enclosed by fencing, a restricted area within the property may be identified with signage only. Public roads cannot be part of a Restricted Area. A Restricted Area is required in order to exclude receptors from the facility property. If the facility does not have a Restricted Area, then receptors shall be placed within the property boundaries of the facility. Describe the fence or other physical barrier at the facility that defines the restricted area.		
	The restricted area is defined by fencing, gates, signs, and rugged terrain.		
2	Receptors must be placed along publicly accessible roads in the restricted area. Are there public roads passing through the restricted area?	**Yes☒**	No☐

3	Are restricted area boundary coordinates included in the modeling files?					**Yes☒**	No☐
4	Describe the receptor grids and their spacing. The table below may be used, adding rows as needed.						
	Grid Type	Shape	Spacing	Start distance from restricted area or center of facility	End distance from restricted area or center of facility	Comments	
	Boundary	**Boundary**	**100 m**			**Around fenceline**	
	Tight	**Boundary**	**100 m**		**500 m**	**From fenceline boundary**	
	Fine	**Square**	**500 m**	**500 m**	**5,000 m**		
	Course	**Square**	**1,000 m**	**5,000 m**	**25,000 m**		
	Sensitive/road	**Road**	**100 m**			**Along all on-site roads**	
5	Describe receptor spacing along the fence line.						
	100-meter spacing						
6	Describe the PSD Class I area receptors.						
	PSD class I area receptors were obtained from the 2018 MergeMaster database provided by NMED for the Gila Wilderness, as modeled in the M5 model assessment.						

16-J: Sensitive areas

1	Are there schools or hospitals or other sensitive areas near the facility? If so describe below. This information is optional (and purposely undefined) but may help determine issues related to public notice.	Yes☐	**No☒**
3	The modeling review process may need to be accelerated if there is a public hearing. Are there likely to be public comments opposing the permit application?	Yes☐	**No☒**

16-K: Modeling Scenarios

1	Identify, define, and describe all modeling scenarios. Examples of modeling scenarios include using different production rates, times of day, times of year, simultaneous or alternate operation of old and new equipment during transition periods, etc. Alternative operating scenarios should correspond to all parts of the Universal Application and should be fully described in Section 15 of the Universal Application (UA3).
	Blasting scenarios: **Scenario 2: Mohawk (150,000 lbs/blast & 2 blasts/day) + Copper Mountain (100,000 lbs/blast & 1 blast/day)** **Scenario 3: Mohawk (150,000 lbs/blast & 2 blasts/day) + Little Rock 6 (100,000 lbs/blast & 1 blast/day)** **Scenario 4: Mohawk (150,000 lbs/blast & 2 blasts/day) + Copper Leach (50,000 lbs/blast & 1 blast/day)** **Scenario 5: Burro Chief (200,000 lbs/blast & 2 blasts/day) + Little Rock 6 (100,000 lbs/blast & 1 blast/day)** **Scenario 6: Burro Chief (200,000 lbs/blast & 2 blasts/day) + Copper Leach (50,000 lbs/blast & 1 blast/day)** **Scenario 7: Mohawk (150,000 lbs/blast & 2 blasts/day) + Burro Chief (200,000 lbs/blast & 2 blasts/day)** **Hours of blasting are limited to start up and shut down times. Blasting will start no earlier than 10am in December, 9am in the other winter months (November, January, and February), and 8am in the remaining months. Blasting will only occur during daylight hours, according to NOAA sunset time.**

Material handling throughputs associated with the blasting operations are included in the model at the following rates:

- **Mohawk – 200,000 tons/day**
- **Copper Mountain – 200,00 tons/day**
- **Little Rock 6 – 90,000 tons/day**
- **Copper Leach – 90,000 tons/day**
- **Burro Chief – 200,00 tons/day**

Reclamation scenarios associated with the worst-case small and large truck projects operating simultaneously within each mining scenario were assessed at the following rates:

- **Launder Line – 5,000 tons/day**
- **Thickener – 15,000 tons/day**
- **P-Plant – 15,000 tons/day**
- **1A/1B Stockpile – 20,000 tons/day**
- **2A/2B Stockpile – 20,000 tons/day**
- **CLW Stockpile – 15,000 tons/day**

Crushing and Screening operations are limited to 600 tph and may only occur between the hours of 8am to 8pm.

2 Which scenario produces the highest concentrations? Why?
A summary of worst case scenario determinations is provided in Attachment A.

Active Mining (Gaseous Pollutants): Scenario 5 (Burro Chief + Little Rock 6) – proximity of operations to boundary
(Particulate Pollutants) Scenario 3: Mohawk + Little Rock 6 – proximity of operations to boundary
Reclamation: Launder Line or Thickener – proximity of operations to boundary

3	Were emission factor sets used to limit emission rates or hours of operation? (This question pertains to the "SEASON", "MONTH", "HROFDY" and related factor sets, not to the factors used for calculating the maximum emission rate.)	Yes☐	**No☒**

4 If so, describe factors for each group of sources. List the sources in each group before the factor table for that group. (Modify or duplicate table as necessary. It's ok to put the table below section 16-K if it makes formatting easier.)
Sources:

5

Hour of Day	Factor	Hour of Day	Factor								
1		13									
2		14									
3		15									
4		16									
5		17									
6		18									
7		19									
8		20									
9		21									
10		22									
11		23									
12		24									

If hourly, variable emission rates were used that were not described above, describe them below.

Not Applicable

6	Were different emission rates used for short-term and annual modeling? If so describe below.	**Yes☒**	No☐

Annual NO_2 compliance was demonstrated using annual emission rates in separate model file runs.

16-L: NO_2 Modeling

1	Which types of NO_2 modeling were used? Check all that apply.	
	☒	**ARM2**
	☐	100% NO_X to NO_2 conversion
	☐	PVMRM
	☐	OLM
	☐	Other:
2	Describe the NO_2 modeling.	
	NO_2 was modeled using default ARM2 parameters.	
3	Were default NO_2/NO_X ratios (0.5 minimum, 0.9 maximum or equilibrium) used? If not describe and justify the ratios used below.	**Yes☒** No☐
	Not applicable	
4	Describe the design value used for each averaging period modeled.	
	1-hour: High eighth high **Annual: One Year Annual Average**	

16-M: Particulate Matter Modeling

1	Select the pollutants for which plume depletion modeling was used.	
	☐	PM2.5
	☒	**PM10**
	☐	None
2	Describe the particle size distributions used. Include the source of information.	
	The particle size information used in the M5 model assessment was maintained in this assessment.	
3	Does the facility emit at least 40 tons per year of NO_X or at least 40 tons per year of SO_2? Sources that emit at least 40 tons per year of NO_X or at least 40 tons per year of SO_2 are considered to emit significant amounts of precursors and must account for secondary formation of PM2.5.	**Yes☒** No☐
4	Was secondary PM modeled for PM2.5?	Yes☐ **No☒**

5 If MERPs were used to account for secondary PM2.5 fill out the information below. If another method was used describe below.

NO_X (ton/yr)	SO_2 (ton/yr)	$[PM2.5]_{annual}$	$[PM2.5]_{24\text{-hour}}$

A secondary $PM_{2.5}$ analysis is only required for modifications that increase emissions of NOx and/or SO_2 by more than 40 tpy. This proposed modification does not increase emissions of NOx or SO_2 by more than 40 tpy, therefore a secondary $PM_{2.5}$ analysis is not required.

16-N: Setback Distances

1	Portable sources or sources that need flexibility in their site configuration requires that setback distances be determined between the emission sources and the restricted area boundary (e.g. fence line) for both the initial location and future locations. Describe the setback distances for the initial location.
	Not Applicable – No setback distance was applied.
2	Describe the requested, modeled, setback distances for future locations, if this permit is for a portable stationary source. Include a haul road in the relocation modeling.
	Not Applicable

16-O: PSD Increment and Source IDs

	The unit numbers in the Tables 2-A, 2-B, 2-C, 2-E, 2-F, and 2-I should match the ones in the modeling files. Do these match? If not, provide a cross-reference table between unit numbers if they do not match below.	Yes☐	**No☒**

Unit Number in UA-2	Unit Number in Modeling Files
Mine Fugitives (Blasting)	**MHBL, LR6BL, CLBL, CMBL, BCBL**
Mine Fugitives (Handling)	**Mohawk, LR6MH, CLMH, CMMH, BCMH**
Mine Fugitives (Hauling, includes Stockpile handling)	**See Attached Table O-1 and Table O-2**
Reclamation Fugitives (Handling)	**See Attached Table O-2**
Reclamation Fugitives (Hauling)	**See Attached Table O-1**
C&S Plant Fugitives (C&S Plant - Handling)	**CRUSH, SCREEN, CONTRN, AggHand**
C&S Plant Fugitives (C&S Plant - Hauling)	**CSROADS, CSROADN**

2	The emission rates in the Tables 2-E and 2-F should match the ones in the modeling files. Do these match? If not, explain why below.	Yes☐	**No☒**
	Fugitive sources are separated depending on source, as indicated above.		
3	Have the minor NSR exempt sources or Title V Insignificant Activities" (Table 2-B) sources been modeled?	Yes☐	**No☒**

4 Which units consume increment for which pollutants?
All current and proposed engines will consume increment, as well as the changes made to blasting, material handling, and hauling since August 1995. Long term (more than one year of operation) reclamation activities will also consume increment.

Unit ID	NO_2	SO_2	PM10	PM2.5
See above	**Blasting; engines**	**Blasting; engines**	**All sources described above**	**Not Applicable**

5	PSD increment description for sources. (for unusual cases, i.e., baseline unit expanded emissions after baseline date).	**The baseline PM_{10} emissions used in this analysis are the same as those used in the modeling analysis submitted in 2020 as part of the application for NSR Permit No. PSD2448-M5. To account for the difference in proposed operation compared to the operation in August 1995, the proposed operation was modeled at the full emission rate and the baseline sources were included with their negative emission rates.**

	Are all the actual installation dates included in Table 2A of the application form, as required?	**Yes☒**	No☐

6	This is necessary to verify the accuracy of PSD increment modeling. If not please explain how increment consumption status is determined for the missing installation dates below.		

16-P: Flare Modeling

1	For each flare or flaring scenario, complete the following – **Not Applicable – there are no flares at this facility**			
	Flare ID (and scenario)	Average Molecular Weight	Gross Heat Release (cal/s)	Effective Flare Diameter (m)

16-Q: Volume and Related Sources

1	Were the dimensions of volume sources different from standard dimensions in the Air Quality Bureau (AQB) Modeling Guidelines? If not please explain how increment consumption status is determined for the missing installation dates below.	Yes☐	**No☒**
	Dimensions of volume sources were determined according to the truck sizes at the facility and guidance in Section 5.3.3 of the modeling guidelines.		
2	Describe the determination of sigma-Y and sigma-Z for fugitive sources.		
	Fugitive volume source parameters were determined according to guidance in Sections 5.3.1 and 5.3.2 of the modeling guidelines.		
3	Describe how the volume sources are related to unit numbers. Or say they are the same.		
	Screening plant sources were modeled as volume sources per Section 5.3.1. Haul roads were modeled as line volume sources, with release parameters determined per Section 5.3.3. Haul road unit numbers are described in Table O-1.		
4	Describe any open pits.		
	Five proposed pits at the facility were modeled. Blasting operations were modeled with a 6 m release height as modeled with past permit applications, while material handling operations in the pit were modeled with a 0 m release height.		
5	Describe emission units included in each open pit.		
	All pits were represented as blasting and material handling sources in the model.		

A summary of model input parameters is provided in Attachment B.

