Appendix 3.02c Construction of CSTW - Calculation of Dust Emission Source (Annual Prediction)

Construction of CSTW

Emission rates for Long-term Average Prediction (Annual)

Location	Source	Emission Rates	(Unmitigated)	(Mitigated)	Parameters		*Remarks*
Portal Exhaust	Exhaust Outlets during Construction of Cavern	Overall Emission Rate (during construciton hours)	**1.982360E-02**	**1.576158E-03**	TSP Emission Rate		*Overall Emission Rate for Heavy Construction, Loading, Screen and Crushing (With Enclosure and Dust Collector for dust suppression on Rock Crusher)*
		Volume Source (g/s)	**9.674397E-03**	**7.485010E-04**	RSP Emission Rate		*Emission Rate = (Construction Activities + Rock Loading + Rock Crushing + Screening) / Area of Exhaust*
	Source ID: 1		**4.869643E-03**	**1.479068E-04**	FSP Emission Rate		
					Area of Exhaust (m^2) (16m x 16m)	256	
	Construction Activities inside Cavern	Heavy Construction (g/s)	3.067374E+00	3.834217E-01	Emission Rate = (Emission Factor*10^6/10000)/(30*No. of Operation hour*60*60)*(Percentage Active/100)*Construction Area*(1-Dust Suppression%)		
					TSP emission factor (Mg/hectare/month of activity)	2.69	*from AP-42, S13.2.3, 1/95 ed.*
					Percentage area actively operating (%)	10	*Worst case assumption, refer to Justification of Percentage Active Works Area for Caverns for Relocation of STSTW*
					% of dust suppression	87.5	*Assuming watering eight times a day, reference to Kai Tak Development EIA Report*
					no. of operation hour (hr)	12	*Assumed typical working hours of work site referenced in AP-42*
					Emission height (m)	0.5	
					Total Construction Area in Cavern (m^2)	147781	*from enginneer*
			1.45087E+00	1.81358E-01	RSP emission factor (Mg/hectare/month of activity)	1.27237	
					RSP-to-TSP Ratio	0.473	*from USEPA AP-42, 5th ed. 11/06 ed. S13.2.4*
			2.20851E-01	2.76064E-02	FSP emission factor (Mg/hectare/month of activity)	0.19368	
					FSP-to-TSP Ratio	0.072	*from USEPA AP-42, 5th ed. 11/06 ed. S13.2.4*
	Rock Crusher inside Cavern	Truck Unloading - Fragmented Stone (g/s)	7.46667E-03	7.46667E-05	Emission Rate = Emission Factor*1000*Loading Rate/3600*Size Mulitplier*(1-Dust Suppression%)		
					RSP emission factor (kg/Mg)	0.000008	*from EPA AP-42, 5th ed. 8/04 ed., S11.19.2 Table 11.19.2-1*
					TSP-to-RSP factor	2.1	*from EPA AP-42, 5th ed. 8/04 ed., S11.19.2 Table 11.19.2-1*
					Loading rate (ton/hr)	1600	*from engineer*
					no. of operation hour (hr)	12	*from engineer (from 0700 to 1900)*
					% of dust suppression	99%	*for typical removal efficiency for Dust Collector inside Enclosure Control Techniques for Particulate Emission from Stationary Sources Vol.2, Section 9.7.1.2.2*
			3.55556E-03	3.55556E-05	RSP emission factor (kg/Mg)	0.000008	*from EPA AP-42, 5th ed. 8/04 ed., S11.19.2 Table 11.19.2-1*
					% of dust suppression	99%	*for typical removal efficiency for Dust Collector inside Enclosure Control Techniques for Particulate Emission from Stationary Sources Vol.2, Section 9.7.1.2.2*
			3.55556E-03	3.55556E-05	FSP emisison factor (kg/Mg)	0.000008	*adopt RSP emission factor as upper limit*
					% of dust suppression	99%	*for typical removal efficiency for Dust Collector inside Enclosure Control Techniques for Particulate Emission from Stationary Sources Vol.2, Section 9.7.1.2.2*
		Tertiary Crushing (g/s)	1.20000E+00	1.20000E-02	Emission Rate = Emission Factor*Processing Rate*1000/3600*(1-Dust Suppression%)		
					TSP emission factor (kg/Mg)	0.0027	*from EPA AP-42, 5th ed. 8/04 ed., S11.19.2 Table 11.19.2-1*
					Crushing rate (ton/hr)	1600	*from engineer*
					no. of operation hour (hr)	12	*from engineer (from 0700 to 1900)*
					% of dust suppression	99%	*for typical removal efficiency for Dust Collector inside Enclosure Control Techniques for Particulate Emission from Stationary Sources Vol.2, Section 9.7.1.2.2*
			5.33333E-01	5.33333E-03	RSP emission factor (kg/Mg)	0.0012	*from EPA AP-42, 5th ed. 8/04 ed., S11.19.2 Table 11.19.2-1*
					% of dust suppression	99%	*for typical removal efficiency for Dust Collector inside Enclosure Control Techniques for Particulate Emission from Stationary Sources Vol.2, Section 9.7.1.2.2*
			5.33333E-01	5.33333E-03	FSP emisison factor (kg/Mg)	0.0012	*adopt RSP emission factor as upper limit*
					% of dust suppression	99%	*for typical removal efficiency for Dust Collector inside Enclosure Control Techniques for Particulate Emission from Stationary Sources Vol.2, Section 9.7.1.2.2*

