

**LEGEND:**

- BPL BARGING POINT AT LAM TIN
- RCR ROCK CRUSHER AT LAM TIN
- LAM TIN WORKS AREA (LTWA)
- LAM TIN WORKS AREA (LTWA) (TIER 2 ASSESSMENT FOR ASR CL1 & CL2)
- LAM TIN WORKS AREA (LTWA) (TIER 2 ASSESSMENT FOR ASR CL8 & CL9)
- LAM TIN WORKS AREA (LTWA) (FOR BOTH TIER 2 ASSESSMENTS)
- PROPOSED TKO-LTT ALIGNMENT

\$DATE\$ \$TIME\$ \$USERS\$ \$FILES\$



AGREEMENT NO. CE 42/2008 (CE)  
 TSUENG KWAN O - LAM TIN TUNNEL AND ASSOCIATED WORKS - INVESTIGATION  
 LOCATIONS OF DUST EMISSION SOURCES (LAM TIN)

SCALE	A3 1 : 3000	DATE	NOV 2012
CHECK	-	DRAWN	HD
JOB No.	60097677	DRAWING No.	APPENDIX 3.1
		REV	-

**Appendix 3.1 Calculations of Construction Dust Emission Rates**

**Emission Rates for 1-hour & 24-hr Average (Lam Tin Area)**

Location	Source	Emission Factors	Unmitigated Emission Rates	Mitigated Emission Rates	Parameters	Remarks
Lam Tin Barging Point	Barging Point for Lam Tin Area  Source: BPL (1 Point Source)	Unloading of spoils to barge (g/s)	1.58672E-01	1.58672E-02	TSP emission factor (kg/Mg) Particle size multiplier, k Material moisture content, M Average wind speed, U (m/s) E (kg/Mg)  Maximum total handling capacity (m <sup>3</sup> /day) Material density (Mg/m <sup>3</sup> ) Maximum total handling capacity (Mg/day)  no. of operation hour (hr) % of dust suppression  Emission height (m)	$E = k \cdot (0.0016)^{-1} \cdot [(U/2.2)^{1.3} / (M/2)^{1.4}]$ from EPA AP-42, Section 13.2.4, 11/06 ed. 0.74 from EPA AP-42, S13.2.4, particle size < 30 um, 11/06 ed. 3% from engineer 3.57 from Hong Kong Observatory Kai Tak Station(Yr2009) 1.26E-03 calculated  2198 from engineer 2.27 from engineer 4989 from engineer  11 from engineer (operation hours would be from 7:00 to 12:00 and 13:00 to 19:00) 90% installation of flexible curtain and shelter with water spray at discharge point from EPA Control Techniques for Particulate Emissions from Stationary Sources - Vol. 2, Sep 1982, Table 9.12-11  0
Lam Tin Rock Crusher	Loading Point  Screening  Crushing  Source: RCR (1 Point Source)	Truck Unloading - Fragmented Stone (g/s)  Fines Screening (controlled) (g/s)  Tertiary Crushing (g/s)  Overall Emission Rate (g/s)	2.11674E-05  1.88995E-03  3.40190E-03  5.31302E-03	2.11674E-05  1.88995E-03  3.40190E-03  5.31302E-03	RSP Emission Factor (kg/Mg)  RSP to TSP factor Crushing rate (Mg/hr)  no. of operation hour (hr) % of dust suppression  TSP emission factor (kg/Mg) % of dust suppression  TSP emission factor (kg/Mg) % of dust suppression  Emission height (m)	0.000008 from EPA AP-42, 5th ed. 8/04 ed., Sec11.19.2, Table 11.19.2-1  2.1 from EPA AP-42 5th ed. 1/95 ed., Sec 11.19.2, Table 11.19.2-1 453.6 from engineer  11 from engineer (operation hours would be from 7:00 to 12:00 and 13:00 to 19:00) 99% for typical removal efficiency for Dust Collector inside Enclosure Control Techniques for Particulate Emissions from Stationary Sources Vol. 2, Section 9.7.1.2.2  0.0015 from EPA AP-42, 5th ed. 8/04 ed., Sec11.19.2, Table 11.19.2-1 99% for typical removal efficiency for Dust Collector inside Enclosure Control Techniques for Particulate Emissions from Stationary Sources Vol. 2, Section 9.7.1.2.2  0.0027 from EPA AP-42, 5th ed. 8/04 ed., Sec11.19.2, Table 11.19.2-1 99% for typical removal efficiency for Dust Collector inside Enclosure Control Techniques for Particulate Emissions from Stationary Sources Vol. 2, Section 9.7.1.2.2  0 Overall Emission Rate for Loading Point, Screening and Crushing (With Enclosure and Dust Collector for dust suppression)
Lam Tin Works Area	Excavation, Surface Blasting and Cut-&-Cover Area  Source: LTWA (93 nos. Area Sources)	Heavy Construction Area Source (g/m <sup>2</sup> /s)  Wind erosion (g/m <sup>2</sup> /s) (For night-time only)	2.07562E-04  2.69533E-06	2.59452E-05  2.69533E-06	TSP emission factor (Mg/hectare/month of activity)  Percentage area actively operating overall % of dust suppression  Emission height (m)  TSP emission factor (Mg/hectare/yr) Percentage area actively operating % of dust suppression Emission height (m)	2.69 the TSP emission factor was derived by assumed 30 working days per month from EPA AP-42, S13.2.3, 1/95 ed. 100% from engineer (conservative approach) 87.5% for watering once on active construction areas for every 1.5 working hour  0  0.85 AP-42, 5th ed., Table 11.9.4 100% from engineer (conservative approach) 0 0

**Remarks:**

Percentage of Dust Suppression by Watering is derived from the equation  $C = 100 - 0.8pd/ti$  (USEPA, Control of Open Fugitive Dust Sources, 1988)  
 where p = potential average hourly daytime evaporation rate, mm/h = 0.25916 ([http://www.weather.gov.hk/cis/normal/1971\\_2000/normal\\_e.htm](http://www.weather.gov.hk/cis/normal/1971_2000/normal_e.htm))  
 d = average hourly daytime traffic rate per hour = 3  
 i = application intensity, L/m<sup>2</sup> = 0.062  
 t = time between applications, hr = 1.5

The water intensity is an assumption used in the dust modeling only. Any potential dust impact and mitigation would be subject to actual site condition and managed by the EM&A programme during the construction stage