16-R: Background Concentrations

1	Were NMED provided background concentrations used? Identify the background station used below. If non-NMED provided background concentrations were used describe the data that was used.	**Yes☒**	No☐
	CO: N/A		
	NO_2: N/A		
	PM2.5: **Las Cruces Distric Office (350130025)**		
	PM10: **Deming (350029001)**		
	SO_2: N/A		
	Other:		
	Comments:		
2	Were background concentrations refined to monthly or hourly values? If so describe below.	Yes☐	**No☒**

16-S: Meteorological Data

1	Was NMED provided meteorological data used? If so select the station used. **Deming** **Processed Deming 2019, provided by Angela Raso, June 11, 2020**	**Yes☒**	No☐
2	If NMED provided meteorological data was not used describe the data set(s) used below. Discuss how missing data were handled, how stability class was determined, and how the data were processed.		
	Not Applicable		

16-T: Terrain

1	Was complex terrain used in the modeling? If not, describe why below.	**Yes☒**	No☐
2	What was the source of the terrain data?		
	NED 10 m data from: NED_n33w109_13.tif, NED_n34w109_13.tif, NED_n33w108_13.tif, NED_n34w108_13.tif		

16-U: Modeling Files

1	Describe the modeling files: **See below**		
	File name (or folder and file name)	Pollutant(s)	Purpose (ROI/SIA, cumulative, culpability analysis, other)

	Tyrone Mine CO SIL M6	**CO**	**ROI/SIA**
	Tyrone Mine CO AAQS M6	**CO**	**Cumulative/AAQS**
	Tyrone Mine NO2 SIL M6	**NO_2**	**ROI/SIA**
	Tyrone Mine NO2 AAQS M6	**NO_2**	**Short Term - Cumulative/AAQS**
	Tyrone Mine Annual NO2 AAQS M6	**NO_2**	**Annual- Cumulative/AAQS/Class II PSD**
	Tyrone Mine Annual NO2 PSD Class I M6	**NO_2**	**Annual- Cumulative/Class I PSD**
	Tyrone Mine PM2.5 SIL M6	**$PM_{2.5}$**	**ROI/SIA – worst case scenario determination**
	Tyrone Mine PM2.5 AAQS M6	**$PM_{2.5}$**	**Cumulative/AAQS**
	Tyrone Mine PM10 SIL M6	**PM_{10}**	**ROI/SIA– worst case scenario determination**
	Tyrone Mine PM10 AAQS M6	**PM_{10}**	**Cumulative/AAQS/Class II PSD**
	Tyrone Mine PM10 M6 Scenarios PSD Class I	**PM_{10}**	**Cumulative/Class I PSD**
	Tyrone Mine SO2 SIL M6	**SO_2**	**ROI/SIA**

16-V: PSD New or Major Modification Applications – Not Applicable

1	A new PSD major source or a major modification to an existing PSD major source requires additional analysis. Was preconstruction monitoring done (see 20.2.74.306 NMAC and PSD Preapplication Guidance on the AQB website)?	Yes☐	No☐
2	If not, did AQB approve an exemption from preconstruction monitoring?	Yes☐	No☐
3	Describe how preconstruction monitoring has been addressed or attach the approved preconstruction monitoring or monitoring exemption.		
4	Describe the additional impacts analysis required at 20.2.74.304 NMAC.		
5	If required, have ozone and secondary PM2.5 ambient impacts analyses been completed? If so describe below.	Yes☐	No☐

16-W: Modeling Results

1	If ambient standards are exceeded because of surrounding sources, a culpability analysis is required for the source to show that the contribution from this source is less than the significance levels for the specific pollutant. Was culpability analysis performed? If so describe below.	Yes☐	**No☒**
2	Identify the maximum concentrations from the modeling analysis. Rows may be modified, added and removed from the table below as necessary. **A summary of maximum concentrations per scenario is provided in Attachment C.**		

Pollutant, Time Period and Standard	Modeled Facility Concentration (µg/m3)	Modeled Concentration with Surrounding Sources (µg/m3)	Secondary PM (µg/m3)	Background Concentration (µg/m3)	Cumulative Concentration (µg/m3)	Value of Standard (µg/m3)	Percent of Standard	Location		
								UTM E (m)	UTM N (m)	Elevation (ft)
CO, 8-hr, NAAQS	1,874.2	1,874.2	NA	NA	1,874.2	10303.60	18.19%	748362.17	3616563.59	1830.2
CO, 8-hr, NMAAQS	1,874.2	1,874.2	NA	NA	1,874.2	9960.10	18.82%	748362.17	3616563.59	1830.2
CO, 1-hr, NAAQS	14,880.4	14,880.5	NA	NA	14,880.5	40069.6	37.14%	749935.66	3615741.9	1900.75
CO, 1-hr, NMAAQS	14,880.4	14,880.5	NA	NA	14,880.5	14997.5	99.22%	749935.66	3615741.9	1900.75
NO_2, Annual, NAAQS	1.26	3.86	NA	NA	3.86	99.66	3.88%	767112	3622605.97	1756.99
NO_2, Annual, NMAAQS	1.26	3.86	NA	NA	3.86	94	4.11%	767112	3622605.97	1756.99
NO_2, Annual, PSD Class I	0.020	0.040	NA	NA	0.04	2.5	1.62%	767221	3658526	1889
NO_2, Annual, PSD Class II	1.26	3.86	NA	NA	3.86	25	15.45%	767112.00	3622605.97	1756.99
NO_2, 24-hr, NMAAQS	30.7	41.9	NA	NA	41.9	188	22.27%	748556.11	3616191.85	1825.41
NO_2, 1-hr, NAAQS	124.6	124.7	NA	NA	124.7	188.03	66.32%	748168.21	3616757.54	1817.41

Pollutant, Time Period and Standard	Modeled Facility Concentration (µg/m3)	Modeled Concentration with Surrounding Sources (µg/m3)	Secondary PM (µg/m3)	Background Concentration (µg/m3)	Cumulative Concentration (µg/m3)	Value of Standard (µg/m3)	Percent of Standard	Location		
								UTM E (m)	UTM N (m)	Elevation (ft)
$PM_{2.5}$, Annual, NAAQS	1.92	1.92	NA	5.1	7.02	12	58.51%	748685.42	3615868.60	1831.34
$PM_{2.5}$, 24-hr, NAAQS	5.92	5.92	NA	14.9	20.82	35	59.50%	749319.10	3614989.27	1819.85
PM_{10}, Annual, PSD Class I	0.0837	0.00	NA	NA	0.00	4	0.00%	NA	NA	NA
PM_{10}, Annual, PSD Class II	19.1	0.00	NA	NA	0.00	17	0.00%	NA	NA	NA
PM_{10}, 24-hr, NAAQS	66.0	66.0	NA	56.5	122.52	150	81.68%	749319.1	3614989.3	1819.9
PM_{10}, 24-hr, PSD Class I	1.3	0.1	NA	NA	0.10	8	1.19%	772973.0	3657516.0	2021.5
PM_{10}, 24-hr, PSD Class II	45.6	29.7	NA	NA	29.7	30	99.08%	741913.3	3615205.9	1894.5
SO_2, Annual, Significance	0.41	0.41	NA	NA	-	1	41.07%	745371.94	3612052.03	1968.05
SO_2, 24-hr, Significance	4.49	4.49	NA	NA	-	5	89.73%	745472.24	3612053.76	1957.59
SO_2, 3-hr, Significance	14.25	14.25	NA	NA	-	25	56.99%	745371.94	3612052.03	1968.05
SO_2, 1-hr, NAAQS	17.24	17.24	NA	1.75	18.99	196.4	9.67%	745672.52	3612062.47	1954.40

16-X: Summary/conclusions

1	A statement that modeling requirements have been satisfied and that the permit can be issued.
	This modeling analysis has shown that the facility meets all applicable modeling standards. The permit can be issued.

Table O-1

Road Name	Road No.	ID	Desc
Wagner	4	ROAD4	Wagner
Wagner Spur A	4A	ROAD4A	Wagner Spur A
Mohawk	5A	ROAD5A	Mohawk
Mohawk	5B	ROAD5B	Mohawk
Mohawk	5C	ROAD5C	Mohawk
5A Stockpile	6	ROAD6	5A Stockpile
8C Stockpile	7	ROAD7	8C Stockpile
6A Stockpile	8	ROAD8	6A Stockpile
6D Stockpile	9	ROAD9	6D Stockpile
Copper Mountain Waste	10	ROAD10	Copper Mountain Waste
Main Pit/Mohawk 2	11	ROAD11	Main Pit/Mohawk 2
Spur off of 11 to 8CW	11A	ROAD11A	Spur off of 11 to 8CW
Spur off of 11 to NRW	11B2	ROAD11B2	Spur off of 11 to NRW
Spur off of 11B to 8CW	11C	ROAD11C	Spur off of 11B to 8CW
Spur off of 11B to ValDump	11D	ROAD11D	Spur off of 11B to ValDump
Main Pit	11E	ROAD11E	Main Pit
Main Pit	11F	ROAD11F	Main Pit
Main Pit	11G	ROAD11G	Main Pit
Valencia B	12B	ROAD12B	Valencia B
4AW Stockpile	15	ROAD15	4AW Stockpile
4D Stockpile	16A	ROAD16A	4D Stockpile
4D Stockpile	16B	ROAD16B	4D Stockpile
2A Stockpile	17	ROAD17	2A Stockpile
West Main Road	18	ROAD18	West Main Road
West Main Road series	18C	ROAD18C	West Main Road series
West Main Road series	18D	ROAD18D	West Main Road series
West Main Road series	18E	ROAD18E	West Main Road series
West Main Road series	18F	ROAD18F	West Main Road series
West Main Road series	18G	ROAD18G	West Main Road series
West Main Road series	18H	ROAD18H	West Main Road series
West Main Road series	18I	ROAD18I	West Main Road series
West Main Road series	18J	ROAD18J	West Main Road series
2B Stockpile	19	ROAD19	2B Stockpile
2B Stockpile	19B	ROAD19B	2B Stockpile
Copper Mountain	20	ROAD20	Copper Mountain
Copper Mountain New	20A	ROAD20A	Copper Mountain
9A Stockpile	21	ROAD21	9A Stockpile
9AX Stockpile	22	ROAD22	9AX Stockpile
Main Pit series	30	ROAD30	Main Pit series
Main Pit series	30A	ROAD30A	Main Pit series
Main Pit series	30B	ROAD30B	Main Pit series
Main Pit series	30C	ROAD30C	Main Pit series
Launder Line	RECLLR1	RECLLR1	Reclamation Launder Line Route 1
	RECLLR2	RECLLR2	Reclamation Launder Line Route 2
	RECLLR3	RECLLR3	Reclamation Launder Line Route 3
Thickener	RECTHR1	RECTHR1	Reclamation Thickener Route1 - not a standalone route
	RECTHR2	RECTHR2	Reclamation Thickener Route2 - route 1,2 emissions
	RECTHR3	RECTHR3	Reclamation Thickener Route3 - route 1,3 emissions
	RECTHR4	RECTHR4	Reclamation Thickener Route4 - route 1,4 emissions
P Plant	RECPPR1	RECPPR1	Reclamation P Plant Route1 - route 1, 5, 6 emissions
	RECPPR2	RECPPR2	Reclamation P Plant Route2 - route 1, 2, 3 emissions
	RECPPR3	RECPPR3	Reclamation P Plant Route3 - route 1, 6, 4, 3 emissions
	RECPPR4	RECPPR4	Reclamation P Plant Route4 - route 1, 6, 4, 3 emissions
	RECPPR5	RECPPR5	Reclamation P Plant Route5 - route 1, 5, 6 emissions
	RECPPR6	RECPPR6	Reclamation P Plant Route6 - route 1, 5, 6 emissions
1A/1B Stockpile	REC1ALR1	REC1ALR1	1A/1B Stockpile - large trucks only - Route1
	REC1ASR1	REC1ASR1	1A/1B Stockpile - small trucks only - Route1
2A/2B Stockpile	REC2ALR1	REC2ALR1	2A/2B Stockpile - large trucks only - Route1 - route 1, 2 emissio
	REC2ALR2	REC2ALR2	2A/2B Stockpile - large trucks only - Route2 - route 1, 2 emissio
	REC2ALR3	REC2ALR3	2A/2B Stockpile - large trucks only - Route3 - route 1, 3 emissio
	REC2ASR1	REC2ASR1	2A/2B Stockpile - small trucks only - Route1 - route 1, 3 emissio
	REC2ASR2	REC2ASR2	2A/2B Stockpile - small trucks only - Route2 - route 1, 2 emissio; also used as C&S route
	REC2ASR3	REC2ASR3	2A/2B Stockpile - small trucks only - Route2 - route 1, 3 emissio
CLW Stockpile	RECCLWR1	RECCLWR1	CLW Stockpile - small trucks only - Route1
	RECCLWR2	RECCLWR2	CLW Stockpile - small trucks only - Route2 - route 2, 6 emissions
	RECCLWR3	RECCLWR3	CLW Stockpile - small trucks only - Route3 - route 3, 6 emissions
	RECCLWR4	RECCLWR4	CLW Stockpile - small trucks only - Route4 - route 2, 4 emissions
	RECCLWR5	RECCLWR5	CLW Stockpile - small trucks only - Route5 - route 2, 5 emissions
	RECCLWR6	RECCLWR6	CLW Stockpile - small trucks only - Route6 - route 2, 6 emissions
C&S Plant North	CSROADN	CSROADN	C&S route to northern area