Appendix 3.02c Construction of CSTW - Calculation of Dust Emission Source (Annual Prediction)

Construction of CSTW

Emission rates for Long-term Average Prediction (Annual)

Location	Source	Emission Rates	(Unmitigated)	(Mitigated)	Parameters		Remarks
		Fines Screening (controlled (with wet suppression) (g/s)	8.00000E-01	8.00000E-03	Emission Rate = Emission Factor*Processing Rate*1000/3600*(1-Dust Suppression%)		
					TSP emission factor (kg/Mg)	0.0018	*from EPA AP-42, 5th ed. 8/04 ed., S11.19.2 Table 11.19.2-1*
					Crushing rate (ton/hr)	1600	*from engineer*
					no. of operation hour (hr)	12	*from engineer (from 0700 to 1900)*
					% of dust suppression	99%	*for typical removal efficiency for Dust Collector inside Enclosure*
							Control Techniques for Particulate Emission from Stationary Sources Vol.2, Section 9.7.1.2.2
			4.88889E-01	4.88889E-03	RSP emission factor (kg/Mg)	0.0011	*from EPA AP-42, 5th ed. 8/04 ed., S11.19.2 Table 11.19.2-1*
					% of dust suppression	99%	*for typical removal efficiency for Dust Collector inside Enclosure*
							Control Techniques for Particulate Emission from Stationary Sources Vol.2, Section 9.7.1.2.2
			4.88889E-01	4.88889E-03	FSP emisison factor (kg/Mg)	0.0011	*adopt RSP emission factor as upper limit*
					% of dust suppression	99%	*for typical removal efficiency for Dust Collector inside Enclosure*
							Control Techniques for Particulate Emission from Stationary Sources Vol.2, Section 9.7.1.2.2
Construction Sites at Main Portal	**Construction Activities** **Source ID: 2 - 28**	Heavy Construction Area Source ($g/m^2/s$)	**2.075617E-05**	**2.594522E-06**	Emission Rate = (Emission Factor*10^6/10000)/(30*No. of Operation hour*60*60)*(Percentage Active/100)*(1-Dust Suppression%)		
					TSP emission factor (Mg/hectare/month of activity)	2.69	*from AP-42, S13.2.3, 1/95 ed.*
					Percentage area actively operating (%)	10	*from enginneer*
					% of dust suppression	87.5	*Assuming watering eight times a day, reference to Kai Tak Development EIA Report*
					no. of operation hour (hr)	12	*Assumed typical working hours of work site referenced in AP-42*
					Emission height (m)	0.5	
			9.81767E-06	**1.22721E-06**	RSP emission factor (Mg/hectare/month of activity)	1.27237	
					% fraction of TSP	0.473	*from USEPA AP-42, 5th ed. 11/06 ed. S13.2.4*
			1.49444E-06	**1.86806E-07**	FSP emission factor (Mg/hectare/month of activity)	0.19368	
					% fraction of TSP	0.072	*from USEPA AP-42, 5th ed. 11/06 ed. S13.2.4*
		Wind Erosion Area Source ($g/m^2/s$)		**2.695332E-07**	Emission Rate = Emission Factor*10^6/(10000*365*24*60*60)*(Percentage Active/100)		
					TSP emission factor (Mg/hectare/yr)	0.85	*AP-42, 5th ed., Table 11.9.4*
					Percentage area actively operating (%)	10	*from enginneer*
					Emission height (m)	0.5	
				1.27489E-07	RSP emission factor (Mg/hectare/month of activity)	0.40205	
					% fraction of TSP	0.473	*from USEPA AP-42, 5th ed. 11/06 ed. S13.2.4*
				1.94064E-08	FSP emission factor (Mg/hectare/month of activity)	0.0612	
					% fraction of TSP	0.072	*from USEPA AP-42, 5th ed. 11/06 ed. S13.2.4*
Construction Sites at Secondary Portal	**Construction Activities** **Source ID: 30 - 39**	Heavy Construction Area Source ($g/m^2/s$)	**2.075617E-05**	**2.594522E-06**	Emission Rate = (Emission Factor*10^6/10000)/(30*No. of Operation hour*60*60)*(Percentage Active/100)*(1-Dust Suppression%)		
					TSP emission factor (Mg/hectare/month of activity)	2.69	*from AP-42, S13.2.3, 1/95 ed.*
					Percentage area actively operating (%)	10	*from enginneer*
					% of dust suppression	87.5	*Assuming watering eight times a day, reference to Kai Tak Development EIA Report*
					no. of operation hour (hr)	12	*Assumed typical working hours of work site referenced in AP-42*
					Emission height (m)	0.5	
			9.81767E-06	**1.22721E-06**	RSP emission factor (Mg/hectare/month of activity)	1.27237	
					% fraction of TSP	0.473	*from USEPA AP-42, 5th ed. 11/06 ed. S13.2.4*
			1.49444E-06	**1.86806E-07**	FSP emission factor (Mg/hectare/month of activity)	0.19368	
					% fraction of TSP	0.072	*from USEPA AP-42, 5th ed. 11/06 ed. S13.2.4*
		Wind Erosion Area Source ($g/m^2/s$)		**2.695332E-07**	Emission Rate = Emission Factor*10^6/(10000*365*24*60*60)*(Percentage Active/100)		
					TSP emission factor (Mg/hectare/yr)	0.85	*AP-42, 5th ed., Table 11.9.4*
					Percentage area actively operating (%)	10	*from enginneer*
					Emission height (m)	0.5	
				1.27489E-07	RSP emission factor (Mg/hectare/month of activity)	0.40205	
					% fraction of TSP	0.473	*from USEPA AP-42, 5th ed. 11/06 ed. S13.2.4*
				1.94064E-08	FSP emission factor (Mg/hectare/month of activity)	0.0612	
					% fraction of TSP	0.072	*from USEPA AP-42, 5th ed. 11/06 ed. S13.2.4*

