Air Emission Calculations

		Tons per year					
Project Summary		**CO**	**HC**	**NOx**	**PM 10**	**SO2**	**CO2**
All Diesel Engines		**35.8**	**13.8**	**94.9**	**2.1**	**0.0033**	**689.4**
Road Dust (as PM10 Uncontrolled)					**155.0**		
ANFO (blasting)		**134**		**34**			
Uncontrolled Road Dust					**157.0**		
Annual Project Emissions (with 80% road dust control)		**169.8**	**13.8**	**128.9**	**33.5**	**0.0033**	**689.4**

Mine Equip			lbs/hr @ 50% use factor (excep gen @ 65%)			
Number	**Type**	**Horsepower**	**CO**	**HC**	**NOx**	**PM 10**
1	Electric Generator	500	1.86123348	0.715859031	4.9394273	0.107378855
4	7 ton wheeled buggies	92	1.053744493	0.405286344	2.7964758	0.060792952
2	2.5 ton Elmac loaders	154	0.881938326	0.339207048	2.3405286	0.050881057
1	Skid Steer	80	0.22907489	0.088105727	0.6079295	0.013215859
1	Kawasaki Mule	25	0.071585903	0.02753304	0.189978	0.004129956
1	Explosives Truck	250	0.715859031	0.275330396	1.8997797	0.041299559
2	Air Compressors (drills)	400	2.290748899	0.881057269	6.0792952	0.13215859
	Total Emissions (lbs/hr)		7.1	2.7	18.9	0.4
	Daily Emissions (lbs)		85.3	32.8	226.2	4.9
	Total Mine Emis (tons/yr)		**15.3**	**5.9**	**40.7**	**0.9**
	Elec Generator Only (APEN 07ME1053)	**(t/yr)**	**4.0**	**1.5**	**10.7**	**0.2**

Highway Vehicles			lbs per hour @ 50% use factor			
Number	**Type**	**Horsepower**	**CO**	**HC**	**NOx**	**PM 10**
6	On-road ore haul trucks	325	5.583700441	2.147577093	14.818282	0.322136564
1	4000 gallon H20 truck	300	0.859030837	0.330396476	2.2797357	0.049559471
3	crew cab diesel 4 x 4	350	3.00660793	1.156387665	7.9790749	0.17345815
	Total Emissions (lbs/hr)		9.4	3.6	25.1	0.5
	Daily Emissions (lbs)		113.4	43.6	300.9	6.5
	Total Emis (tons/yr)		**20.4**	**7.9**	**54.2**	**1.2**

Road Dust Generation	lbs/day
Heavy truck uncontrolled daily road dust (as PM10) =	**476**
Med duty vehicle uncontrolled road dust (as PM10) =	**385**
Daily total vehicle road dust (pounds)	**861**

Traffic Assumptions		
Assume 12 are truck haul veh trip ends -Total Miles/day dirt road =		158.4000
Assume 20 misc veh trip ends	Total miles/day =	264.0000
Ore truck emission factor/mile (25 ton) E=		3.0062
Med duty emission factor/mile (5 ton) E =		1.4571

Road Dust Colculations		
Where :	Ef = k (s/12)a (w/3)b	(source AP-42)
k = 1.5 a = 0.9 b= 0.45	(empirical constants)	
s = silt fraction of road w = weight of vehicle		
s = 9% (assume high end) w = 25 tons		
Daily one-way haul mileage on unpaved road =		13.2
Daily one-way haul mileage on paved road =		50

On-road vehicle emissions		
Assume diesel fuel ppm S =	15	
Mol. Wt of SO2 = 2 *S		
Diesel fuel lb/gal	7.05	
mpg large truck =	6.6	
Crew Tk (Fry Cyn Lodge w/ town) =		40
Crew Tk mileage =	17	

Fuel Cons gals/day		**Annual Emiss Fuel**	
On road truck	57.45454545	On-road veh gal	26104.8
H2O truck (2x day)	8	Mine gal (from applicant)	36000
Crew Truck	7.058823529	Annual Total	62104.8
Total	72.51336898	SO2 On-road veh	0.0014
		SO2 Mine Equip and Gen	0.0019
		SO2 Total Project	**0.0033**
		CO2	**689.4**

Emission Factors			
Emission factor blasting - lbs/ton ANFO			
CO	**NOx**		
67	17		
Vehicle Emission factors g/bhp			
CO	**HC**	**NOx**	**PM**
2.6	1	6.9	0.15
Generator use factor =		0.65	
Equip use factor =		0.5	
360 days x 12 hrs =		4320	

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Other assumptions

lb CO2/gal diesel =	22.2	EPA Emission Facts EPA420-F-005-001

Sources

Diesel emissions: Standards for US Nonroad Diesel Engines 9/29/08 http://www.dieselnet.com/standards/us/nonroad.php
ANFO Blasting emissions: AP-42 2/80 Miscellaneous Sources pp 13.3-3
Mikel Saunders, Personal Comm. October 15, 2008 Advanced Blasting Alaska, Anchorage AK
Sample emission calc formula: Hp x emiss fact x use factor / 454 (grams per lb conversion)
Tier 3 Em factor g/bhp-hr for <750 hp
Lrg Truck fuel econ - Atmospheric Environment 40 (2006)
Crew truck fuel econ EPA