Table O-2

M6 Operational Stockpiles	Descrpition
9AX	Waste
9AW	Waste
5AW	Waste and Reclamation 5A Stockpile
6DO	Leach
4AW	Leach
4AE	Leach
4DO	Leach
4CO	Leach
2AO	Leach
6AO	Leach
6HW	Waste
EMW	Waste
CMO	Leach
L6R	Waste
VAO	Leach
VAW	Waste
VBO	Leach
BCPILE	Burrow Chief Stockpile - MBR, MB1, MB2
8CW	Waste
MR4	MR Ramp
MRR	MR1, MR2 & MR3
8CR	8CR Ramp
NRW	NR Waste Pile
2BW	2B Waste Pile
WMR	Waste Ramp
CLW	Copper Leach Push Back
CLW	Reclamation CLW Stockpile
LAUNDER2	Reclamation Launder2 Stockpile
9A9AX	Reclamation 9A/9AX Stockpile
THICKENER	Reclamation Thickener Stockpile
RIPRAP	Reclamation Rip Rap Production Area
9AREC	Reclamation Area East of Thickener
PPLANT	Reclamation P-Plant Stockpile
1A1B	Reclamation 1A/1B Stockpile
2A2B	Reclamation 2A/2B Stockpile

Attachment A

Operating Scenario	Pit Name	Maximum Blasting Agent Usage per Blast (lbs/blast)	Maximum No. of Blasts per Day	Maximum Daily Blasting Agent Usage (lbs/day)	Maximum Blast Area per Blast (ft2/blast)	Maximum Mining Rates (tons/day)
Scenario 2	Mohawk	150,000	2	300,000	125,000	200,000
	Copper Mountain	100,000	1	100,000	125,000	200,000
Scenario 3	Mohawk	150,000	2	300,000	125,000	200,000
	Little Rock 6	100,000	1	100,000	125,000	90,000
Scenario 4	Mohawk	150,000	2	300,000	125,000	200,000
	Copper Leach	50,000	1	50,000	125,000	90,000
Scenario 5	Burro Chief	200,000	2	400,000	125,000	200,000
	Little Rock 6	100,000	1	100,000	125,000	90,000
Scenario 6	Burro Chief	200,000	2	400,000	125,000	200,000
	Copper Leach	50,000	1	50,000	125,000	90,000
Scenario 7	Mohawk	150,000	2	300,000	125,000	200,000
	Burro Chief	200,000	2	400,000	125,000	200,000

SIL results were based on each scenario sources, and all other on-site operational sources (C&S operation, engines, boilers).
AAQS results were based on each scenario sources, all other on-site operational sources (C&S operation, engines, boilers, reclamation), and any nearby sources provided by NMED.
PSD Incrment results were based on each scenario sources, all other on-site operational sources (C&S operation, engines, boilers), only long-term reclamation, any nearby sources provided by NMED, and any baseline sources provided by NMED.

worst case
next worst case

A worst case impact analysis was run and it was determined that the LR1 scenario created worst case impacts over all other Little Rock or Copper Leach operations impacts. Therefore a Copper Leach scenario is not represented.

Results of runs prior to limitations imposed to reduce impacts.

The below concentration comparisons are based on preliminary runs, before modifications were imposed.

Scenario 2 - MKCM9 in worst-case tab (VAO, CMO/4CO/4DO 33%)

Scenario 2 had comparative lower overall concentrations than other scenarios

Option No.	Mohawk	Copper Mountain	Mohawk	Copper Mountain
1	VAO (100%)	CMO (100%)	1	1
2	VAO (100%)	2BW (100%)	1	8
3	6DO (100%)	4CO (100%)	3	3
4	VAO (100%)	4CO (100%)	1	3
5	6DO (100%)	2BW (100%)	3	8
6	6DO (100%)	4AE (100%)	3	4
7	6DO (100%)	CMO (100%)	3	1
8	6AO (100%)	4CO (100%)	4	3
9	VAO (100%)	CMO/4CO/4DO (all 33%)	1	6

Scenario 3 - MKLR1 in worst-case tab (VAO, CLW)

Scenario 3 had comparative higher overall concentrations than other scenarios

Options 1 and 7 had similar maximums.

Option No.	Mohawk	Little Rock 6	Mohawk	Little Rock 6
1	VAO (100%)	CLW (100%)	1	3
2	VAO (100%)	NRW (100%)	1	2
3	6DO (100%)	4CO (100%)	3	4
4	VAO (100%)	4CO (100%)	1	4
5	VAO (100%)	4CO/4DO (all 50%)	1	5
6	VAO (100%)	4AW/4CO/4DO (all 33%)	1	6
7	6AO (100%)	CLW (100%)	4	3

Scenario 5 - BCLR1 in worst-case tab (2AO 50%, 2BW 50%, CLW)

Scenario 5 had comparative highest overall concentrations than other scenarios

Options 1 and 6 had similar maximums.

Option No.	Burro Chief	Little Rock 6	Burro Chief	Little Rock 6
1	2AO (100%)	CLW (100%)	7	3
2	4CO (100%)	CLW (100%)	6	3
3	4AE (100%)	CLW (100%)	4	3
4	5AW (100%)	CLW (100%)	3	3
5	6HW (100%)	4CO (100%)	2	4
6	2BW (100%)	CLW (100%)	1	3
7	4CO/4DO (all 50%)	CLW (100%)	5	3
8	5AW (100%)	4CO/4DO (all 50%)	3	5
9	5AW (100%)	4AW/4CO/4DO (all 33%)	3	6

Scenario 7 - BCMK4 in the worst-case tab (5AW, 6DO)

Scenario 7 had comparative moderate overall concentrations than other scenarios

Options 4 and 8 had similar maximums, with 4 being slightly higher.

Option No.	Burro Chief	Mohawk	Burro Chief	Mohawk
1	2AO (100%)	VAO (100%)	7	1
2	4CO (100%)	VAO (100%)	6	1
3	4AE (100%)	6DO (100%)	4	3
4	5AW (100%)	6DO (100%)	3	3
5	6HW (100%)	6DO (100%)	2	3
6	2BW (100%)	VAO (100%)	1	1
7	4CO/4DO (all 50%)	VAO (100%)	5	1
8	5AW (100%)	6AO (100%)	3	4

worst case
next worst case

Reclamation Area	Road Number	Total Length of Road (ft, one-way)	Vehicle Type on Reclamation Route	Scenario Representation
Launder Line	RECLLR1	15,967	Small	ALWAYS
	RECLLR2,1	7,294		WORST-CASE
	RECLLR3,1	36,101		
Thickener	RECTHR1,2	14,271	Small	WORST-CASE
	RECTHR1,4	18,150		
	RECTHR1,3	3,691		
P Plant	RECPPR1,2,3	3,947	Small	WORST-CASE
	RECPPR1,6,4,3	5,350		
	RECPPR1,6,5	11,185		
1A/1B Stockpile	REC1ALR1	12,877	Large	ALWAYS
	REC1ASR1	7,849	Small (in-pit)	ALWAYS
2A/2B Stockpile	REC2ALR1,3	8,099	Large	WORST-CASE
	REC2ALR1,2	18,191		
	REC2ASR1,2	8,779	Small	WORST-CASE
	REC2ASR1,3	22,299		
CLW Stockpile	RECCLWR1	1,583	Small	WORST-CASE
	RECCLWR2,4	22,310		
	RECCLWR3,4	12,839		
	RECCLWR2,5	21,613		
	RECCLWR3,5	12,142		
	RECCLWR2,6	35,830		
	RECCLWR3,6	26,359		

Resulting worst case scenarios run to show compliance

SIL results were based on each scenario sources, and all other on-site operational sources (C&S operation, engines, boilers).
AAQS results were based on each scenario sources, all other on-site operational sources (C&S operation, engines, boilers, reclamation), and any nearby sources provided by NMED.
PSD Incrment results were based on each scenario sources, all other on-site operational sources (C&S operation, engines, boilers), only long-term reclamation, any nearby sources provided by NMED, and any baseline sources provided by NMED.

Scenario 2[1] - MKCM9 - Run with RER2AL2 and RECPP1	**Scenario 3[1,2] - MKLR1 - Run with REC1AL1 and RECTHR3**	**Scenario 5[1,2] - BCLR1 - Run with RER2AL2 and RECLL1**	**Scenario 7[1,2] - BCMK4 - Run with RER2AL2 and RECCLW6**
Sources included:	Sources included:	Sources included:	Sources included:
MHBL	MHBL	BCBL	BCBL
Mohawk	Mohawk	BCMH	BCMH
VAO	VAO	2AO50	5AW
RD11G	RD11G	2BW50	RD6
RD30	RD30	CLW	RD7
CMBL	LR6BL	LR6BL	RD11E
CMMH	LR6MH	LR6MH	RD12B
CMO33%	CLW	RD17	RD30A
4CO33%	RD18E	RD18	RD30B
4DO33%	RD18D	RD18D	MHBL
RD16A	RD18G	RD18E	Mohawk
RD16B	RD18H	RD18G	6DO
RD18J	REC1ALR1	RD18H	RD9
RD20A	1A/1B	RD21	RD11C
REC2ALR1	5AW	RECLLR1	RD11F
REC2ALR2	RECTHR1	RECLLR2	REC2ALR1
2A/2B	RECTHR3	Launder2	REC2ALR2
5AW	THICKENER	REC2ALR1	2A/2B
RECPPR1	9AREC	REC2ALR2	RECCLWR2
RECPPR2		2A/2B	RECCLWR6
RECPPR3		5AW	CLW
PPLANT			RIPRAP

1- Small truck reclemation activities (RECPP1, RECTHR3, RECLL1, and RECCLW6) were not included in PSD Increment runs because they are temporary (less than one year) operations.
2 - A worst case impact analysis was run and it was determined that the LR1 scenario created worst case impacts over all other Little Rock or Copper Leach operations impacts. Therefore a Copper Leach scenario is not represented.

Attachment B

Operating Scenario	Pit Name	Maximum Blasting Agent Usage per Blast (lbs/blast)	Maximum No. of Blasts per Day	Maximum Daily Blasting Agent Usage (lbs/day)	Maximum Blast Area per Blast (ft2/blast)	Maximum Mining Rates (tons/day)
Scenario 2	Mohawk	150,000	2	300,000	125,000	200,000
	Copper Mountain	100,000	1	100,000	125,000	200,000
Scenario 3	Mohawk	150,000	2	300,000	125,000	200,000
	Little Rock 6	100,000	1	100,000	125,000	90,000
Scenario 4	Mohawk	150,000	2	300,000	125,000	200,000
	Copper Leach	50,000	1	50,000	125,000	90,000
Scenario 5	Burro Chief	200,000	2	400,000	125,000	200,000
	Little Rock 6	100,000	1	100,000	125,000	90,000
Scenario 6	Burro Chief	200,000	2	400,000	125,000	200,000
	Copper Leach	50,000	1	50,000	125,000	90,000
Scenario 7	Mohawk	150,000	2	300,000	125,000	200,000
	Burro Chief	200,000	2	400,000	125,000	200,000

SIL results were based on each scenario sources, and all other on-site operational sources (C&S operation, engines, boilers).
AAQS results were based on each scenario sources, all other on-site operational sources (C&S operation, engines, boilers, reclamation), and any nearby sources provided by NMED.
PSD Incrment results were based on each scenario sources, all other on-site operational sources (C&S operation, engines, boilers), only long-term reclamation, any nearby sources provided by NMED, and any baseline sources provided by NMED.

For PM runs

Resulting worst case scenarios run to show compliance

A worst case impact analysis was run and it was determined that the LR1 scenario created worst case impacts over all other Little Rock or Copper Leach operations impacts. Therefore, the Copper Leach scenarios (Scenarios 4 and 6) are not represented separately.