**Appendix 3.1 Calculations of Construction Dust Emission Rates**

**Emission Rates for Annual Average (Lam Tin Area)**

Location	Source	Emission Factors	Unmitigated Emission Rates	Mitigated Emission Rates	Parameters	Remarks
Lam Tin Barging Point	Barging Point for Lam Tin Area  Source: BPL (1 Point Source)	Unloading of spoils to barge (g/s)	1.58672E-01	1.58672E-02	TSP emission factor (kg/Mg) Particle size multiplier, k Material moisture content, M (%) Average wind speed, U (m/s) E (kg/Mg)  Maximum total handling capacity (m <sup>3</sup> /day) Material density (Mg/m <sup>3</sup> ) Maximum total handling capacity (Mg/day)  no. of operation hour (hr) % of dust suppression  Emission height (m)	$E = k \cdot (0.0016) \cdot [(U/2.2)^{1.3} / (M/2)^{1.4}]$ from EPA AP-42, Section 13.2.4, 11/06 ed. 0.74 from EPA AP-42, S13.2.4, particle size < 30 um, 11/06 ed. 3% from engineer 3.57 from Hong Kong Observatory Kai Tak Station(Yr2009) 1.26E-03 calculated  2198 from engineer 2.27 from engineer 4989 from engineer  11 from engineer (operation hours would be from 7:00 to 12:00 and 13:00 to 19:00) 90% installation of flexible curtain and shelter with water spray at discharge point from EPA Control Techniques for Particulate Emissions from Stationary Sources - Vol. 2, Sep 1982, Table 9.12-11  0
Lam Tin Rock Crusher	Loading Point  Screening  Crushing  Source: RCR (1 Point Source)	Truck Unloading - Fragmented Stone (g/s)  Fines Screening (controlled) (g/s)  Tertiary Crushing (g/s)  Overall Emission Rate (g/s)	2.11674E-05  1.88995E-03  3.40190E-03  5.31302E-03	2.11674E-05  1.88995E-03  3.40190E-03  5.31302E-03	RSP Emission Factor (kg/Mg)  RSP to TSP factor Crushing rate (Mg/hr)  no. of operation hour (hr) % of dust suppression  TSP emission factor (kg/Mg) % of dust suppression  TSP emission factor (kg/Mg) % of dust suppression  Emission height (m)	0.000008 from EPA AP-42, 5th ed. 8/04 ed., Sec11.19.2, Table 11.19.2-1  2.1 from EPA AP-42 5th ed. 1/95 ed., Sec 11.19.2, Table 11.19.2-1 453.6 from engineer  11 from engineer (operation hours would be from 7:00 to 12:00 and 13:00 to 19:00) 99% for typical removal efficiency for Dust Collector inside Enclosure Control Techniques for Particulate Emissions from Stationary Sources Vol. 2, Section 9.7.1.2.2  0.0015 from EPA AP-42, 5th ed. 8/04 ed., Sec11.19.2, Table 11.19.2-1 99% for typical removal efficiency for Dust Collector inside Enclosure Control Techniques for Particulate Emissions from Stationary Sources Vol. 2, Section 9.7.1.2.2  0.0027 from EPA AP-42, 5th ed. 8/04 ed., Sec11.19.2, Table 11.19.2-1 99% for typical removal efficiency for Dust Collector inside Enclosure Control Techniques for Particulate Emissions from Stationary Sources Vol. 2, Section 9.7.1.2.2  0 Overall Emission Rate for Loading Point, Screening and Crushing (With Enclosure and Dust Collector for dust suppression)
Lam Tin Works Area	Excavation, Surface Blasting and Cut-&-Cover Area  Source: LTWA (93 nos. Area Sources)	Heavy Construction Area Source (g/m <sup>2</sup> /s)  Wind erosion (g/m <sup>2</sup> /s) (For night-time only)	6.22685E-05  8.08600E-07	7.78356E-06  8.08600E-07	TSP emission factor (Mg/hectare/month of activity)  Percentage area actively operating (%) overall % of dust suppression  Emission height (m)  TSP emission factor (Mg/hectare/yr) Percentage area actively operating (%) % of dust suppression Emission height (m)	2.69 the TSP emission factor was derivated by assumed 30 working days per month from EPA AP-42, S13.2.3, 1/95 ed. 30% from engineer (conservative approach) 87.5% for watering once on active construction areas for every 1.5 working hour  0  0.85 from EPA AP-42, 5th ed., Table 11.9.4 30% from engineer (conservative approach) 0 0

**Remarks:**

Percentage of Dust Suppression by Watering is derived from the equation  $C = 100 - 0.8pd/ti$  (USEPA, Control of Open Fugitive Dust Sources, 1988)

where p = potential average hourly daytime evaporation rate, mm/h = 0.25916 ([http://www.weather.gov.hk/cis/normal/1971\\_2000/normals\\_e.htm](http://www.weather.gov.hk/cis/normal/1971_2000/normals_e.htm))

d = average hourly daytime traffic rate per hour = 3

i = application intensity, L/m<sup>2</sup> = 0.062

t = time between applications, hr = 1.5

The water intensity is an assumption used in the dust modeling only. Any potential dust impact and mitigation would be subject to actual site condition and managed by the EM&A programme during the construction stage

### Appendix 3.1 Calculations of Construction Dust Emission Rates

#### Lam Tin Works Area Dust Emission Sources (Unmitigated)

##### Point Sources

No.	Source	1-hour/24-hour TSP Assessment		Annual TSP Assessment		X co-ordinates (At centre)	Y co-ordinates (At centre)	Emission Height (metres)
		Weekday's Day-time Emission Rates (g/s)	Weekday's Night- time/Sunday or Public Holiday Emission Rates (g/s)	Weekday's Day-time Emission Rates (g/s)	Weekday's Night- time/Sunday or Public Holiday Emission Rates (g/s)			
1	BPL	1.58672E-01	0.00000E+00	1.58672E-01	0.00000E+00	841636.5	817758.0	0
2	RCR	5.31302E-03	0.00000E+00	5.31302E-03	0.00000E+00	841809.6	817952.7	0

##### Area Sources

No.	Source	1-hour/24-hour TSP Assessment		Annual TSP Assessment		X co-ordinates (At centre)	Y co-ordinates (At centre)	X dimension (metres)	Y dimension (metres)	Emission Height (metres)	Rotation angle(°)
		Weekday's Day-time Emission Rates (g/m <sup>2</sup> /s)	Weekday's Night- time/Sunday or Public Holiday's Emission Rates (g/m <sup>2</sup> /s)	Weekday's Day-time Emission Rates (g/m <sup>2</sup> /s)	Weekday's Night- time/Sunday or Public Holiday's Emission Rates (g/m <sup>2</sup> /s)						
1		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841760.5	817843.5	15.9	30.4	0	4.04
2		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841791.5	817843.4	45.9	34.9	0	4.04
3		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841769.8	817879.9	28.8	40.9	0	4.04
4		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841804.1	817882.3	40.0	40.9	0	4.04
5		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841831.7	817890.0	16.1	29.4	0	4.04
6		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841784.5	817921.5	25.8	40.0	0	4.04
7		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841817.3	817923.8	40.0	40.0	0	4.04
8		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841848.9	817916.0	21.9	20.0	0	4.04
9		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841858.4	817936.7	43.8	20.0	0	4.04
10		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841781.5	817961.4	40.0	40.0	0	4.04
11		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841821.4	817964.2	40.0	40.0	0	4.04
12		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841861.3	817967.0	40.0	40.0	0	4.04
13		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841893.1	817969.3	23.6	40.0	0	4.04
14		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841918.1	817981.8	28.1	18.6	0	4.04
15		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841766.4	818000.7	45.5	40.3	0	4.04
16		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841797.3	818002.9	16.4	40.3	0	4.04
17		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841817.2	818004.3	23.6	40.3	0	4.04
18		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841849.0	818006.5	40.0	40.3	0	4.04
19		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841888.9	818009.4	40.0	40.3	0	4.04
20		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841928.8	818012.2	40.0	40.3	0	4.04
21		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841968.4	818018.4	40.0	33.5	0	4.04
22		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842007.8	818028.2	40.0	19.5	0	4.04
23		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841751.9	818043.7	35.1	47.5	0	4.04
24		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841777.4	818041.9	15.5	40.4	0	4.04
25		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841797.4	818043.3	24.5	40.4	0	4.04
26		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841829.5	818045.6	40.0	40.4	0	4.04
27		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841869.4	818048.4	40.0	40.4	0	4.04
28		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841909.3	818051.2	40.0	40.4	0	4.04
29		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841949.2	818054.0	40.0	40.4	0	4.04
30		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841989.1	818056.9	40.0	40.4	0	4.04
31		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842029.0	818059.7	40.0	40.4	0	4.04
32		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842068.7	818065.5	40.0	34.3	0	4.04
33		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842108.2	818074.3	40.0	22.4	0	4.04
34		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841772.9	818067.6	10.1	11.5	0	4.04
35		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841785.3	818072.0	15.3	18.5	0	4.04
36		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841782.5	818092.2	18.1	22.2	0	4.04
37		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841801.6	818084.2	18.8	40.7	0	4.04
38		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841830.9	818086.3	40.0	40.7	0	4.04
39		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841870.8	818089.1	40.0	40.7	0	4.04
40		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841910.7	818092.0	40.0	40.7	0	4.04
41		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841950.6	818094.8	40.0	40.7	0	4.04
42		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841990.5	818097.6	40.0	40.7	0	4.04
43		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842030.4	818100.4	40.0	40.7	0	4.04
44		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842070.3	818103.2	40.0	40.7	0	4.04

