

Annex A2 - Dust Emission Rate Estimation									
Blasting									
(Reference : AP-42, Section 11.9, Table 11.9-2, http://www.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf)									
Equation:									
$E = 0.00022(A)^{1.5}$									
E	emission rate (kg/blast)								
A	blasting area (m2)								
A	1000	m2	(provided by engineer)						
no. of blast	1	blast/day							
E	6.96	kg/blast							
E (hourly average)	1.93	g/s	(6.96 x 1000 / 3600)						
release height	0.5	m above gd							
Excavation									
Activity :									
materials handling									
rock crushing & screening									
truck movement									
Materials handling									
(Reference to AP-42, Section 13.2.4, http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s0204.pdf)									
Equation:									
$E = k (0.0016) (U/2.2)^{1.3} / (M/2)^{1.4}$ (AP-42, Section 13.2.4-4)									
E	kg/Mg								
k	particle size multiplier								
U	mean wind speed (m/s)								
M	moisture (%)								
k	0.74	(AP-42, Section 13.2.4-4)							
U	2.06	m/s	(average of wind speed measured at on-site met station in 2006)						
M	4.8	%	(AP-42, Section 13.2.4-4)						
period of excavation	1.5	yr							
no. of day per month	24	days							
no. of hour per day	12	hour	(7am-7pm)						
total volume of soil	770000	m3/1.5yr							
volume of soil per hr	148.5	m3/hour							
density of soil	1.56	Mg/m3							
total weight of soil	231.71	Mg/hr							
% reduction	50	%	(by watering)						
E (mitigated)	1.60E-04	kg/Mg							
	0.0103	g/s							
Rock crushing									
(Reference to AP-42, Section 11.9.2, Table 11.9.2-1, http://www.epa.gov/ttn/chief/ap42/ch11/final/c11s1902.pdf)									
Two types of emission will be considered, ie, tertiary crushing & screening.									
Two steps of crushing would be involved, so 2 emission sources will be assumed for each tertiary crushing & screening.									
volume of rock	400	m3/day							
no. of day per month	24	days							
no. of hour per day	12	hour	(7am-7pm)						
volume of rock per hr	33.3	m3/hr							
density of rock	1760	kg/m3							
total weight of crushed rock	59	Mg/hr							
a. crushing									
E	0.0006	kg/Mg	(AP-42, Table 11.19.2-1, controlled emission factor)						
E (mitigated)	9.8E-03	g/s							
b. screening									
E	0.0011	kg/Mg	(AP-42, Table 11.19.2-1, controlled emission factor)						
E (mitigated)	0.018	g/s							
Truck Movement on Unpaved Road									
(Reference to AP-42, Section 13.2.2, http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s0202.pdf)									
Equation:									
$E = k (s/12)^a (W/3)^b$									
E	lb/vmt								
k	empirical constant = 4.9 lb/vkt								
s	surface material silt content (%)								
W	mean vehicle weight (ton)								
a	empirical constant = 0.7								
b	empirical constant = 0.45								
k	4.9	lb/vmt	(AP-42, Table 13.2.2-2)						

s	6.5 %	(AP-42, Table 13.2.2-3)
W	21.5 Mg	(average of truck weight with pay load (28 ton) and without pay load (15 ton))
a	0.7	(AP-42, Table 13.2.1-2)
b	0.45	
lb/vmt to g/vkt	289.10	
E	2237.43 g/vkt	
total vol. of rock to be disposed offsite	161400 m ³	
total no. of day	107 day	
no of hour a day	12 hour	
volume of rock per hr	125.7 m ³ /hr	
bulk factor of rock	1.4	
no. of vehicle per hr (rock)	24 veh/hr	
total vol. of soil to be disposed offsite	350600 m ³	
no. of yr for soil generation	1.5 yr	
volume of soil per hr	67.6 m ³ /hr	
bulk factor of soil	1.2	
vol. of vehicle	7.5 m ³	
no. of vehicle per hr (soil)	11 veh/hr	
total no. of trips	70 veh/hr	
% reduction	90 %	(overall % reduction by limit the vehicle speed to 10 m/s, paving the haul road with aggregate and watering to keep wet of the road all the time, reference to AP-42, Figure 13.2.2-2)
E (mitigated)	4.35E-03 g/m/s	
Filling		
Activity :	materials handling	
	wind erosion	
	truck movement	
Materials handling		
Equation:		
$E = k (0.0016) (U/2.2)^{1.3} / (M/2)^{1.4}$		(AP-42, Section 13.2.4-4)
E	kg/Mg	
k	particle size multiplier	
U	mean wind speed (m/s)	
M	moisture (%)	
k	0.74	(AP-42, Section 13.2.4-4)
U	2.06 m/s	(average wind speed measured at SENT Landfill met station in 2006)
M	4.8 %	(AP-42, Section 13.2.4-4)
period of filling	1.5 yr	
no. of day per month	24 days	
no. of hour per day	12 hour	(7am-7pm)
total volume of soil	407200 m ³ /1.5yr	
volume of soil per hr	78.5 m ³ /hr	
density of soil	1560 kg/m ³	
total weight of soil	122.54 Mg/hr	
% reduction	50 %	(by watering)
E (mitigated)	1.60E-04 kg/Mg	
	0.0054 g/s	
Wind Erosion		
E	0.85 Mg/hect/y	(AP-42, Section 11.9-12)
E (unmitigated)	2.7E-06 g/m ² /s	
% reduction	50 %	(by watering)
E (mitigated)	1.35E-06	
Truck Movement		
(Reference to AP-42, Section 13.2.2, http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s0202.pdf)		
Equation:		
$E = k (s/12)^a (W/3)^b$		
E	lb/vmt	
k	empirical constant = 4.9 lb/vkt	
s	surface material silt content (%)	
W	mean vehicle weight (ton)	
a	empirical constant = 0.7	
b	empirical constant = 0.45	
k	4.9 lb/vmt	(AP-42, Table 13.2.2-2)
s	6.5 %	(AP-42, Table 13.2.2-3)
W	20 Mg	(average of truck weight with load (25 ton) and without load (15 ton))
a	0.7	(AP-42, Table 13.2.1-2)
b	0.45	
lb to g	289.10	
E	2165.79 g/vkt	
vehicle speed	10 kph	

[illegible]