Scenario 2 - MKCM9 - Run with RER2AL2 and RECPP1	Scenario 3 - MKLR1 - Run with REC1AL1 and RECTHR3	Scenario 5 - BCLR1 - Run with RER2AL2 and RECLL1	Scenario 7 - BCMK4 - Run with RER2AL2 and RECCLW6
Sources included:	Sources included:	Sources included:	Sources included:
MHBL	MHBL	BCBL	BCBL
Mohawk	Mohawk	BCMH	BCMH
VAO	VAO	2AO50	5AW
RD11G	RD11G	2BW50	RD6
RD30	RD30	CLW	RD7
CMBL	LR6BL	LR6BL	RD11E
CMMH	LR6MH	LR6MH	RD12B
CMO33%	CLW	RD17	RD30A
4CO33%	RD18E	RD18	RD30B
4DO33%	RD18D	RD18D	MHBL
RD16A	RD18G	RD18E	Mohawk
RD16B	RD18H	RD18G	6DO
RD18J	REC1ALR1	RD18H	RD9
RD20A	1A/1B	RD21	RD11C
REC2ALR1	5AW	RECLLR1	RD11F
REC2ALR2	RECTHR1	RECLLR2	REC2ALR1
2A/2B	RECTHR3	Launder2	REC2ALR2
5AW	THICKENER	REC2ALR1	2A/2B
RECPPR1	9AREC	REC2ALR2	RECCLWR2
RECPPR2		2A/2B	RECCLWR6
RECPPR3		5AW	CLW
PPLANT			RIPRAP

C & S Plant[1] (formerly SP-7A)

										Maximum Hourly Emission Rates (lb/hr)			Maximum Daily Emission Rates (lb/day)			Maximum Annual Emission Rates (ton/yr)			
Activity	**Source**	**Release Height (m)**	**Sigma-y (m)**	**Sigma-z (m)**	**UTM X (m)**	**UTM Y (m)**	**Elevation (m)**	**Height of Volume Source (m)**	**Width of Volume Source (m)**	**TSP**	**PM_{10}**	**$PM_{2.5}$**	**TSP**	**PM_{10}**	**$PM_{2.5}$**	**TSP**	**PM_{10}**	**$PM_{2.5}$**	**Scenarios**
Crushing[2]	CRUSH	6	1.16	2.33	744422	3616117	1902	5	5	1.44	0.648	0.120	17.28	7.78	1.44	3.15	1.42	0.26	all
Screening[3]	SCREEN	4	1.16	2.33	744424	3616119	1902	5	5	1.32	0.444	0.030	15.84	5.33	0.36	2.89	0.97	0.07	all
Conveyor Transfers	CONTRN	2	0.47	0.93	744426	3616121	1902	2	2	0.672	0.221	0.062	8.06	2.65	0.75	1.47	0.48	0.14	all
Aggregate Handling	AggHand	2	0.47	0.93	744428	3616123	1902	2	2	5.01	2.37	0.359	60.17	28.46	4.31	10.98	5.19	0.79	all

1 - Operations for this source occur during the daylight hours for 12 hr/day and 4,380 hr/yr.

2 - Tertiary crushing since there are is "ND" listed in the AP-42 table for Primary Crushing and Secondary Crushing.

3 - Not Fines Screening.

Stockpiles

M6 Operational Stockpiles	Descrpition	Throughput Assumption (tpd)	Initial Vertice Location		Release Height	Vertical Dimension	Sigma-z	Area (m^2)	PM10 Emission Rate			PM2.5 Emission Rate		
			UTM x	UTM y	m	m	m		lb/hr	lb/day	ton/yr	lb/hr	lb/day	ton/yr
9AX	Waste	200,000	744601.67	3616502.22	1.524	3.048	1.4177	130925.2	0.133	3.200	0.584	0.020	0.48	0.0876
9AW	Waste	200,000	744054.33	3616356.92	1.524	3.048	1.4177	438990.4	0.133	3.200	0.584	0.020	0.48	0.0876
5AW	Waste and Reclamation 5A Stockpile	200,000	747716.69	3616206.36	1.524	3.048	1.4177	680481.3	0.133	3.200	0.584	0.020	0.48	0.0876
6DO	Leach	200,000	746548.09	3613732.64	1.524	3.048	1.4177	484672.9	0.133	3.200	0.584	0.020	0.48	0.0876
4FO	Leach	200,000	745063.26	3612507.59	1.524	3.048	1.4177	801998.5	0.133	3.200	0.584	0.020	0.48	0.0876
4AW	Leach	200,000	745596.02	3613926.60	1.524	3.048	1.4177	440726.5	0.133	3.200	0.584	0.020	0.48	0.0876
4AE	Leach	200,000	746144.79	3613647.79	1.524	3.048	1.4177	569503.2	0.133	3.200	0.584	0.020	0.48	0.0876
4DO	Leach	200,000	744916.33	3613131.77	1.524	3.048	1.4177	319593.1	0.133	3.200	0.584	0.020	0.48	0.0876
4CO	Leach	200,000	744645.81	3612930.33	1.524	3.048	1.4177	209082	0.133	3.200	0.584	0.020	0.48	0.0876
2AO	Leach	200,000	744611.55	3615838.07	1.524	3.048	1.4177	695617.1	0.133	3.200	0.584	0.020	0.48	0.0876
6AO	Leach	200,000	747163.78	3614567.00	1.524	3.048	1.4177	197352.5	0.133	3.200	0.584	0.020	0.48	0.0876
6HW	Waste	200,000	746907.15	3612939.09	1.524	3.048	1.4177	220254.4	0.133	3.200	0.584	0.020	0.48	0.0876
CMO	Leach	200,000	744496.59	3613824.38	1.524	3.048	1.4177	293259.7	0.133	3.200	0.584	0.020	0.48	0.0876
L6R	Waste	90,000	743576.12	3616172.93	1.524	3.048	1.4177	28923.1	0.0600	1.440	0.263	0.00900	0.216	0.0394
VAO	Leach	200,000	745934.8	3614802.86	1.524	3.048	1.4177	397371.9	0.133	3.200	0.584	0.020	0.48	0.0876
VAW	Waste	200,000	746450.91	3614798.67	1.524	3.048	1.4177	79487.8	0.133	3.200	0.584	0.020	0.48	0.0876
VBO	Leach	200,000	746324.73	3613989.41	1.524	3.048	1.4177	549802.6	0.133	3.200	0.584	0.020	0.48	0.0876
BCPILE	Burrow Chief Stockpile - MBR, MB1, MB2	200,000	746018.52	3615066.25	1.524	3.048	1.4177	218080.9	0.133	3.200	0.584	0.020	0.48	0.0876
8CW	Waste	200,000	746554.61	3614932.1	1.524	3.048	1.4177	416004.4	0.133	3.200	0.584	0.020	0.48	0.0876
MR4	MR Ramp	200,000	746606.65	3615661.79	1.524	3.048	1.4177	21903.2	0.133	3.200	0.584	0.020	0.48	0.0876
MRR	MR1, MR2 & MR3	200,000	745948.29	3615058.62	1.524	3.048	1.4177	62353.8	0.133	3.200	0.584	0.020	0.48	0.0876
8CR	8CR Ramp	200,000	746530.76	3614942.52	1.524	3.048	1.4177	62817.9	0.133	3.200	0.584	0.020	0.48	0.0876
NRW	NR Waste Pile	200,000	742439.85	3616248.97	1.524	3.048	1.4177	561754.2	0.133	3.200	0.584	0.020	0.48	0.0876
2BW	2B Waste Pile	200,000	744641.24	3615127.38	1.524	3.048	1.4177	412034.3	0.133	3.200	0.584	0.020	0.48	0.0876
WMR	Waste Ramp	200,000	745646.3	3615042.58	1.524	3.048	1.4177	76099	0.133	3.200	0.584	0.020	0.48	0.0876
CLW	Copper Leach Push Back	80,000	742381.39	3615203.11	1.524	3.048	1.4177	153237.9	0.0533	1.280	0.234	0.00800	0.192	0.0350
CLW	Reclamation CLW Stockpile	15,000	742381.39	3615203.11	1.524	3.048	1.4177	153237.9	0.0100	0.2400	0.0438	0.0015	0.036	0.0066
LAUNDER2	Reclamation Launder2 Stockpile	5,000	743483.52	3620091.23	1.524	3.048	1.4177	56568.5	0.0033	0.0800	0.0146	0.00050	0.012	0.00219
9A9AX	Reclamation 9A/9AX Stockpile	20,000	743909.41	3616377.03	1.524	3.048	1.4177	745387.2	0.0133	0.3200	0.0584	0.002	0.048	0.00876
THICKENER	Reclamation Thickener Stockpile	15,000	746853.89	3617755.78	1.524	3.048	1.4177	194934	0.0100	0.2400	0.0438	0.0015	0.036	0.0066
RIPRAP	Reclamation Rip Rap Production Area	20,000	743843.71	3617117.57	1.524	3.048	1.4177	390509.3	0.0133	0.3200	0.0584	0.002	0.048	0.00876
9AREC	Reclamation Area East of Thickener	15,000	744036.69	3616364.67	1.524	3.048	1.4177	277696.5	0.0100	0.2400	0.0438	0.0015	0.036	0.0066
PPLANT	Reclamation P-Plant Stockpile	15,000	748991.28	3615077.2	1.524	3.048	1.4177	6308.8	0.0100	0.2400	0.0438	0.0015	0.036	0.0066
1A1B	Reclamation 1A/1B Stockpile	20,000	748377.62	3615025.94	1.524	3.048	1.4177	1178884.1	0.0133	0.3200	0.0584	0.002	0.048	0.00876
2A2B	Reclamation 2A/2B Stockpile	20,000	744295.43	3614909.2	1.524	3.048	1.4177	524490.4	0.0133	0.3200	0.0584	0.002	0.048	0.00876

Note that Tyrone will not be moving the max of 200,000 tpd to all of these stockpiles at the same time.