45		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842110.2	818106.1	40.0	40.7	0	4.04
46		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842150.1	818108.9	40.0	40.7	0	4.04
47	LTWA	2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841777.7	818123.1	14.6	40.3	0	4.04
48		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841798.5	818124.6	27.2	40.3	0	4.04
49		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841832.1	818127.0	40.0	40.3	0	4.04
50		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841872.0	818129.8	40.0	40.3	0	4.04
51		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841911.9	818132.6	40.0	40.3	0	4.04
52		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841951.8	818135.5	40.0	40.3	0	4.04
53		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841991.7	818138.3	40.0	40.3	0	4.04
54		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842031.6	818141.1	40.0	40.3	0	4.04
55		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842071.5	818143.9	40.0	40.3	0	4.04
56		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842111.4	818146.7	40.0	40.3	0	4.04
57		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842141.5	818148.9	20.3	40.3	0	4.04
58		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842164.3	818150.5	25.5	40.3	0	4.04
59		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841803.7	818176.9	33.7	21.5	0	4.04
60		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841798.7	818155.3	46.8	20.9	0	4.04
61		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841842.0	818158.4	40.0	20.9	0	4.04
62		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841840.4	818181.2	40.0	24.8	0	4.04
63		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841881.7	818164.7	40.0	28.1	0	4.04
64		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841879.9	818189.5	40.0	21.5	0	4.04
65		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841921.3	818170.8	40.0	34.5	0	4.04
66		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841919.5	818196.3	40.0	16.7	0	4.04
67		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841961.2	818173.6	40.0	34.5	0	4.04
68		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841959.4	818199.1	40.0	16.7	0	4.04
69		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842001.1	818176.4	40.0	34.5	0	4.04
70		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841999.3	818201.9	40.0	16.7	0	4.04
71		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842041.0	818179.2	40.0	34.5	0	4.04
72		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842039.2	818204.8	40.0	16.7	0	4.04
73		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842080.9	818182.0	40.0	34.5	0	4.04
74		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842079.1	818207.6	40.0	16.7	0	4.04
75		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842120.6	818187.6	40.0	40.0	0	4.04
76		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842118.2	818221.5	40.0	28.0	0	4.04
77		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842160.5	818190.4	40.0	40.0	0	4.04
78		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842158.1	818224.3	40.0	28.0	0	4.04
79		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842154.8	818245.9	43.6	15.5	0	4.04
80		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842200.0	818198.8	40.0	28.9	0	4.04
81		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842197.8	818230.1	40.0	33.9	0	4.04
82		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842226.8	818219.7	16.3	40.0	0	4.04
83		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842233.7	818180.1	24.5	40.0	0	4.04
84		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842253.7	818181.5	15.5	40.0	0	4.04
85		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	842252.1	818221.5	34.3	40.0	0	4.04
86		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841473.0	818075.8	9.2	12.3	0	77.56
87		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841452.1	818080.9	35.2	30.8	0	77.56
88		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841424.4	818091.4	26.7	27.8	0	77.56
89		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841477.7	818062.6	29.2	19.2	0	26.75
90		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841488.8	818042.0	30.4	27.7	0	26.75
91		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841378.5	818131.6	32.1	51.4	0	77.56
92		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841424.0	818121.6	32.0	41.7	0	77.56
93		2.07562E-04	2.69533E-06	6.22685E-05	0.00000E+00	841454.3	818111.1	24.7	22.1	0	77.56

### Appendix 3.1 Calculations of Construction Dust Emission Rates

#### Lam Tin Works Area Dust Emission Sources (Mitigated Tier 1)

##### Point Sources

No.	Source	1-hour/24-hour TSP Assessment		Annual TSP Assessment		X co-ordinates (At centre)	Y co-ordinates (At centre)	Emission Height (metres)
		Weekday's Day-time Emission Rates (g/s)	Weekday's Night- time/Sunday or Public Holiday Emission Rates (g/s)	Weekday's Day-time Emission Rates (g/s)	Weekday's Night- time/Sunday or Public Holiday Emission Rates (g/s)			
1	BPL	1.58672E-02	0.00000E+00	1.58672E-02	0.00000E+00	841636.5	817758.0	0
2	RCR	5.31302E-03	0.00000E+00	5.31302E-03	0.00000E+00	841809.6	817952.7	0

##### Area Sources

No.	Source	1-hour/24-hour TSP Assessment		Annual TSP Assessment		X co-ordinates (At centre)	Y co-ordinates (At centre)	X dimension (metres)	Y dimension (metres)	Emission Height (metres)	Rotation angle(°)
		Weekday's Day-time Emission Rates (g/m <sup>2</sup> /s)	Weekday's Night- time/Sunday or Public Holiday's Emission Rates (g/m <sup>2</sup> /s)	Weekday's Day-time Emission Rates (g/m <sup>2</sup> /s)	Weekday's Night- time/Sunday or Public Holiday's Emission Rates (g/m <sup>2</sup> /s)						
1		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841760.5	817843.5	15.9	30.4	0	4.04
2		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841791.5	817843.4	45.9	34.9	0	4.04
3		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841769.8	817879.9	28.8	40.9	0	4.04
4		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841804.1	817882.3	40.0	40.9	0	4.04
5		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841831.7	817890.0	16.1	29.4	0	4.04
6		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841784.5	817921.5	25.8	40.0	0	4.04
7		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841817.3	817923.8	40.0	40.0	0	4.04
8		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841848.9	817916.0	21.9	20.0	0	4.04
9		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841858.4	817936.7	43.8	20.0	0	4.04
10		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841781.5	817961.4	40.0	40.0	0	4.04
11		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841821.4	817964.2	40.0	40.0	0	4.04
12		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841861.3	817967.0	40.0	40.0	0	4.04
13		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841893.1	817969.3	23.6	40.0	0	4.04
14		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841918.1	817981.8	28.1	18.6	0	4.04
15		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841766.4	818000.7	45.5	40.3	0	4.04
16		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841797.3	818002.9	16.4	40.3	0	4.04
17		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841817.2	818004.3	23.6	40.3	0	4.04
18		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841849.0	818006.5	40.0	40.3	0	4.04
19		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841888.9	818009.4	40.0	40.3	0	4.04
20		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841928.8	818012.2	40.0	40.3	0	4.04
21		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841968.4	818018.4	40.0	33.5	0	4.04
22		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842007.8	818028.2	40.0	19.5	0	4.04
23		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841751.9	818043.7	35.1	47.5	0	4.04
24		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841777.4	818041.9	15.5	40.4	0	4.04
25		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841797.4	818043.3	24.5	40.4	0	4.04
26		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841829.5	818045.6	40.0	40.4	0	4.04
27		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841869.4	818048.4	40.0	40.4	0	4.04
28		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841909.3	818051.2	40.0	40.4	0	4.04
29		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841949.2	818054.0	40.0	40.4	0	4.04
30		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841989.1	818056.9	40.0	40.4	0	4.04
31		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842029.0	818059.7	40.0	40.4	0	4.04
32		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842068.7	818065.5	40.0	34.3	0	4.04
33		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842108.2	818074.3	40.0	22.4	0	4.04
34		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841772.9	818067.6	10.1	11.5	0	4.04
35		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841785.3	818072.0	15.3	18.5	0	4.04
36		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841782.5	818092.2	18.1	22.2	0	4.04
37		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841801.6	818084.2	18.8	40.7	0	4.04
38		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841830.9	818086.3	40.0	40.7	0	4.04
39		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841870.8	818089.1	40.0	40.7	0	4.04
40		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841910.7	818092.0	40.0	40.7	0	4.04
41		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841950.6	818094.8	40.0	40.7	0	4.04
42		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841990.5	818097.6	40.0	40.7	0	4.04
43		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842030.4	818100.4	40.0	40.7	0	4.04
44		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842070.3	818103.2	40.0	40.7	0	4.04