Appendix 3.02c Construction of CSTW - Calculation of Dust Emission Source (Annual Prediction)

Construction of CSTW

Emission rates for Long-term Average Prediction (Annual)

Location	Source	Emission Rates	(Unmitigated)	(Mitigated)	Parameters		Remarks
Construction Sites at Ah Kung Kok Shan Road Surface Magazine Site	**Construction Activities** **Source ID: 40 - 69**	Heavy Construction Area Source ($g/m^2/s$)	**2.075617E-05**	**2.594522E-06**	Emission Rate = (Emission Factor*10^6/10000)/(30*No. of Operation hour*60*60)*(Percentage Active/100)*(1-Dust Suppression%)		
					TSP emission factor (Mg/hectare/month of activity)	2.69	*from AP-42, S13.2.3, 1/95 ed.*
					Percentage area actively operating (%)	10	*from enginneer*
					% of dust suppression	87.5	*Assuming watering eight times a day, reference to Kai Tak Development EIA Report*
					no. of operation hour (hr)	12	*Assumed typical working hours of work site referenced in AP-42*
					Emission height (m)	0.5	
			9.81767E-06	**1.22721E-06**	RSP emission factor (Mg/hectare/month of activity)	1.27237	
					% fraction of TSP	0.473	*from USEPA AP-42, 5th ed. 11/06 ed. S13.2.4*
			1.49444E-06	**1.86806E-07**	FSP emission factor (Mg/hectare/month of activity)	0.19368	
					% fraction of TSP	0.072	*from USEPA AP-42, 5th ed. 11/06 ed. S13.2.4*
		Wind Erosion Area Source ($g/m^2/s$)		**2.695332E-07**	Emission Rate = Emission Factor*10^6/(10000*365*24*60*60)*(Percentage Active/100)		
					TSP emission factor (Mg/hectare/yr)	0.85	*AP-42, 5th ed., Table 11.9.4*
					Percentage area actively operating (%)	10	*from enginneer*
					Emission height (m)	0.5	
				1.27489E-07	RSP emission factor (Mg/hectare/month of activity)	0.40205	
					% fraction of TSP	0.473	*from USEPA AP-42, 5th ed. 11/06 ed. S13.2.4*
				1.94064E-08	FSP emission factor (Mg/hectare/month of activity)	0.0612	
					% fraction of TSP	0.072	*from USEPA AP-42, 5th ed. 11/06 ed. S13.2.4*
Haul Road Conneting Main Portal to Area 73	**Unpaved Haul Road** (assumed as Heavy Construction as worst case) **Source ID: 70 - 82**	Heavy Construction Area Source ($g/m^2/s$)	**2.075617E-05**	**2.594522E-06**	Emission Rate = (Emission Factor*10^6/10000)/(30*No. of Operation hour*60*60)*(Percentage Active/100)*(1-Dust Suppression%)		
					TSP emission factor (Mg/hectare/month of activity)	2.69	*from AP-42, S13.2.3, 1/95 ed.*
					Percentage area actively operating (%)	10	*from enginneer*
					% of dust suppression	87.5	*Assuming watering eight times a day, reference to Kai Tak Development EIA Report*
					no. of operation hour (hr)	12	*Assumed typical working hours of work site referenced in AP-42*
					Emission height (m)	0.5	
			9.81767E-06	**1.22721E-06**	RSP emission factor (Mg/hectare/month of activity)	1.27237	
					% fraction of TSP	0.473	*from USEPA AP-42, 5th ed. 11/06 ed. S13.2.4*
			1.49444E-06	**1.86806E-07**	FSP emission factor (Mg/hectare/month of activity)	0.19368	
					% fraction of TSP	0.072	*from USEPA AP-42, 5th ed. 11/06 ed. S13.2.4*
		Wind Erosion Area Source ($g/m^2/s$)		**2.695332E-07**	Emission Rate = Emission Factor*10^6/(10000*365*24*60*60)*(Percentage Active/100)		
					TSP emission factor (Mg/hectare/yr)	0.85	*AP-42, 5th ed., Table 11.9.4*
					Percentage area actively operating (%)	10	*from enginneer*
					Emission height (m)	0.5	
				1.27489E-07	RSP emission factor (Mg/hectare/month of activity)	0.40205	
					% fraction of TSP	0.473	*from USEPA AP-42, 5th ed. 11/06 ed. S13.2.4*
				1.94064E-08	FSP emission factor (Mg/hectare/month of activity)	0.0612	
					% fraction of TSP	0.072	*from USEPA AP-42, 5th ed. 11/06 ed. S13.2.4*