Haul Roads

						PM10 Emissions			PM2.5 Emissions								
Road Name	**Road No.**	**ID**	**Desc**	**Calculated in AERMOD (m)**	**Road Length (ft)**	**Short Term lb/hr**	**lb/day**	**ton/yr**	**Short Term lb/hr**	**lb/day**	**ton/yr**	**Line Volume (Plume) Height (m)**	**Plume Width (m)**	**Number of Coords**	**Release Height (m)**	**Vehicle Height (m)**	**Vehicle Width (m)**
Wagner	4	ROAD4	Wagner	856.2	2809	17.96	430.95	63.57	1.80	43.10	6.36	11.22	14.3	60	5.61	6.6	8.3
Wagner Spur A	4A	ROAD4A	Wagner Spur A	269.6	885	5.65	135.70	20.02	0.565	13.57	2.00	11.22	14.3	19	5.61	6.6	8.3
Mohawk	5A	ROAD5A	Mohawk	1926.7	6321	40.41	969.77	143.04	4.04	96.98	14.30	11.22	14.3	135	5.61	6.6	8.3
Mohawk	5B	ROAD5B	Mohawk	1067	3501	22.38	537.06	79.22	2.24	53.71	7.92	11.22	14.3	75	5.61	6.6	8.3
Mohawk	5C	ROAD5C	Mohawk	1011.9	3320	21.22	509.32	75.13	2.12	50.93	7.51	11.22	14.3	71	5.61	6.6	8.3
5A Stockpile	6	ROAD6	5A Stockpile	892.1	2927	18.71	449.02	66.23	1.87	44.90	6.62	11.22	14.3	62	5.61	6.6	8.3
8C Stockpile	7	ROAD7	8C Stockpile	1136.7	3729	23.84	572.14	84.39	2.38	57.21	8.44	11.22	14.3	79	5.61	6.6	8.3
6A Stockpile	8	ROAD8	6A Stockpile	382.5	1255	8.02	192.52	28.40	0.802	19.25	2.84	11.22	14.3	27	5.61	6.6	8.3
6D Stockpile	9	ROAD9	6D Stockpile	1253.4	4112	26.29	630.88	93.05	2.63	63.09	9.31	11.22	14.3	88	5.61	6.6	8.3
Copper Mountain Waste	10	ROAD10	Copper Mountain Waste	2104.6	6905	44.14	1059.32	156.25	4.41	105.93	15.62	11.22	14.3	147	5.61	6.6	8.3
Main Pit/Mohawk 2	11	ROAD11	Main Pit/Mohawk 2	1104.9	3625	23.17	556.13	82.03	2.32	55.61	8.20	11.22	14.3	77	5.61	6.6	8.3
Spur off of 11 to 8CW	11A	ROAD11A	Spur off of 11 to 8CW	217.5	714	4.56	109.47	16.15	0.456	10.95	1.61	11.22	14.3	15	5.61	6.6	8.3
Spur off of 11 to NRW	11B2	ROAD11B2	Spur off of 11 to NRW	398.2	1306	8.35	200.43	29.56	0.84	20.04	2.96	11.22	14.3	28	5.61	6.6	8.3
Spur off of 11B to 8CW	11C	ROAD11C	Spur off of 11B to 8CW	917.6	3010	19.24	461.86	68.12	1.92	46.19	6.81	11.22	14.3	64	5.61	6.6	8.3
Spur off of 11B to ValDump	11D	ROAD11D	Spur off of 11B to ValDump	513.1	1683	10.76	258.26	38.09	1.08	25.83	3.81	11.22	14.3	36	5.61	6.6	8.3
Main Pit	11E	ROAD11E	Main Pit	363	1191	7.61	182.71	26.95	0.761	18.27	2.69	11.22	14.3	25	5.61	6.6	8.3
Main Pit	11F	ROAD11F	Main Pit	352.9	1158	7.40	177.63	26.20	0.740	17.76	2.62	11.22	14.3	25	5.61	6.6	8.3
Main Pit	11G	ROAD11G	Main Pit	563	1847	11.81	283.38	41.80	1.18	28.34	4.18	11.22	14.3	39	5.61	6.6	8.3
Valencia B	12B	ROAD12B	Valencia B	751.5	2466	15.76	378.25	55.79	1.58	37.83	5.58	11.22	14.3	53	5.61	6.6	8.3
4AE and 4FO	13	ROAD13	4AE and 4FO	885.5	2905	18.57	445.70	65.74	1.86	44.57	6.57	11.22	14.3	62	5.61	6.6	8.3
4 series	13A	ROAD13A	4 series	1313.9	4311	27.56	661.33	97.55	2.76	66.13	9.75	11.22	14.3	92	5.61	6.6	8.3
4 series	13B	ROAD13B	4 series	467.2	1533	9.80	235.16	34.69	0.980	23.52	3.47	11.22	14.3	33	5.61	6.6	8.3
4AW Stockpile	15	ROAD15	4AW Stockpile	819.7	2689	17.19	412.58	60.86	1.72	41.26	6.09	11.22	14.3	57	5.61	6.6	8.3
4D Stockpile	16A	ROAD16A	4D Stockpile	1949.7	6397	40.89	981.35	144.75	4.09	98.13	14.47	11.22	14.3	136	5.61	6.6	8.3
4D Stockpile	16B	ROAD16B	4D Stockpile	483.6	1587	10.14	243.41	35.90	1.01	24.34	3.59	11.22	14.3	34	5.61	6.6	8.3
2A Stockpile	17	ROAD17	2A Stockpile	1066.3	3498	22.36	536.70	79.16	2.24	53.67	7.92	11.22	14.3	126	5.61	6.6	8.3
West Main Road	18	ROAD18	West Main Road	2497.3	8193	52.37	1256.97	185.40	5.24	125.70	18.54	11.22	14.3	296	5.61	6.6	8.3
West Main Road series	18C	ROAD18C	West Main Road series	330.1	1083	6.92	166.15	24.51	0.692	16.62	2.45	11.22	14.3	39	5.61	6.6	8.3
West Main Road series	18D	ROAD18D	West Main Road series	1002.8	3290	9.46	227.13	33.50	0.946	22.713	3.350	11.22	14.3	119	5.61	6.6	8.3
West Main Road series	18E	ROAD18E	West Main Road series	1571.6	5156	14.83	355.97	52.51	1.48	35.597	5.251	11.22	14.3	186	5.61	6.6	8.3
West Main Road series	18F	ROAD18F	West Main Road series	279.6	917	5.86	140.73	20.76	0.586	14.07	2.08	11.22	14.3	33	5.61	6.6	8.3
West Main Road series	18G	ROAD18G	West Main Road series	314	1030	2.96	71.12	10.49	0.296	7.112	1.049	11.22	14.3	37	5.61	6.6	8.3
West Main Road series	18H	ROAD18H	West Main Road series	1235	4052	10.36	248.65	36.68	1.04	24.865	3.668	11.22	14.3	146	5.61	6.6	8.3
West Main Road series	18I	ROAD18I	West Main Road series	156.1	512	3.27	78.57	11.59	0.327	7.86	1.16	11.22	14.3	18	5.61	6.6	8.3
West Main Road series	18J	ROAD18J	West Main Road series	456.3	1497	9.57	229.67	33.88	0.957	22.97	3.39	11.22	14.3	54	5.61	6.6	8.3
2B Stockpile	19	ROAD19	2B Stockpile	1907.3	6258	40.00	960.01	141.60	4.00	96.00	14.16	11.22	14.3	226	5.61	6.6	8.3
2B Stockpile	19B	ROAD19B	2B Stockpile	1744.7	5724	36.59	878.17	129.53	3.66	87.82	12.95	11.22	14.3	207	5.61	6.6	8.3
Copper Mountain	20	ROAD20	Copper Mountain	1748.5	5737	36.67	880.08	129.81	3.67	88.01	12.98	11.22	14.3	207	5.61	6.6	8.3
Copper Mountain New	20A	ROAD20A	Copper Mountain	337.4	1107	7.08	169.82	25.05	0.708	16.98	2.50	11.22	14.3	40	5.61	6.6	8.3
9A Stockpile	21	ROAD21	9A Stockpile	1865.8	6121	39.13	939.12	138.52	3.91	93.91	13.85	11.22	14.3	221	5.61	6.6	8.3
9AX Stockpile	22	ROAD22	9AX Stockpile	914.7	3001	19.18	460.40	67.91	1.92	46.04	6.79	11.22	14.3	108	5.61	6.6	8.3
Main Pit series	30	ROAD30	Main Pit series	1674.3	5493	35.11	842.73	124.30	3.51	84.27	12.43	11.22	14.3	117	5.61	6.6	8.3
Main Pit series	30A	ROAD30A	Main Pit series	577.5	1895	12.11	290.67	42.87	1.21	29.07	4.29	11.22	14.3	40	5.61	6.6	8.3
Main Pit series	30B	ROAD30B	Main Pit series	821.3	2695	17.22	413.39	60.97	1.72	41.34	6.10	11.22	14.3	57	5.61	6.6	8.3
Main Pit series	30C	ROAD30C	Main Pit series	158	518	3.31	79.53	11.73	0.331	7.95	1.17	11.22	14.3	11	5.61	6.6	8.3
Launder Line	RECLLR1	RECLLR1	Reclamation Launder Line Route 1	4866.7	15967	8.81	211.48	31.19	0.881	21.15	3.12	5.865	9.7	502	2.93	3.45	3.70
	RECLLR2	RECLLR2	Reclamation Launder Line Route 2	1349.8	4428	2.44	58.65	8.65	0.244	5.87	0.87	5.865	9.7	139	2.93	3.45	3.70
	RECLLR3	RECLLR3	Reclamation Launder Line Route 3	10966.6	35980	19.86	476.54	70.29	1.986	47.65	7.03	5.865	9.7	1131	2.93	3.45	3.70
Thickener	RECTHR1	RECTHR1	Reclamation Thickener Route1 - not a standalone route	503.6	1652	2.74	65.65	9.68	0.274	6.56	0.97	5.865	9.7	52	2.93	3.45	3.70
	RECTHR2	RECTHR2	Reclamation Thickener Route2 - route 1,2 emissions	3846.3	12619	20.89	501.41	73.96	2.089	50.14	7.40	5.865	9.7	397	2.93	3.45	3.70
	RECTHR3	RECTHR3	Reclamation Thickener Route3 - route 1,3 emissions	337.4	1107	1.83	43.98	6.49	0.183	4.40	0.65	5.865	9.7	35	2.93	3.45	3.70
	RECTHR4	RECTHR4	Reclamation Thickener Route4 - route 1,4 emissions	5028.6	16498	27.31	655.53	96.69	2.731	65.55	9.67	5.865	9.7	518	2.93	3.45	3.70
P Plant	RECPPR1	RECPPR1	Reclamation P Plant Route1 - route 1, 5, 6 emissions	236.9	777	1.29	30.88	4.56	0.129	3.09	0.46	5.865	9.7	24	2.93	3.45	3.70
	RECPPR2	RECPPR2	Reclamation P Plant Route2 - route 1, 2, 3 emissions	674	2211	3.66	87.86	12.96	0.366	8.79	1.30	5.865	9.7	69	2.93	3.45	3.70
	RECPPR3	RECPPR3	Reclamation P Plant Route3 - route 1, 6, 4, 3 emissions	292.2	959	1.59	38.09	5.62	0.159	3.81	0.56	5.865	9.7	30	2.93	3.45	3.70
	RECPPR4	RECPPR4	Reclamation P Plant Route4 - route 1, 6, 4, 3 emissions	446.7	1466	2.43	58.23	8.59	0.243	5.82	0.86	5.865	9.7	46	2.93	3.45	3.70
	RECPPR5	RECPPR5	Reclamation P Plant Route5 - route 1, 5, 6 emissions	2517.2	8259	13.67	328.14	48.40	1.367	32.81	4.84	5.865	9.7	260	2.93	3.45	3.70
	RECPPR6	RECPPR6	Reclamation P Plant Route6 - route 1, 5, 6 emissions	655	2149	3.56	85.39	12.59	0.356	8.54	1.26	5.865	9.7	68	2.93	3.45	3.70
1A/1B Stockpile	REC1ALR1	REC1ALR1	1A/1B Stockpile - large trucks only - Route1	3924.9	12877	8.23	197.55	29.14	0.823	19.76	2.91	11.22	14.3	274	5.61	6.6	8.3
	REC1ASR1	REC1ASR1	1A/1B Stockpile - small trucks only - Route1	2392.5	7849	13.00	311.89	46.00	1.300	31.19	4.60	5.865	9.7	247	2.93	3.45	3.70
2A/2B Stockpile	REC2ALR1	REC2ALR1	2A/2B Stockpile - large trucks only - Route1 - route 1, 2 emissions	112.3	368	0.236	5.65	0.83	0.024	0.57	0.08	11.22	14.3	8	5.61	6.6	8.3
	REC2ALR2	REC2ALR2	2A/2B Stockpile - large trucks only - Route1 - route 1, 2 emissions	5432.3	17823	11.39	273.43	40.33	1.139	27.34	4.03	11.22	14.3	380	5.61	6.6	8.3
	REC2ALR3	REC2ALR3	2A/2B Stockpile - large trucks only - Route3 - route 1, 3 emissions	2356.4	7731	4.94	118.61	17.49	0.494	11.86	1.75	11.22	14.3	165	5.61	6.6	8.3
	REC2ASR1	REC2ASR1	2A/2B Stockpile - small trucks only - Route1 - route 1, 3 emissions	1862	6109	10.11	242.73	35.80	1.011	24.27	3.58	5.865	9.7	192	2.93	3.45	3.70
	REC2ASR2	REC2ASR2	2A/2B Stockpile - small trucks only - Route2 - route 1, 2 emissio; also used as C&S route	813.7	2670	4.42	106.07	15.65	0.442	10.61	1.56	5.865	9.7	84	2.93	3.45	3.70
	REC2ASR3	REC2ASR3	2A/2B Stockpile - small trucks only - Route2 - route 1, 3 emissions	4934.7	16190	26.80	643.29	94.89	2.680	64.33	9.49	5.865	9.7	509	2.93	3.45	3.70
CLW Stockpile	RECCLWR1	RECCLWR1	CLW Stockpile - small trucks only - Route1	482.6	1583	2.62	62.91	9.28	0.262	6.29	0.93	5.865	9.7	50	2.93	3.45	3.70
	RECCLWR2	RECCLWR2	CLW Stockpile - small trucks only - Route2 - route 2, 6 emissions	5986.3	19640	32.52	780.38	115.11	3.252	78.04	11.51	5.865	9.7	617	2.93	3.45	3.70
	RECCLWR3	RECCLWR3	CLW Stockpile - small trucks only - Route3 - route 3, 6 emissions	3099.5	10169	16.84	404.05	59.60	1.684	40.41	5.96	5.865	9.7	320	2.93	3.45	3.70
	RECCLWR4	RECCLWR4	CLW Stockpile - small trucks only - Route4 - route 2, 4 emissions	813.7	2670	4.42	106.07	15.65	0.442	10.61	1.56	5.865	9.7	84	2.93	3.45	3.70
	RECCLWR5	RECCLWR5	CLW Stockpile - small trucks only - Route5 - route 2, 5 emissions	601.4	1973	3.27	78.40	11.56	0.327	7.84	1.16	5.865	9.7	62	2.93	3.45	3.70
	RECCLWR6	RECCLWR6	CLW Stockpile - small trucks only - Route6 - route 2, 6 emissions	4934.7	16190	26.80	643.29	94.89	2.680	64.33	9.49	5.865	9.7	509	2.93	3.45	3.70
C&S Plant South[1]	CSROADS	CSROADS	C&S route to southern area	813.7	2670	1.73	20.7	3.789	0.173	2.07	0.379	5.865	9.7	84	2.93	3.45	3.70
C&S Plant North[1]	CSROADN	CSROADN	C&S route to northern area	1124.8	3690	2.37	28.5	4.201	0.237	2.85	0.420	5.865	9.7	116	2.93	3.45	3.70

1 - Only C&S Plant North route was included in the model to represent worst case operations. Operations for this source occur during the daylight hours for 12 hr/day and 4,380 hr/y