45		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842110.2	818106.1	40.0	40.7	0	4.04
46		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842150.1	818108.9	40.0	40.7	0	4.04
47	LTWA	2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841777.7	818123.1	14.6	40.3	0	4.04
48		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841798.5	818124.6	27.2	40.3	0	4.04
49		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841832.1	818127.0	40.0	40.3	0	4.04
50		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841872.0	818129.8	40.0	40.3	0	4.04
51		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841911.9	818132.6	40.0	40.3	0	4.04
52		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841951.8	818135.5	40.0	40.3	0	4.04
53		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841991.7	818138.3	40.0	40.3	0	4.04
54		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842031.6	818141.1	40.0	40.3	0	4.04
55		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842071.5	818143.9	40.0	40.3	0	4.04
56		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842111.4	818146.7	40.0	40.3	0	4.04
57		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842141.5	818148.9	20.3	40.3	0	4.04
58		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842164.3	818150.5	25.5	40.3	0	4.04
59		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841803.7	818176.9	33.7	21.5	0	4.04
60		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841798.7	818155.3	46.8	20.9	0	4.04
61		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841842.0	818158.4	40.0	20.9	0	4.04
62		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841840.4	818181.2	40.0	24.8	0	4.04
63		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841881.7	818164.7	40.0	28.1	0	4.04
64		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841879.9	818189.5	40.0	21.5	0	4.04
65		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841921.3	818170.8	40.0	34.5	0	4.04
66		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841919.5	818196.3	40.0	16.7	0	4.04
67		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841961.2	818173.6	40.0	34.5	0	4.04
68		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841959.4	818199.1	40.0	16.7	0	4.04
69		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842001.1	818176.4	40.0	34.5	0	4.04
70		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841999.3	818201.9	40.0	16.7	0	4.04
71		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842041.0	818179.2	40.0	34.5	0	4.04
72		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842039.2	818204.8	40.0	16.7	0	4.04
73		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842080.9	818182.0	40.0	34.5	0	4.04
74		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842079.1	818207.6	40.0	16.7	0	4.04
75		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842120.6	818187.6	40.0	40.0	0	4.04
76		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842118.2	818221.5	40.0	28.0	0	4.04
77		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842160.5	818190.4	40.0	40.0	0	4.04
78		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842158.1	818224.3	40.0	28.0	0	4.04
79		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842154.8	818245.9	43.6	15.5	0	4.04
80		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842200.0	818198.8	40.0	28.9	0	4.04
81		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842197.8	818230.1	40.0	33.9	0	4.04
82		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842226.8	818219.7	16.3	40.0	0	4.04
83		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842233.7	818180.1	24.5	40.0	0	4.04
84		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842253.7	818181.5	15.5	40.0	0	4.04
85		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842252.1	818221.5	34.3	40.0	0	4.04
86		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841473.0	818075.8	9.2	12.3	0	77.56
87		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841452.1	818080.9	35.2	30.8	0	77.56
88		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841424.4	818091.4	26.7	27.8	0	77.56
89		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841477.7	818062.6	29.2	19.2	0	26.75
90		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841488.8	818042.0	30.4	27.7	0	26.75
91		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841378.5	818131.6	32.1	51.4	0	77.56
92		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841424.0	818121.6	32.0	41.7	0	77.56
93		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841454.3	818111.1	24.7	22.1	0	77.56

### Appendix 3.1 Calculations of Construction Dust Emission Rates

Lam Tin Works Area Dust Emission Sources (Mitigated Tier 2 for ASRs CL1 and CL2)

Point Sources

No.	Source	1-hour/24-hour TSP Assessment		Annual TSP Assessment		X co-ordinates (At centre)	Y co-ordinates (At centre)	Emission Height (metres)
		Weekday's Day-time Emission Rates (g/s)	Weekday's Night-time/Sunday or Public Holiday Emission Rates (g/s)	Weekday's Day-time Emission Rates (g/s)	Weekday's Night-time/Sunday or Public Holiday Emission Rates (g/s)			
1	BPL	1.58672E-02	0.00000E+00	1.58672E-02	0.00000E+00	841636.5	817758.0	0
2	RCR	5.31302E-03	0.00000E+00	5.31302E-03	0.00000E+00	841809.6	817952.7	0

Area Sources

No.	Source	1-hour/24-hour TSP Assessment		Annual TSP Assessment		X co-ordinates (At centre)	Y co-ordinates (At centre)	X dimension (metres)	Y dimension (metres)	Emission Height (metres)	Rotation angle(°)
		Weekday's Day-time Emission Rates (g/m <sup>2</sup> /s)	Weekday's Night-time/Sunday or Public Holiday's Emission Rates (g/m <sup>2</sup> /s)	Weekday's Day-time Emission Rates (g/m <sup>2</sup> /s)	Weekday's Night-time/Sunday or Public Holiday's Emission Rates (g/m <sup>2</sup> /s)						
1	LTWA	2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841760.5	817843.5	15.9	30.4	0	4.04
2		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841791.5	817843.4	45.9	34.9	0	4.04
3		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841769.8	817879.9	28.8	40.9	0	4.04
4		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841804.1	817882.3	40.0	40.9	0	4.04
5		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841831.7	817890.0	16.1	29.4	0	4.04
6		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841784.5	817921.5	25.8	40.0	0	4.04
7		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841817.3	817923.8	40.0	40.0	0	4.04
8		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841781.5	817961.4	40.0	40.0	0	4.04
9		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841821.4	817964.2	40.0	40.0	0	4.04
10		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841766.4	818000.7	45.5	40.3	0	4.04
11		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841797.3	818002.9	16.4	40.3	0	4.04
12		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841817.2	818004.3	23.6	40.3	0	4.04
13		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841849.0	818006.5	40.0	40.3	0	4.04
14		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841751.9	818043.7	35.1	47.5	0	4.04
15		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841777.4	818041.9	15.5	40.4	0	4.04
16		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841797.4	818043.3	24.5	40.4	0	4.04
17		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841829.5	818045.6	40.0	40.4	0	4.04
18		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841772.9	818067.6	10.1	11.5	0	4.04
19		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841785.3	818072.0	15.3	18.5	0	4.04
20		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841782.5	818092.2	18.1	22.2	0	4.04
21		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841801.6	818084.2	18.8	40.7	0	4.04
22		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841830.9	818086.3	40.0	40.7	0	4.04
23		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841777.7	818123.1	14.6	40.3	0	4.04
24		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841798.5	818124.6	27.2	40.3	0	4.04
25		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841832.1	818127.0	40.0	40.3	0	4.04
26		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841803.7	818176.9	33.7	21.5	0	4.04
27		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841798.7	818155.3	46.8	20.9	0	4.04
28		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841842.0	818158.4	40.0	20.9	0	4.04
29		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841840.4	818181.2	40.0	24.8	0	4.04
30		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841869.4	818048.4	40.0	40.4	0	4.04
31		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841870.8	818089.1	40.0	40.7	0	4.04
32		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841872.0	818129.8	40.0	40.3	0	4.04
33		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841473.0	818075.8	9.2	12.3	0	77.56
34		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841452.1	818080.9	35.2	30.8	0	77.56
35		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841424.4	818091.4	26.7	27.8	0	77.56
36		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841477.7	818062.6	29.2	19.2	0	26.75
37		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841488.8	818042.0	30.4	27.7	0	26.75
38		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841378.5	818131.6	32.1	51.4	0	77.56
39		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841424.0	818121.6	32.0	41.7	0	77.56
40		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841454.3	818111.1	24.7	22.1	0	77.56