Appendix 3.02c Construction of CSTW - Calculation of Dust Emission Source (Annual Prediction)

Construction of CSTW

Emission rates for Long-term Average Prediction (Annual)

Location	Source	Emission Rates	(Unmitigated)	(Mitigated)	Parameters		Remarks
Area 73	**Stockpile of Spoils from Cavern** (assumed as Heavy Construction as worst case) **Source ID: 83 - 113**	Heavy Construction Area Source ($g/m^2/s$)	**2.075617E-05**	**2.594522E-06**	Emission Rate = (Emission Factor*10^6/10000)/(30*No. of Operation hour*60*60)*(Percentage Active/100)*(1-Dust Suppression%)		
					TSP emission factor (Mg/hectare/month of activity)	2.69	*from AP-42, S13.2.3, 1/95 ed.*
					Percentage area actively operating (%)	10	*from enginneer*
					% of dust suppression	87.5	*Assuming watering eight times a day, reference to Kai Tak Development EIA Report*
					no. of operation hour (hr)	12	*Assumed typical working hours of work site referenced in AP-42*
					Emission height (m)	0.5	
			9.81767E-06	**1.22721E-06**	RSP emission factor (Mg/hectare/month of activity)	1.27237	
					% fraction of TSP	0.473	*from USEPA AP-42, 5th ed. 11/06 ed. S13.2.4*
			1.49444E-06	**1.86806E-07**	FSP emission factor (Mg/hectare/month of activity)	0.19368	
					% fraction of TSP	0.072	*from USEPA AP-42, 5th ed. 11/06 ed. S13.2.4*
		Wind Erosion Area Source ($g/m^2/s$)		**2.695332E-07**	Emission Rate = Emission Factor*10^6/(10000*365*24*60*60)*(Percentage Active/100)		
					TSP emission factor (Mg/hectare/yr)	0.85	*AP-42, 5th ed., Table 11.9.4*
					Percentage area actively operating (%)	10	*from enginneer*
					Emission height (m)	0.5	
				1.27489E-07	RSP emission factor (Mg/hectare/month of activity)	0.40205	
					% fraction of TSP	0.473	*from USEPA AP-42, 5th ed. 11/06 ed. S13.2.4*
				1.94064E-08	FSP emission factor (Mg/hectare/month of activity)	0.0612	
					% fraction of TSP	0.072	*from USEPA AP-42, 5th ed. 11/06 ed. S13.2.4*