Road Input Assumption

		Large Trucks	Small Trucks	Small Trucks
		793	**730**	**769**
Vehicle Height	ft	21.65	11.33	13.22
	m	6.6	3.45	4.03
Vehicle Width	ft	27.23	12.15	16.63
	m	8.3	3.70	5.07
Plume Height	m	11.22	5.87	6.85
Release Height	m	5.61	2.94	3.43
Initial sigma z	m	5.22	2.73	3.19
Plume Width	m	14.3	9.7	11.1
Initial sigma y	m	6.65	4.51	5.15

Plume Height = truck height * 1.7
Release Height = Plume Height * 0.5
Initial Sigma z = Plume Height/2.15
Haul road width = actual vehicle width + 6m
Initial Sigma y = (road width/2.15)

Point sources (stack emission points - engines/pumps)

ID	Description	M6 Modeled General Location	Stack Height	Stack Temp.	Stack Velocity	Stack Diameter	Location		Rain Cap?	NOx Maximum Emissions			CO Maximum Emissions		SO_2 Maximum Emissions			PM_{10} Maximum Emissions			$PM_{2.5}$ Maximum Emissions (same as PM_{10})			Scenarios
			ft	F	ft/s	ft	UTM x	UTM y		lb/hr	lb/day	tpy	lb/hr	tpy	lb/hr	lb/day	tpy	lb/hr	lb/day	tpy	lb/hr	lb/day	tpy	
SXWBOIL	Cathode Washing Hot Water Boilers (B-951 and B-748; common stack)	SX/EW Area	35.1	400.7	31.17	0.328	745560	3616120	Y	0.357	8.57	1.56	0.206	0.90	0.044	1.05	0.19	0.0192	0.461	0.0842	0.0192	0.461	0.0842	all
B-3891	Heat Exchanger Hot Water Boiler (T3600; SO# 963891)	SX/EW Area	15	450.0	0.45	1.67	745562	3616122	Y	0.511	12.28	2.24	0.295	1.29	0.063	1.50	0.27	0.0275	0.661	0.121	0.0275	0.661	0.1206	all
B-1454	Heat Exchanger Hot Water Boiler (T3600; SO# 961454)	SX/EW Area	15	450.0	0.45	1.50	745564	3616124	Y	0.511	12.28	2.24	0.295	1.29	0.063	1.50	0.27	0.0275	0.661	0.121	0.0275	0.661	0.1206	all
SD1	Cat C9 300 hp	San Salvador	8	900	138.6	0.344	745622	3612371	Y	1.77	42.55	7.77	1.633	7.15	0.58	13.96	2.55	0.0933	2.24	0.41	0.0933	2.239	0.4087	all
SD2	Cat C9 300 hp	San Salvador	8	900	138.6	0.344	745620	3612369	Y	1.77	42.55	7.77	1.633	7.15	0.58	13.96	2.55	0.0933	2.24	0.41	0.0933	2.239	0.4087	all
ENV-101	John Deere 125 hp	5E/Dead Man's Pond	9.84	923	136.4	0.338	744041	3614823	Y	3.88	93.00	16.97	0.838	3.67	0.26	6.15	1.12	0.2750	6.60	1.20	0.2750	6.600	1.2045	all
ENV-111	John Deere 125 hp	5E/Dead Man's Pond	9.84	923	136.4	0.338	744039	3614821	Y	3.88	93.00	16.97	0.838	3.67	0.26	6.15	1.12	0.2750	6.60	1.20	0.2750	6.600	1.2045	all
ENV-117	John Deere115 hp	South Rim Pit	8	900	129.4	0.351	746616	3612585	Y	0.95	22.90	4.18	0.215	0.94	0.22	5.37	0.98	0.0520	1.25	0.23	0.0520	1.248	0.2278	all
ENV-122	Cat 3054C 125 hp	South Rim Pit	9.84	900	128.9	0.341	746618	3612587	Y	1.29	30.95	5.65	1.028	4.50	0.26	6.15	1.12	0.0617	1.48	0.27	0.0617	1.481	0.2702	all
ENV-123	Cat 3126B 225 hp	South Rim Pit	8	833	87.5	0.495	746620	3612589	Y	2.19	52.65	9.61	1.225	5.36	0.44	10.47	1.91	0.0700	1.68	0.31	0.0700	1.680	0.3065	all
OP-2	Perkins 403C-15 32.5 hp	Little Rock Pit	8	833	114.6	0.372	742963	3615654	Y	0.360	8.64	1.58	0.278	1.22	0.063	1.51	0.28	0.0305	0.73	0.13	0.0305	0.732	0.1336	all
OP-4	Cat 6.6 225 hp	Little Rock Pit	8	833	162.4	0.347	742967	3615657	Y	1.33	31.91	5.82	1.225	5.36	0.44	10.47	1.91	0.0700	1.68	0.31	0.0700	1.680	0.3065	all
OP-7	Cat C7 225 hp	Mohawk	8	833	87.5	0.495	746506	3615394	Y	1.330	31.91	5.82	1.225	5.36	0.44	10.47	1.91	0.0700	1.68	0.31	0.0700	1.680	0.3065	all
OP-8	Cat C7 225 hp	Mohawk	8	833	87.5	0.495	746558	3615373	Y	1.33	31.91	5.82	1.225	5.36	0.44	10.47	1.91	0.0700	1.68	0.31	0.0700	1.680	0.3065	all
ENV-120	Cat C6.6 225 hp	Little Rock Pit	8	833	162.4	0.347	742968	3615651	Y	1.33	31.91	5.82	1.225	5.36	0.44	10.47	1.91	0.0700	1.68	0.31	0.0700	1.680	0.3065	all
EMP-1	Cat 3126 190 hp	Little Rock Pit	8	833	87.5	0.495	742972	3615654	Y	2.72	65.24	11.91	3.368	14.75	0.37	8.84	1.61	0.1596	3.83	0.70	0.1596	3.829	0.6989	all
EMP-2	Cat 3126B 200 hp	Little Rock Pit	8	833	87.5	0.495	742966	3615649	Y	1.95	46.80	8.54	1.089	4.77	0.39	9.31	1.70	0.0622	1.49	0.27	0.0622	1.493	0.2725	all

Open Pit sources

ID	Description	Release Height	X Length	Y Length	Pit Volume	Angle	Area	Area	Pit Depth	Elevation	Actual Pit Depth	Actual Pit Depth	SW Corner Location		PM10 Emissions			PM2.5 Emissions			Applicable Scenario	Notes
		m	m	m	m3	%	m2	ft2	ft	ft	ft	m	UTM x	UTM y	lb/hr	lb/day	ton/yr	lb/hr	lb/day	ton/yr		
MOHBL	Mohawk Blasting	6	1200	750	216,000,000	25	900000.0	9687519.375	5118	5905.512	787.402	240	746320.39	3615628.85	321.734	643.467	117.433	18.562	37.123	6.775	2, 3, 4, 7	Blasting at 2 blasts/day and 125,000 ft^2/blast
MOHAWK	Mohawk Material Handling	0	1200	750	252,000,000	25	900000.0	9687519.375	4331	5249.344	918.635	280	746320.39	3615628.85	0.133	3.2	0.584	0.020	0.48	0.0876	2, 3, 4, 7	Material Handling (i.e., truck loading) inside the pit at 200,000 tons/day
CMBL	Copper Mountain Blasting	6	1121	566	95,172,900	-40	634486.0	6829550.465	5853	6345.571	492.126	150	744296.55	3613000.42	321.734	321.734	58.716	18.562	18.562	3.387	2	Blasting at 1 blast/day and 125,000 ft^2/blast
CMMH	Copper Mountain Material Handling	0	1121	566	95,172,900	-40	634486.0	6829550.465	5853	6345.571	492.126	150	744296.55	3613000.42	0.133	3.2	0.584	0.020	0.48	0.0876	2	Material Handling (i.e., truck loading) inside the pit at 200,000 tons/day.
LR6BL	Little Rock6 Blasting	6	875	604	75,047,000	-30	528500.0	5688726.655	5594	6059.711	465.879	142	743293.96	3615235.98	321.734	321.734	58.716	18.562	18.562	3.387	3, 5	Blasting at 1 blast/day and 125,000 ft^2/blast
LR6MH	Little Rock6 Material Handling	0	875	604	75,047,000	-30	528500.0	5688726.655	5594	6059.711	465.879	142	743293.96	3615235.98	0.0600	1.440	0.263	0.00900	0.216	0.0394	3, 5	Material Handling (i.e., truck loading) inside the pit at 90,000 tons/day
BCBL	Burrow Chief Blasting	6	1114	1256	426,751,120	-40	1399184.0	15060691.23	5223	6223.753	1000.656	305	745739.45	3614493.17	321.734	643.467	117.433	18.562	37.123	6.775	5, 6, 7	Blasting at 2 blasts/day and 125,000 ft^2/blast
BCMH	Burrow Chief Material Handling	0	1114	1256	426,751,120	-40	1399184.0	15060691.23	5223	6223.753	1000.656	305	745739.45	3614493.17	0.133	3.2	0.584	0.020	0.48	0.0876	5, 6, 7	Material Handling (i.e., truck loading) inside the pit at 200,000 tons/day
CLBL	Copper Leach Blasting	6	740	310	32,574,800	-25	229400.0	2469241.05	5594	6059.711	465.879	142	742217.16	3614850.75	321.734	321.734	58.716	18.562	18.562	3.387	4, 6	Blasting at 1 blast/day and 125,000 ft^2/blast
CLMH	Copper Leach Material Handling	0	740	310	32,574,800	-25	229400.0	2469241.05	5594	6059.711	465.879	142	742217.16	3614850.75	0.0600	1.440	0.263	0.00900	0.216	0.0394	4, 6	Material Handling (i.e., truck loading) inside the pit at 90,000 tons/day

Pit Blasting	Blasting Agent Usage (lbs/blast) & Blast Area (ft^2/blast) & No. Blasts/Day	NOx					CO		SO_2				PM_{10}			$PM_{2.5}$		
		lb/hr	tpy	lb/day	Daily[1] (lb/hr)	Annual[2] (lb/hr)	lb/hr	tpy	lb/hr	lb/day	Daily[1] (lb/hr)	tpy	lb/hr	lb/day	Daily[1] (lb/hr)	lb/hr	lb/day	Daily[1] (lb/hr)
Mohawk	150,000 lbs & 125,000 ft^2 & 2	135.0	49.3	270.0	27.00	11.25	3,048	1,112.5	0.27	0.54	0.05	0.10	321.73	643.47	64.35	18.56	37.12	3.71
Copper Mountain	100,000 lbs & 125,000 ft^2 & 1	90.0	16.4	90.0	9.00	3.75	2,032	370.8	0.18	0.18	0.02	0.03	321.73	321.73	32.17	18.56	18.56	1.86
Little Rock 6	100,000 lbs & 125,000 ft^2 & 1	90.0	16.4	90.0	9.00	3.75	2,032	370.8	0.18	0.18	0.02	0.03	321.73	321.73	32.17	18.56	18.56	1.86
Copper Leach	50,000 lbs & 125,000 ft^2 & 1	45.0	8.2	45.0	4.50	1.87	1,016	185.4	0.090	0.090	0.01	0.016	321.73	321.73	32.17	18.56	18.56	1.86
Burro Chief	200,000 lbs & 125,000 ft^2 & 2	180.0	65.7	360.0	36.00	15.00	4,064	1,483.4	0.36	0.72	0.07	0.13	321.73	643.47	64.35	18.56	37.12	3.71

1 - Daily short term calculations based on 10 hour/day operation.
2 - Calculated based on annual tons per year emission rate.