### Appendix 3.1 Calculations of Construction Dust Emission Rates

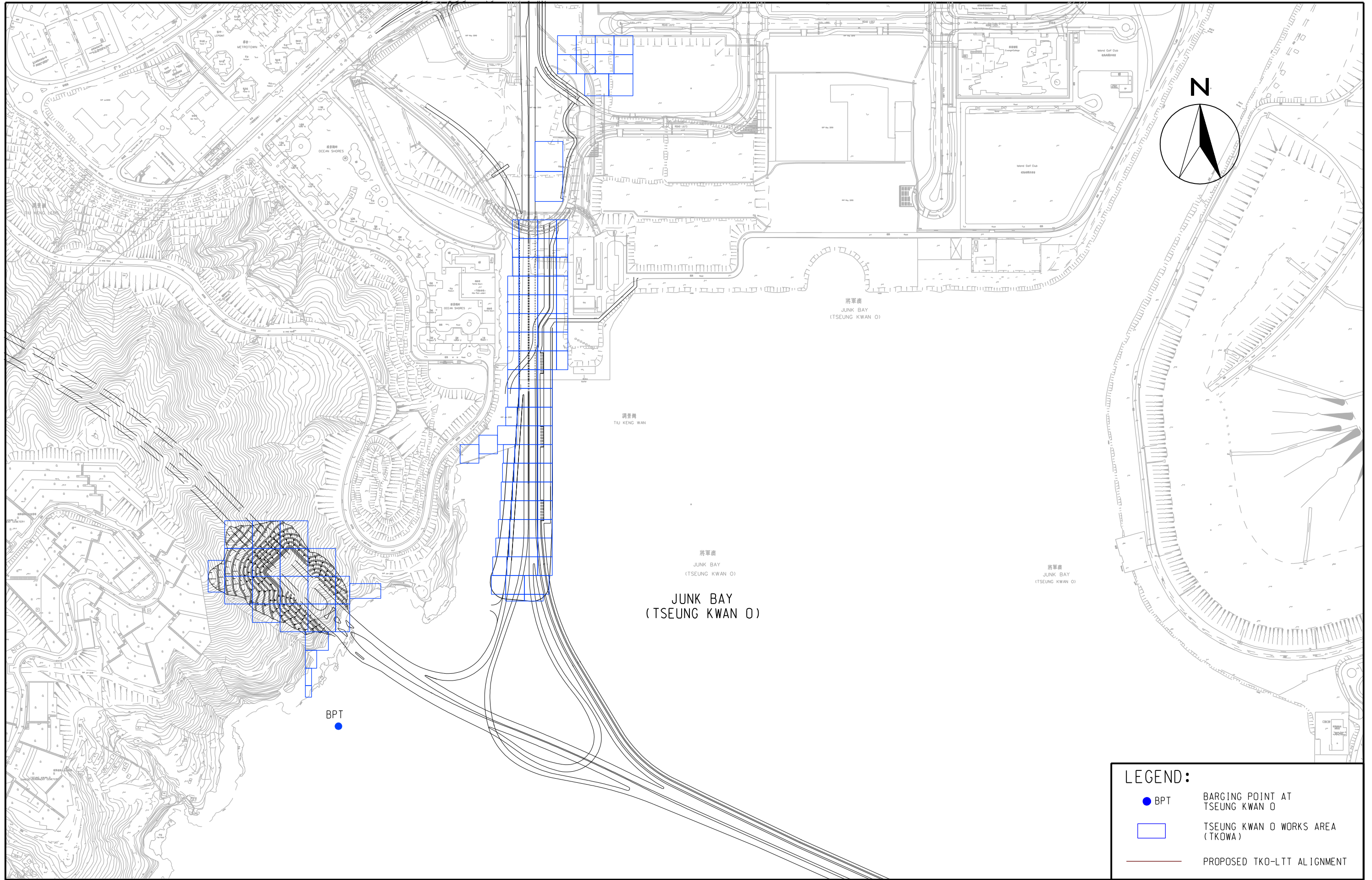
Lam Tin Works Area Dust Emission Sources (Mitigated Tier 2 for ASRs CL8 and CL9)

Point Sources

No.	Source	1-hour/24-hour TSP Assessment		Annual TSP Assessment		X co-ordinates (At centre)	Y co-ordinates (At centre)	Emission Height (metres)
		Weekday's Day-time Emission Rates (g/s)	Weekday's Night-time/Sunday or Public Holiday Emission Rates (g/s)	Weekday's Day-time Emission Rates (g/s)	Weekday's Night-time/Sunday or Public Holiday Emission Rates (g/s)			
1	BPL	1.58672E-02	0.00000E+00	1.58672E-02	0.00000E+00	841636.5	817758.0	0
2	RCR	5.31302E-03	0.00000E+00	5.31302E-03	0.00000E+00	841809.6	817952.7	0

Area Sources

No.	Source	1-hour/24-hour TSP Assessment		Annual TSP Assessment		X co-ordinates (At centre)	Y co-ordinates (At centre)	X dimension (metres)	Y dimension (metres)	Emission Height (metres)	Rotation angle(°)
		Weekday's Day-time Emission Rates (g/m <sup>2</sup> /s)	Weekday's Night-time/Sunday or Public Holiday's Emission Rates (g/m <sup>2</sup> /s)	Weekday's Day-time Emission Rates (g/m <sup>2</sup> /s)	Weekday's Night-time/Sunday or Public Holiday's Emission Rates (g/m <sup>2</sup> /s)						
1	LTWA	2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842108.2	818074.3	40.0	22.4	0	4.04
2		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842110.2	818106.1	40.0	40.7	0	4.04
3		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842150.1	818108.9	40.0	40.7	0	4.04
4		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842071.5	818143.9	40.0	40.3	0	4.04
5		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842111.4	818146.7	40.0	40.3	0	4.04
6		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842141.5	818148.9	20.3	40.3	0	4.04
7		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842164.3	818150.5	25.5	40.3	0	4.04
8		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842080.9	818182.0	40.0	34.5	0	4.04
9		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842079.1	818207.6	40.0	16.7	0	4.04
10		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842120.6	818187.6	40.0	40.0	0	4.04
11		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842118.2	818221.5	40.0	28.0	0	4.04
12		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842160.5	818190.4	40.0	40.0	0	4.04
13		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842158.1	818224.3	40.0	28.0	0	4.04
14		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842154.8	818245.9	43.6	15.5	0	4.04
15		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842200.0	818198.8	40.0	28.9	0	4.04
16		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842197.8	818230.1	40.0	33.9	0	4.04
17		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842226.8	818219.7	16.3	40.0	0	4.04
18		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842233.7	818180.1	24.5	40.0	0	4.04
19		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842253.7	818181.5	15.5	40.0	0	4.04
20		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842252.1	818221.5	34.3	40.0	0	4.04
21		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842068.7	818065.5	40.0	34.3	0	4.04
22		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842070.3	818103.2	40.0	40.7	0	4.04
23		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842030.4	818100.4	40.0	40.7	0	4.04
24		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842031.6	818141.1	40.0	40.3	0	4.04
25		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842041.0	818179.2	40.0	34.5	0	4.04
26		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	842039.2	818204.8	40.0	16.7	0	4.04
27		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841473.0	818075.8	9.2	12.3	0	77.56
28		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841452.1	818080.9	35.2	30.8	0	77.56
29		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841424.4	818091.4	26.7	27.8	0	77.56
30		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841477.7	818062.6	29.2	19.2	0	26.75
31		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841488.8	818042.0	30.4	27.7	0	26.75
32		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841378.5	818131.6	32.1	51.4	0	77.56
33		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841424.0	818121.6	32.0	41.7	0	77.56
34		2.59452E-05	2.69533E-06	7.78356E-06	0.00000E+00	841454.3	818111.1	24.7	22.1	0	77.56



**LEGEND:**

- BPT BARGING POINT AT TSEUNG KWAN O
- TSEUNG KWAN O WORKS AREA (TKOWA)
- PROPOSED TKO-LTT ALIGNMENT

AGREEMENT NO. CE 42/2008 (CE)  
 TSUENG KWAN O - LAM TIN TUNNEL AND ASSOCIATED WORKS - INVESTIGATION  
 LOCATIONS OF DUST EMISSION SOURCES (TSEUNG KWAN O)

SCALE	A3 1:5000	DATE	NOV 2012
CHECK	-	DRAWN	-
JOB No.	60097677	DRAWING No.	APPENDIX 3.1
		REV	-



\$USERS\$  
 \$TIMES\$  
 \$DATES\$  
 \$FILE\$

### Appendix 3.1 Calculations of Construction Dust Emission Rates

#### Emission Rates for 1-hour & 24-hr Average (Tseung Kwan O Area)

Location	Source	Emission Factors	Unmitigated Emission Rates	Mitigated Emission Rates	Parameters	Remarks
Tseung Kwan O Barging Point	Barging Point for Tseung Kwan O Area  Source: BPT (1 Point Source)	Unloading of spoils to barge (g/s)	7.02286E-02	7.02286E-03	TSP emission factor (kg/Mg) Particle size multiplier, k Material moisture content, M (%) Average wind speed, U (m/s) E (kg/Mg)  Maximum total handling capacity (m <sup>3</sup> /day) Material density (Mg/m <sup>3</sup> ) Maximum total handling capacity (Mg/day)  no. of operation hour (hr) % of dust suppression  Emission height (m)	$E = k \cdot (0.0016)^{-1} \cdot [(U/2.2)^{1.3} / (M/2)^{1.4}]$ from EPA AP-42, Section 13.2.4, 11/06 ed. 0.74 from EPA AP-42, S13.2.4, particle size < 30 um, 11/06 ed. 3% from engineer 2.87 from Hong Kong Observatory Sai Kung Station(Yr2009) 9.48E-04 calculated  1292 from engineer 2.27 from engineer 2933 from engineer  11 from engineer (operation hours would be from 7:00 to 12:00 and 13:00 to 19:00) 90% installation of flexible curtain and shelter with water spray at discharge point from EPA Control Techniques for Particulate Emissions from Stationary Sources - Vol. 2, Sep 1982, Table 9.12-11  0
Tseung Kwan O Works Area	Excavation, Surface Blasting and Cut-&-Cover Area  Source: TKOWA (106 nos. Area Sources)	Heavy Construction Area Source (g/m <sup>2</sup> /s)  Wind erosion (g/m <sup>2</sup> /s) (For night-time only)	2.07562E-04  2.69533E-06	2.59452E-05  2.69533E-06	TSP emission factor (Mg/hectare/month of activity)  Percentage area actively operating overall % of dust suppression Emission height (m)  TSP emission factor (Mg/hectare/yr) Percentage area actively operating % of dust suppression Emission height (m)	2.69 the TSP emission factor was derived by assumed 30 working days per month from EPA AP-42, S13.2.3, 1/95 ed. 100% from engineer (conservative approach) 87.5% for watering once on active construction areas for every 1.5 working hour 0  0.85 AP-42, 5th ed., Table 11.9.4 100% from engineer (conservative approach) 0 0

**Remarks:**

Percentage of Dust Suppression by Watering is derived from the equation  $C = 100 - 0.8pd/t$  (USEPA, Control of Open Fugitive Dust Sources, 1988)

where p = potential average hourly daytime evaporation rate, mm/h = 0.25916 ([http://www.weather.gov.hk/cis/normal/1971\\_2000/normals\\_e.htm](http://www.weather.gov.hk/cis/normal/1971_2000/normals_e.htm))

d = average hourly daytime traffic rate per hour = 3

i = application intensity, L/m<sup>2</sup> = 0.062

t = time between applications, hr = 1.5

The water intensity is an assumption used in the dust modeling only. Any potential dust impact and mitigation would be subject to actual site condition and managed by the EM&A programme during the construction stage

### Appendix 3.1 Calculations of Construction Dust Emission Rates

#### Emission Rates for Annual Average (Tseung Kwan O Area)

Location	Source	Emission Factors	Unmitigated Emission Rates	Mitigated Emission Rates	Parameters	Remarks
Tseung Kwan O Barging Point	Barging Point for Tseung Kwan O Area  Source: BPT (1 Point Source)	Unloading of spoils to barge (g/s)	7.02286E-02	7.02286E-03	TSP emission factor (kg/Mg) Particle size multiplier, k Material moisture content, M Average wind speed, U (m/s) E (kg/Mg)  Maximum total handling capacity (m <sup>3</sup> /day) Material density (Mg/m <sup>3</sup> ) Maximum total handling capacity (Mg/day)  no. of operation hour (hr) % of dust suppression  Emission height (m)	$E = k \cdot (0.0016)^{-1} \cdot [(U/2.2)^{1.3} / (M/2)^{1.4}]$ from EPA AP-42, Section 13.2.4, 11/06 ed. 0.74 from EPA AP-42, S13.2.4, particle size < 30 um, 11/06 ed. 3% from engineer 2.87 from Hong Kong Observatory Sai Kung Station(Yr2009) 9.48E-04 calculated  1292 from engineer 2.27 from engineer 2933 from engineer  11 from engineer (operation hours would be from 7:00 to 12:00 and 13:00 to 19:00) 90% installation of flexible curtain and shelter with water spray at discharge point from EPA Control Techniques for Particulate Emissions from Stationary Sources - Vol. 2, Sep 1982, Table 9.12-11  0
Tseung Kwan O Works Area	Excavation, Surface Blasting and Cut-&Cover Area  Source: TKOWA (106 nos. Area Sources)	Heavy Construction Area Source (g/m <sup>2</sup> /s)  Wind erosion (g/m <sup>2</sup> /s) (For night-time only)	6.22685E-05  8.08600E-07	7.78356E-06  8.08600E-07	TSP emission factor (Mg/hectare/month of activity)  Percentage area actively operating overall % of dust suppression  Emission height (m)  TSP emission factor (Mg/hectare/yr) Percentage area actively operating % of dust suppression Emission height (m)	2.69 the TSP emission factor was derived by assumed 30 working days per month from EPA AP-42, S13.2.3, 1/95 ed. 30% from engineer (in average, only 30% of the area will be exposed within the whole year) 87.5% for watering once on active construction areas for every 1.5 working hour  0  0.85 from EPA AP-42, 5th ed., Table 11.9.4 30% from engineer (in average, only 30% of the area will be exposed within the whole year) 0 0