Area source

ID	Description	Release Height	X Length	Y Length	Angle	Initial Vertical Dim.	Location		Applicable Scenario	TSP	PM10	PM10	Scenarios
		m	m	m	degree	m	UTM x	UTM y		(lb/hr-ft2)	(lb/hr)	(lb/hr-ft2)	
SXEW2	Acid Tank House	6	34	34	0	0	745498	3615908	all	1.47E-04	1.82	1.47E-04	all

Attachment C

Pollutant, Time Period and Standard	Modeled Facility Concentration (µg/m3)	Cumulative Concentration[1, 2] (µg/m3)	Background Concentration (µg/m3)	Cumulative Concentration (µg/m3)	Value of Standard (µg/m3)	Percent of Standard	Location		
							UTM E (m)	UTM N (m)	Elevation (ft)
CO, 8-hr, NAAQS	1,874.2	1,874.2	-	1,874.2	10,303.60	18.19%	748362.17	3616563.59	1830.2
CO, 8-hr, NMAAQS					9,960.10	18.82%			
CO, 1-hr, NAAQS	14,880.4	14,880.5	-	14,880.5	40,069.60	37.14%	749935.66	3615741.9	1900.75
CO, 1-hr, NMAAQS					14,997.50	99.22%			
NO_2, Annual, NAAQS	1.26	3.86	-	3.86	99.66	3.88%	767112	3622605.97	1756.99
NO_2, Annual, NMAAQS					94	4.11%			
NO_2, Annual, PSD Class I	0.020	0.040	-	0.04	2.5	1.62%	767221	3658526	1889
NO_2, Annual, PSD Class II	1.26	3.86	-	3.86	25	15.45%	767112.00	3622605.97	1756.99
NO_2, 24-hr, NMAAQS	30.7	41.9	-	41.9	188	22.27%	748556.11	3616191.85	1825.41
NO_2, 1-hr, NAAQS	124.6	124.7	-	124.7	188.03	66.32%	748168.21	3616757.54	1817.41
$PM_{2.5}$, Annual, NAAQS	1.92	1.92	5.1	7.02	12	58.51%	748685.42	3615868.60	1831.32
$PM_{2.5}$, 24-hr, NAAQS	5.92	5.92	14.9	20.82	35	59.50%	749319.10	3614989.27	1819.85
PM_{10}, Annual, PSD Class I	0.0837	0.00	-	0.00	4	0.00%	NA	NA	NA
PM_{10}, Annual, PSD Class II	19.1	0.00	-	0.00	17	0.00%	NA	NA	NA
PM_{10}, 24-hr, NAAQS	66.0	66.0	56.5	122.52	150	81.68%	749319.1	3614989.3	1819.9
PM_{10}, 24-hr, PSD Class I	1.3	0.1	-	0.10	8	1.19%	772973.0	3657516.0	2021.5
PM_{10}, 24-hr, PSD Class II	45.6	29.7	-	29.7	30	99.08%	741913.3	3615205.9	1894.5
SO_2, Annual, Significance	0.41	0.41	-	-	1	41.07%	745371.94	3612052.03	1968.05
SO_2, 24-hr, Significance	4.49	4.49	-	-	5	89.73%	745472.24	3612053.76	1957.59
SO_2, 3-hr, Significance	14.25	14.25	-	-	25	56.99%	745371.94	3612052.03	1968.05
SO_2, 1-hr, NAAQS	17.24	17.24	1.75	18.99	196.4	9.67%	745672.52	3612062.47	1954.40

Pollutant, Time Period and Standard	Cumulative H1H Concentration[1, 2] (µg/m3)	Modeled Facility Concentration (µg/m3)	Value of Standard[3] (µg/m3)	Percent of Standard	Location		
					UTM E (m)	UTM N (m)	Elevation (ft)
Scenario 2 Mohawk (150K)/Copper Mountain (100K) => Copper Mountain prime							
CO, 8-hr, NAAQS	1,279.30	1,279.27	10,303.60	12.42%	743359.83	3612328.98	1956.81
CO, 8-hr, NMAAQS			9,960.10	12.84%			
CO, 1-hr, NAAQS	10,234.24	10,234.04	40,069.60	25.54%	743359.83	3612328.98	1956.81
CO, 1-hr, NMAAQS			14,997.50	68.24%			
Scenario 3 Mohawk (150K)/Little Rock 6 (100K)=> LR6 prime							
CO, 8-hr, NAAQS	1,363.53	1,363.50	10,303.60	13.23%	745951.64	3619804.8	1869.94
CO, 8-hr, NMAAQS			9,960.10	13.69%			
CO, 1-hr, NAAQS	10,901.68	10,901.52	40,069.60	27.21%	745951.64	3619804.8	1869.94
CO, 1-hr, NMAAQS			14,997.50	72.69%			
Scenario 4 Mohawk (150K)/Copper Leach (50K) => Copper Leach prime							
CO, 8-hr, NAAQS	1,521.53	1,521.49	10,303.60	14.77%	742268.86	3614761.46	1901.29
CO, 8-hr, NMAAQS			9,960.10	15.28%			
CO, 1-hr, NAAQS	12,171.96	12,171.70	40,069.60	30.38%	742268.86	3614761.46	1901.29
CO, 1-hr, NMAAQS			14,997.50	81.16%			
Scenario 5 Burro Chief (200K)/Little Rock 6 (100K) => LR6 prime							
CO, 8-hr, NAAQS	1,363.53	1,363.50	10,303.60	13.23%	745951.64	3619804.8	1869.94
CO, 8-hr, NMAAQS			9,960.10	13.69%			
CO, 1-hr, NAAQS	10,901.68	10,901.52	40,069.60	27.21%	745951.64	3619804.8	1869.94
CO, 1-hr, NMAAQS			14,997.50	72.69%			
Scenario 6 Burro Chief (200K)/Copper Leach (50K)=> Burro Chief prime							
CO, 8-hr, NAAQS	1,861.79	1,861.79	10,303.60	18.07%	749935.66	3615741.9	1900.75
CO, 8-hr, NMAAQS			9,960.10	18.69%			
CO, 1-hr, NAAQS	14,880.48	14,880.43	40,069.60	37.14%	749935.66	3615741.9	1900.75
CO, 1-hr, NMAAQS			14,997.50	99.22%			
Scenario 7 Mohawk (150K)/Burrow Chief (200K) => Mohawk prime							
CO, 8-hr, NAAQS	1,874.24	1,874.18	10,303.60	18.19%	748362.17	3616563.59	1830.2
CO, 8-hr, NMAAQS			9,960.10	18.82%			
CO, 1-hr, NAAQS	14,846.55	14,846.17	40,069.60	37.05%	748362.17	3616563.59	1830.2
CO, 1-hr, NMAAQS			14,997.50	98.99%			

1 - Blasting Hours restricted to the following: December - 10 - sunset; other Winter (J, F, N) 9 - sunset; and all other months 8 - sunset

2 - Optionally, all nearby sources may be modeled instead of adding a background concentration, if the facility is over 10 km from the center of Albuquerque and El Paso.

3 - CO NAAQS are not to be exceeded more than once per year. NMAAQS are not to be exceeded.

Pollutant, Time Period and Standard	Cumulative Modeled Concentration[1, 2, 3] (µg/m3)	Modeled Facility Concentration (µg/m3)	Value of Standard (µg/m3)	Percent of Standard	Location		
					UTM E (m)	UTM N (m)	Elevation (ft)
Scenario 2 Mohawk/Copper Mountain => Copper Mountain prime							
NO_2, Annual, NAAQS	3.9	1.3	99.66	3.87%	767112	3622605.97	1756.99
NO_2, Annual, NMAAQS			94	4.11%			
NO_2, Annual, PSD Class I	0.038	0.017	2.5	1.53%	767519	3658510	1889
NO_2, Annual, PSD Class II	3.9	1.3	25	15.44%	767112	3622605.97	1756.99
NO_2, 24-hr, NMAAQS	22.4	22.4	188	9.30%	748507.63	3616240.34	1825.51
NO_2, 1-hr, NAAQS (H8H)	71.6	71.6	188.03	38.06%	743235.21	3614063.49	1862.09
Scenario 3 Mohawk/Little Rock 6 => Little Rock 6 prime							
NO_2, Annual, NAAQS	3.9	1.3	99.66	3.87%	767112	3622605.97	1756.99
NO_2, Annual, NMAAQS			94	4.11%			
NO_2, Annual, PSD Class I	0.038	0.018	2.5	1.53%	767553	3658505	1889
NO_2, Annual, PSD Class II	3.9	1.3	25	15.44%	767112	3622605.97	1756.99
NO_2, 24-hr, NMAAQS	23.1	23.1	188	9.30%	748507.63	3616240.34	1825.51
NO_2, 1-hr, NAAQS (H8H)	68.8	63.2	188.03	36.57%	769112	3624605.97	1720.51
Scenario 4 Mohawk/Copper Leach => Copper Leach prime							
NO_2, Annual, NAAQS	3.9	1.3	99.66	3.87%	767112	3622605.97	1756.99
NO_2, Annual, NMAAQS			94	4.11%			
NO_2, Annual, PSD Class I	0.038	0.017	2.5	1.52%	767553	3658505	1889
NO_2, Annual, PSD Class II	3.9	1.3	25	15.44%	767112	3622605.97	1756.99
NO_2, 24-hr, NMAAQS	22.9	22.9	188	9.30%	748507.63	3616240.34	1825.51
NO_2, 1-hr, NAAQS (H8H)	119.0	119.0	188.03	63.31%	742850.71	3614923.08	1887.22
Scenario 5 Burro Chief/Little Rock 6 => LR6 prime							
NO_2, Annual, NAAQS	3.9	1.3	99.66	3.87%	767112	3622605.97	1756.99
NO_2, Annual, NMAAQS			94	4.11%			
NO_2, Annual, PSD Class I	0.039	0.018	2.5	1.56%	767221	3658526	1889
NO_2, Annual, PSD Class II	3.9	1.3	25	15.44%	767112	3622605.97	1756.99
NO_2, 24-hr, NMAAQS	17.1	15.6	188	9.30%	767112	3622605.97	1756.99
NO_2, 1-hr, NAAQS (H8H)	68.8	63.2	188.03	36.57%	769112	3624605.97	1720.51
Scenario 6 Burro Chief/Copper Leach => Burro Chief prime							
NO_2, Annual, NAAQS	3.9	1.3	99.66	3.87%	767112	3622605.97	1756.99
NO_2, Annual, NMAAQS			94	4.11%			
NO_2, Annual, PSD Class I	0.039	0.018	2.5	1.55%	767030	3658516	1889
NO_2, Annual, PSD Class II	3.9	1.3	25	15.44%	767112	3622605.97	1756.99
NO_2, 24-hr, NMAAQS	19.3	19.3	188	9.30%	742786.06	3614979.65	1882.36
NO_2, 1-hr, NAAQS (H8H)	101.7	101.6	188.03	54.09%	747414.12	3618062.52	1866.53
Scenario 7 Mohawk/Burrow Chief => Mohawk prime							
NO_2, Annual, NAAQS	3.9	1.3	99.66	3.88%	767112	3622605.97	1756.99
NO_2, Annual, NMAAQS			94	4.11%			
NO_2, Annual, PSD Class I	0.040	0.020	2.5	1.62%	767221	3658526	1889
NO_2, Annual, PSD Class II	3.9	1.3	25	15.45%	767112	3622605.97	1756.99
NO_2, 24-hr, NMAAQS	41.9	30.7	188	9.30%	748556.11	3616191.85	1825.41
NO_2, 1-hr, NAAQS (H8H)	124.7	124.6	188.03	66.32%	748168.21	3616757.54	1817.41

1 - Cumulative concentrations are H1H except for NO_2 1-hour NAAQS compliace where 98th percentile (H8H) concentrations are shown.

2 - Blasting Hours restricted to the following: December - 10 - sunset; other Winter (J, F, N) 9 - sunset; and all other months 8 - sunset

3 - The 98th-percentile value associated with the 1-year period of meteorological data modeled is the design value. Each day of modeling, the maximum 1-hour concentration is determined for each receptor. The high-eighth-high value at each receptor is calculated, and the maximum of these is compared with the standard.