**Remarks:**

Percentage of Dust Suppression by Watering is derived from the equation  $C = 100 - 0.8pdt/i$  (USEPA, Control of Open Fugitive Dust Sources, 1988)

where p = potential average hourly daytime evaporation rate, mm/h = 0.25916 ([http://www.weather.gov.hk/cis/normal/1971\\_2000/normals\\_e.htm](http://www.weather.gov.hk/cis/normal/1971_2000/normals_e.htm))

d = average hourly daytime traffic rate per hour = 3

i = application intensity, L/m<sup>2</sup> = 0.062

t = time between applications, hr = 1.5

The water intensity is an assumption used in the dust modeling only. Any potential dust impact and mitigation would be subject to actual site condition and managed by the EM&A programme during the construction stage

### Appendix 3.1 Calculations of Construction Dust Emission Rates

Tseung Kwan O Works Area Dust Emission Sources (Unmitigated)

Point Sources

No.	Source	1-hour/24-hour TSP Assessment		Annual TSP Assessment		X co-ordinates (At centre)	Y co-ordinates (At centre)	Emission Height (metres)
		Weekday's Day-time Emission Rates (g/s)	Weekday's Night-time/Sunday or Public Holiday Emission Rates (g/s)	Weekday's Day-time Emission Rates (g/s)	Weekday's Night-time/Sunday or Public Holiday Emission Rates (g/s)			
1	BPT	7.02286E-02	0.00000E+00	7.02286E-02	0.00000E+00	844116.1	817417.2	0.0

Area Sources

No.	Source	1-hour/24-hour TSP Assessment		Annual TSP Assessment		X co-ordinates (At centre)	Y co-ordinates (At centre)	X dimension (metres)	Y dimension (metres)	Emission Height (metres)	Rotation angle(°)
		Weekday's Day-time Emission Rates (g/m <sup>2</sup> /s)	Weekday's Night-time/Sunday or Public Holiday's Emission Rates (g/m <sup>2</sup> /s)	Weekday's Day-time Emission Rates (g/m <sup>2</sup> /s)	Weekday's Night-time/Sunday or Public Holiday's Emission Rates (g/m <sup>2</sup> /s)						
1		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844371.9	818134.1	9.5	27.0	0	0
2		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844371.9	818107.1	9.5	27.0	0	0
3		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844371.9	818080.1	9.5	27.0	0	0
4		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844438.9	818134.1	16.4	27.0	0	0
5		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844417.2	818134.1	27.0	27.0	0	0
6		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844438.9	818107.1	16.4	27.0	0	0
7		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844417.2	818107.1	27.0	27.0	0	0
8		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844438.9	818080.1	16.4	27.0	0	0
9		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844417.2	818080.1	27.0	27.0	0	0
10		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844398.0	817602.7	27.0	9.8	0	0
11		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844371.0	817602.7	27.0	9.8	0	0
12		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844402.2	817621.1	35.5	27.0	0	0
13		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844371.0	817621.1	27.0	27.0	0	0
14		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844347.1	817621.1	20.7	27.0	0	0
15		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844348.9	817648.1	20.4	27.0	0	0
16		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844381.4	817648.1	44.6	27.0	0	0
17		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844414.2	817648.1	21.0	27.0	0	0
18		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844414.2	817675.1	21.0	27.0	0	0
19		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844382.8	817675.1	41.8	27.0	0	0
20		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844352.5	817675.1	18.7	27.0	0	0
21		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844383.5	817702.1	40.2	27.0	0	0
22		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844414.2	817702.1	21.0	27.0	0	0
23		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844414.2	817729.1	21.0	27.0	0	0
24		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844384.6	817729.1	38.1	27.0	0	0
25		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844385.5	817756.1	36.2	27.0	0	0
26		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844414.2	817756.1	21.0	27.0	0	0
27		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844414.2	817783.1	21.0	27.0	0	0
28		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844386.4	817783.1	34.5	27.0	0	0
29		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844355.2	817702.1	16.4	27.0	0	0
30		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844357.4	817729.1	16.4	27.0	0	0
31		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844359.2	817756.1	16.4	27.0	0	0
32		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844361.0	817783.1	16.4	27.0	0	0
33		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844414.2	817810.1	21.0	27.0	0	0
34		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844387.1	817810.1	33.1	27.0	0	0
35		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844362.4	817810.1	16.4	27.0	0	0
36		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844332.2	817823.6	27.0	27.0	0	0
37		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844305.2	817810.1	27.0	27.0	0	0
38		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844414.2	817837.1	21.0	27.0	0	0
39		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844388.2	817837.1	30.9	27.0	0	0
40		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844359.2	817837.1	27.0	27.0	0	0
41		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844414.2	817864.1	21.0	27.0	0	0
42		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844388.8	817864.1	29.7	27.0	0	0
43		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844365.8	817864.1	16.4	27.0	0	0
44		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844414.2	817891.1	21.0	27.0	0	0
45		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844390.2	817891.1	27.0	27.0	0	0

46		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844368.5	817891.1	16.4	27.0	0	0
47		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844414.2	817918.1	21.0	27.0	0	0
48		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844390.2	817918.1	27.0	27.0	0	0
49		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844368.5	817918.1	16.4	27.0	0	0
50		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844390.2	817945.1	27.0	27.0	0	0
51		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844368.5	817945.1	16.4	27.0	0	0
52		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844368.5	817972.1	16.4	27.0	0	0
53	TKOWA	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844390.2	817972.1	27.0	27.0	0	0
54		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844417.2	817945.1	27.0	27.0	0	0
55		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844417.2	817972.1	27.0	27.0	0	0
56		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844438.9	817945.1	16.4	27.0	0	0
57		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844438.9	817972.1	16.4	27.0	0	0
58		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844438.9	817999.1	16.4	27.0	0	0
59		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844417.2	817999.1	27.0	27.0	0	0
60		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844390.2	817999.1	27.0	27.0	0	0
61		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844368.5	817999.1	16.4	27.0	0	0
62		2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844438.9	818026.1	16.4	27.0	0	0
63	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844417.2	818026.1	27.0	27.0	0	0	
64	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844390.2	818026.1	27.0	27.0	0	0	
65	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844368.5	818026.1	16.4	27.0	0	0	
66	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844438.9	818053.1	16.4	27.0	0	0	
67	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844417.2	818053.1	27.0	27.0	0	0	
68	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844390.2	818053.1	27.0	27.0	0	0	
69	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844368.5	818053.1	16.4	27.0	0	0	
70	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844390.2	818080.1	27.0	27.0	0	0	
71	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844390.2	818107.1	27.0	27.0	0	0	
72	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844390.2	818134.1	27.0	27.0	0	0	
73	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844154.7	817612.4	44.9	21.4	122	0	
74	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844085.0	817540.2	33.2	26.8	0	0	
75	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844076.5	817513.8	16.2	25.9	0	0	
76	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844072.8	817488.3	8.7	25.1	0	0	
77	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844072.8	817467.5	8.7	16.6	0	0	
78	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844011.9	817653.6	40.0	40.0	0	0	
79	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844091.9	817573.6	40.0	39.9	0	0	
80	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844091.9	817613.6	39.9	40.0	0	0	
81	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844122.1	817573.6	20.3	40.1	0	0	
82	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844122.1	817613.6	20.4	40.0	0	0	
83	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844011.9	817613.6	40.0	40.0	0	0	
84	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	843972.0	817613.6	40.0	40.0	0	0	
85	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844051.9	817573.6	40.0	40.0	0	0	
86	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844012.0	817580.3	40.0	26.6	0	0	
87	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844051.9	817613.6	40.0	40.0	0	0	
88	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844051.9	817653.6	40.0	40.1	0	0	
89	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844091.9	817653.6	39.9	40.1	0	0	
90	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844051.9	817693.6	40.0	40.0	0	0	
91	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844011.9	817693.6	40.0	40.0	0	0	
92	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	843972.0	817653.6	40.0	40.0	0	0	
93	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	843939.9	817633.6	24.0	45.8	0	0	
94	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	843971.9	817693.6	40.0	40.0	0	0	
95	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844523.6	818342.4	34.8	31.7	0	0	
96	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844488.7	818342.4	34.8	31.7	0	0	
97	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844527.4	818372.0	27.2	27.5	0	0	
98	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844527.4	818399.6	27.2	27.5	0	0	
99	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844500.2	818372.0	27.2	27.5	0	0	
100	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844500.2	818399.6	27.2	27.5	0	0	
101	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844473.0	818372.0	27.2	27.5	0	0	
102	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844473.0	818399.6	27.2	27.5	0	0	
103	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844445.7	818372.0	27.2	27.5	0	0	
104	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844445.7	818399.6	27.2	27.5	0	0	
105	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844420.0	818239.0	40.0	43.3	0	0	
106	2.07562E-04	2.69533E-06	6.22685E-05	8.08600E-07	844420.0	818195.8	40.0	43.3	0	0	