Pollutant, Time Period and Standard	Modeled Facility Concentration[1] (µg/m3)	Background Concentration[2] (µg/m3)	Cumulative Concentration[3, 4] (µg/m3)	Value of Standard (µg/m3)	Percent of Standard	Location		
						UTM E (m)	UTM N (m)	Elevation (m)
Scenario 2 Mohawk/Copper Mountain => Copper Mountain prime								
SO_2, Annual, Significance	0.41	--	--	1	41.07%	745371.94	3612052.03	1968.05
SO_2, 24-hr, Significance	4.49	--	--	5	89.73%	745472.24	3612053.76	1957.59
SO_2, 3-hr, Significance	14.2	--	--	25	56.99%	745371.94	3612052.03	1968.05
SO_2, 1-hr, Significance	17.2	--	--	7.8	**221.09%**	745672.52	3612062.47	1954.4
SO_2, 1-hr, NAAQS	17.2	1.8	19.0	196.4	9.67%	745672.52	3612062.47	1954.4
Scenario 3 Mohawk/Little Rock 6 => Little Rock 6 prime								
SO_2, Annual, Significance	0.41	--	--	1	41.07%	745371.94	3612052.03	1968.05
SO_2, 24-hr, Significance	4.49	--	--	5	89.73%	745472.24	3612053.76	1957.59
SO_2, 3-hr, Significance	14.2	--	--	25	56.99%	745371.94	3612052.03	1968.05
SO_2, 1-hr, Significance	17.2	--	--	7.8	**221.09%**	745672.52	3612062.47	1954.4
SO_2, 1-hr, NAAQS	17.2	1.8	19.0	196.4	9.67%	745672.52	3612062.47	1954.4
Scenario 4 Mohawk/Copper Leach => Copper Leach prime								
SO_2, Annual, Significance	0.41	--	--	1	41.07%	745371.94	3612052.03	1968.05
SO_2, 24-hr, Significance	4.49	--	--	5	89.73%	745472.24	3612053.76	1957.59
SO_2, 3-hr, Significance	14.2	--	--	25	56.99%	745371.94	3612052.03	1968.05
SO_2, 1-hr, Significance	17.2	--	--	7.8	**221.09%**	745672.52	3612062.47	1954.4
SO_2, 1-hr, NAAQS	17.2	1.8	19.0	196.4	9.67%	745672.52	3612062.47	1954.4
Scenario 5 Burro Chief/Little Rock 6 => LR6 prime								
SO_2, Annual, Significance	0.41	--	--	1	41.07%	745371.94	3612052.03	1968.05
SO_2, 24-hr, Significance	4.49	--	--	5	89.73%	745472.24	3612053.76	1957.59
SO_2, 3-hr, Significance	14.2	--	--	25	56.99%	745371.94	3612052.03	1968.05
SO_2, 1-hr, Significance	17.2	--	--	7.8	**221.09%**	745672.52	3612062.47	1954.4
SO_2, 1-hr, NAAQS	17.2	1.8	19.0	196.4	9.67%	745672.52	3612062.47	1954.4
Scenario 6 Burro Chief/Copper Leach => Burro Chief prime								
SO_2, Annual, Significance	0.41	--	--	1	41.07%	745371.94	3612052.03	1968.05
SO_2, 24-hr, Significance	4.49	--	--	5	89.73%	745472.24	3612053.76	1957.59
SO_2, 3-hr, Significance	14.2	--	--	25	56.99%	745371.94	3612052.03	1968.05
SO_2, 1-hr, Significance	17.2	--	--	7.8	**221.09%**	745672.52	3612062.47	1954.4
SO_2, 1-hr, NAAQS	17.2	1.8	19.0	196.4	9.67%	745672.52	3612062.47	1954.4
Scenario 7 Mohawk/Burrow Chief => Mohawk prime								
SO_2, Annual, Significance	0.41	--	--	1	41.07%	745371.94	3612052.03	1968.05
SO_2, 24-hr, Significance	4.49	--	--	5	89.73%	745472.24	3612053.76	1957.59
SO_2, 3-hr, Significance	14.2	--	--	25	56.99%	745371.94	3612052.03	1968.05
SO_2, 1-hr, Significance	17.2	--	--	7.8	**221.09%**	745672.52	3612062.47	1954.4
SO_2, 1-hr, NAAQS	17.2	1.8	19.0	196.4	9.67%	745672.52	3612062.47	1954.4

1 - Blasting Hours restricted to the following: December - 10 - sunset; other Winter (J, F, N) 9 - sunset; and all other months 8 - sunset

2 - NMED background for 99th percentil 1-hour Background at the Hurley Smelter (2013 - 2015 monitoring years)

3 - Tier 1: Add the 99th percentile 1-hour background concentration to 99th percentile modeling for the entire facility and compare with the 1-hour NAAQS.

4 - Over prediction because the Facility H1H is being evaluated in the maximum, as opposed to the 99th percentile.

Pollutant, Time Period and Standard	Cumulative Modeled Concentration[1, 2] (µg/m3)	Scenario Contribution (µg/m3)	Background Concentration[3] (µg/m3)	Cumulative Concentration[4, 5] (µg/m3)	Value of Standard (µg/m3)	Percent of Standard	Location		
							UTM E (m)	UTM N (m)	Elevation (ft)
Scenario 2 - MKCM9 - Run with RER2AL2 and RECPP1									
PM_{10}, Annual, PSD Class I	0.00	0.07	-	0.00	4	0.00%	NA	NA	NA
PM_{10}, Annual, PSD Class II	0.00	17.5	-	0.00	17	0.00%	NA	NA	NA
PM_{10}, 24-hr, NAAQS (H2H)	66.0	66.0	56.5	122.5	150	81.68%	749319.1	3614989.27	1819.85
PM_{10}, 24-hr, PSD Class I (H2H)	0.0003	1.0	-	0.00	8	0.00%	760550	3664038	2068.23
PM_{10}, 24-hr, PSD Class II (H2H)	0.64	66.0	-	0.64	30	2.14%	743306.67	3613390.61	1926.42
Scenario 3[6] - MKLR1 - Run with RER1AL1 and RECTH3									
PM_{10}, Annual, PSD Class I	0.00	0.05	-	0.00	4	0.00%	NA	NA	NA
PM_{10}, Annual, PSD Class II	0.00	13.1	-	0.00	17	0.00%	NA	NA	NA
PM_{10}, 24-hr, NAAQS (H2H)	43.0	43.0	56.5	99.5	150	66.35%	747176.9	3617538.73	1774.91
PM_{10}, 24-hr, PSD Class I (H2H)	0.05374	0.9	-	0.05	8	0.67%	752828	3656115	2024.21
PM_{10}, 24-hr, PSD Class II (H2H)	22.5	43.0	-	22.51	30	75.02%	741913.28	3615205.93	1894.49
Scenario 5[6] - BCLR1 - Run with RER2AL2 and RECLL1									
PM_{10}, Annual, PSD Class I	0.00	0.08	-	0.00	4	0.00%	NA	NA	NA
PM_{10}, Annual, PSD Class II	0.00	13.0	-	0.00	17	0.00%	NA	NA	NA
PM_{10}, 24-hr, NAAQS (H2H)	45.6	45.6	56.5	102.1	150	68.07%	741910.05	3615118.65	1877.57
PM_{10}, 24-hr, PSD Class I (H2H)	0.0954	1.0	-	0.10	8	1.19%	772973	3657516	2021.45
PM_{10}, 24-hr, PSD Class II (H2H)	29.7	45.6	-	29.72	30	99.08%	741913.28	3615205.93	1894.49
Scenario 7 - BCMK4 - Run with RER2AL2 and RECCLW6									
PM_{10}, Annual, PSD Class I	0.00	0.08	-	0.00	4	0.00%	NA	NA	NA
PM_{10}, Annual, PSD Class II	0.00	19.1	-	0.00	17	0.00%	NA	NA	NA
PM_{10}, 24-hr, NAAQS (H2H)	66.2	66.2	56.5	122.7	150	81.79%	742786.06	3614979.65	1882.36
PM_{10}, 24-hr, PSD Class I (H2H)	0.00046	1.3	-	0.00	8	0.01%	740239.2	3657043	2074.71
PM_{10}, 24-hr, PSD Class II (H2H)	0.97	66.2	-	0.97	30	3.23%	749204.93	3614441.67	1829.81

1 - Cumulative concentrations are based on H1H for annual compliance and H2H for short-term/ 24-hour compliace.

2 - Blasting Hours restricted to the following: December - 10 - sunset; other Winter (J, F, N) 9 - sunset; and all other months 8 - sunset

3 - NMED background for Maximum 24-hour Background at the Post Office in Deming (2013 - 2015 monitoring years)

4 - For 24-hour NAAQS compliance, use Tier 1, option 2: Use high second high predicted concentration and a single year of representative meteorological data. To the modeled concentration, add the highest 24-hour monitored background concentration.

5 - For PSD Increment compliance, model all increment-consuming sources at the facility and at nearby sources. Compare the high-second-high predicted concentration with the allowable increment.

6 - A worst case impact analysis was run and it was determined that the LR1 scenario created worst case impacts over all other Little Rock or Copper Leach operations impacts. Therefore a Copper Leach scenario is not represented.

Pollutant, Time Period and Standard	Cumulative Modeled Concentration[1, 2] (µg/m3)	Scenario Contribution (µg/m3)	Background Concentration[3] (µg/m3)	Cumulative Concentration[4] (µg/m3)	Value of Standard (µg/m3)	Percent of Standard	Location		
							UTM E (m)	UTM N (m)	Elevation (ft)
Scenario 2 - MKCM9 - Run with RER2AL2 and RECPP1									
$PM_{2.5}$, Annual, NAAQS	1.79	1.79	5.1	6.9	12	57.4%	749332.1	3615090.11	1827.1
$PM_{2.5}$, 24-hr, NAAQS (H8H)	5.92	5.92	14.9	20.8	35	59.5%	749319.1	3614989.27	1819.85
Scenario 3[6] - MKLR1 - Run with RER1AL1 and RECTH3									
$PM_{2.5}$, Annual, NAAQS	1.31	1.31	5.1	6.4	12	53.4%	747176.9	3617538.73	1775.44
$PM_{2.5}$, 24-hr, NAAQS (H8H)	3.58	3.58	14.9	18.5	35	52.8%	747236.17	3617463.31	1782.43
Scenario 5[5] - BCLR1 - Run with RER2AL2 and RECLL1									
$PM_{2.5}$, Annual, NAAQS	1.31	1.31	5.1	6.4	12	53.4%	746830.75	3618159.65	1751.72
$PM_{2.5}$, 24-hr, NAAQS (H8H)	3.41	3.41	14.9	18.3	35	52.3%	741910.05	3615118.65	1877.57
Scenario 7 - BCMK4 - Run with RER2AL2 and RECCLW6									
$PM_{2.5}$, Annual, NAAQS	1.92	1.92	5.1	7.0	12	58.5%	748685.42	3615868.6	1831.32
$PM_{2.5}$, 24-hr, NAAQS (H8H)	5.22	5.22	14.9	20.1	35	57.5%	748685.42	3615868.6	1831.32

1 - Cumulative concentrations are H1H except as noted in the table.

2 - Blasting Hours restricted to the following: December - 10 - sunset; other Winter (J, F, N) 9 - sunset; and all other months 8 - sunset

3 - NMED background for 98th Percentile 24-hour and Maximum Annual Background at the Las Cruces District Office (2013 - 2015 monitoring years)

4 - For 24-hour NAAQS compliance, use Tier 1: To the modeled concentration, add the secondary $PM_{2.5}$ and the 98th percentile 24-hour monitored background concentration. Note that the proposed modeification does not increase emissions of NO_X or SO_2 by more than 40 tpy therefore secondary $PM_{2.5}$ analysis is not required and has not been conducted.

5 - A worst case impact analysis was run and it was determined that the LR1 scenario created worst case impacts over all other Little Rock or Copper Leach operations impacts. Therefore a Copper Leach scenario is not represented.

Section 17

Compliance Test History

(Submitting under 20.2.70, 20.2.72, 20.2.74 NMAC)

Compliance Test History Table

Unit No.	Test Description	Test Date
ENV-123	Tested in accordance with EPA test methods for NOx and CO as required by NSR Permit No. PSD2448-M1R6.	9/16/2013
PPG-1, 3, 7, 8, 11, 12, 13, 15	Tested in accordance with EPA test methods for NOx and CO as required by Title V Permit No. P147-R1M3.	3/10/2014

Section 20

Other Relevant Information

Other relevant information. Use this attachment to clarify any part in the application that you think needs explaining. Reference the section, table, column, and/or field. Include any additional text, tables, calculations or clarifying information.

Additionally, the applicant may propose specific permit language for AQB consideration. In the case of a revision to an existing permit, the applicant should provide the old language and the new language in track changes format to highlight the proposed changes. If proposing language for a new facility or language for a new unit, submit the proposed operating condition(s), along with the associated monitoring, recordkeeping, and reporting conditions. In either case, please limit the proposed language to the affected portion of the permit.

Freeport-McMoRan Tyrone Inc. requests confidentiality on behalf of our diluent suppliers for the materials used in the SX/EW process. Specifically, Freeport-McMoRan Tyrone Inc. wishes to maintain confidentiality regarding the constituency of the diluents and reactants. Section 6 is the only location in this application that contains this information.

Section 22: Certification

Company Name: Freeport-McMoRan Tyrone Inc.

I, Erich J. Bower, hereby certify that the information and data submitted in this application are true and as accurate as possible, to the best of my knowledge and professional expertise and experience.

Signed this 6 day of November ,2020, upon my oath or affirmation, before a notary of the State of

New Mexico.

*Signature

11/6/2020
Date

Erich J. Bower
Printed Name

President; General Manager
Title

Scribed and sworn before me on this 6 day of November , 2020.

My authorization as a notary of the State of New Mexico expires on the

12 day of December , 2021.

Notary's Signature

11/6/2020
Date

Jeanie B. Gutierrez
Notary's Printed Name

Official Seal
JEANIE B GUTIERREZ
Notary Public
State of New Mexico
My Comm. Expires 12/12/21

*For Title V applications, the signature must be of the Responsible Official as defined in 20.2.70.7.AE NMAC.