### Appendix 3.1 Calculations of Construction Dust Emission Rates

Tseung Kwan O Works Area Dust Emission Sources (Mitigated)

Point Sources

No.	Source	1-hour/24-hour TSP Assessment		Annual TSP Assessment		X co-ordinates (At centre)	Y co-ordinates (At centre)	Emission Height (metres)
		Weekday's Day-time Emission Rates (g/s)	Weekday's Night-time/Sunday or Public Holiday Emission Rates (g/s)	Weekday's Day-time Emission Rates (g/s)	Weekday's Night-time/Sunday or Public Holiday Emission Rates (g/s)			
1	BPT	7.02286E-03	0.00000E+00	7.02286E-03	0.00000E+00	844116.1	817417.2	0.0

Area Sources

No.	Source	1-hour/24-hour TSP Assessment		Annual TSP Assessment		X co-ordinates (At centre)	Y co-ordinates (At centre)	X dimension (metres)	Y dimension (metres)	Emission Height (metres)	Rotation angle(°)
		Weekday's Day-time Emission Rates (g/m <sup>2</sup> /s)	Weekday's Night-time/Sunday or Public Holiday's Emission Rates (g/m <sup>2</sup> /s)	Weekday's Day-time Emission Rates (g/m <sup>2</sup> /s)	Weekday's Night-time/Sunday or Public Holiday's Emission Rates (g/m <sup>2</sup> /s)						
1		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844371.9	818134.1	9.5	27.0	0	0
2		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844371.9	818107.1	9.5	27.0	0	0
3		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844371.9	818080.1	9.5	27.0	0	0
4		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844438.9	818134.1	16.4	27.0	0	0
5		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844417.2	818134.1	27.0	27.0	0	0
6		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844438.9	818107.1	16.4	27.0	0	0
7		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844417.2	818107.1	27.0	27.0	0	0
8		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844438.9	818080.1	16.4	27.0	0	0
9		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844417.2	818080.1	27.0	27.0	0	0
10		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844398.0	817602.7	27.0	9.8	0	0
11		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844371.0	817602.7	27.0	9.8	0	0
12		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844402.2	817621.1	35.5	27.0	0	0
13		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844371.0	817621.1	27.0	27.0	0	0
14		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844347.1	817621.1	20.7	27.0	0	0
15		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844348.9	817648.1	20.4	27.0	0	0
16		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844381.4	817648.1	44.6	27.0	0	0
17		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844414.2	817648.1	21.0	27.0	0	0
18		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844414.2	817675.1	21.0	27.0	0	0
19		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844382.8	817675.1	41.8	27.0	0	0
20		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844352.5	817675.1	18.7	27.0	0	0
21		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844383.5	817702.1	40.2	27.0	0	0
22		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844414.2	817702.1	21.0	27.0	0	0
23		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844414.2	817729.1	21.0	27.0	0	0
24		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844384.6	817729.1	38.1	27.0	0	0
25		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844385.5	817756.1	36.2	27.0	0	0
26		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844414.2	817756.1	21.0	27.0	0	0
27		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844414.2	817783.1	21.0	27.0	0	0
28		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844386.4	817783.1	34.5	27.0	0	0
29		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844355.2	817702.1	16.4	27.0	0	0
30		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844357.4	817729.1	16.4	27.0	0	0
31		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844359.2	817756.1	16.4	27.0	0	0
32		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844361.0	817783.1	16.4	27.0	0	0
33		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844414.2	817810.1	21.0	27.0	0	0
34		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844387.1	817810.1	33.1	27.0	0	0
35		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844362.4	817810.1	16.4	27.0	0	0
36		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844332.2	817823.6	27.0	27.0	0	0
37		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844305.2	817810.1	27.0	27.0	0	0
38		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844414.2	817837.1	21.0	27.0	0	0
39		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844388.2	817837.1	30.9	27.0	0	0
40		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844359.2	817837.1	27.0	27.0	0	0
41		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844414.2	817864.1	21.0	27.0	0	0
42		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844388.8	817864.1	29.7	27.0	0	0
43		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844365.8	817864.1	16.4	27.0	0	0
44		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844414.2	817891.1	21.0	27.0	0	0
45		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844390.2	817891.1	27.0	27.0	0	0

46		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844368.5	817891.1	16.4	27.0	0	0
47		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844414.2	817918.1	21.0	27.0	0	0
48		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844390.2	817918.1	27.0	27.0	0	0
49		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844368.5	817918.1	16.4	27.0	0	0
50		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844390.2	817945.1	27.0	27.0	0	0
51		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844368.5	817945.1	16.4	27.0	0	0
52		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844368.5	817972.1	16.4	27.0	0	0
53	TKOWA	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844390.2	817972.1	27.0	27.0	0	0
54		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844417.2	817945.1	27.0	27.0	0	0
55		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844417.2	817972.1	27.0	27.0	0	0
56		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844438.9	817945.1	16.4	27.0	0	0
57		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844438.9	817972.1	16.4	27.0	0	0
58		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844438.9	817999.1	16.4	27.0	0	0
59		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844417.2	817999.1	27.0	27.0	0	0
60		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844390.2	817999.1	27.0	27.0	0	0
61		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844368.5	817999.1	16.4	27.0	0	0
62		2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844438.9	818026.1	16.4	27.0	0	0
63	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844417.2	818026.1	27.0	27.0	0	0	
64	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844390.2	818026.1	27.0	27.0	0	0	
65	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844368.5	818026.1	16.4	27.0	0	0	
66	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844438.9	818053.1	16.4	27.0	0	0	
67	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844417.2	818053.1	27.0	27.0	0	0	
68	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844390.2	818053.1	27.0	27.0	0	0	
69	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844368.5	818053.1	16.4	27.0	0	0	
70	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844390.2	818080.1	27.0	27.0	0	0	
71	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844390.2	818107.1	27.0	27.0	0	0	
72	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844390.2	818134.1	27.0	27.0	0	0	
73	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844154.7	817612.4	44.9	21.4	122	0	
74	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844085.0	817540.2	33.2	26.8	0	0	
75	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844076.5	817513.8	16.2	25.9	0	0	
76	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844072.8	817488.3	8.7	25.1	0	0	
77	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844072.8	817467.5	8.7	16.6	0	0	
78	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844011.9	817653.6	40.0	40.0	0	0	
79	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844091.9	817573.6	40.0	39.9	0	0	
80	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844091.9	817613.6	39.9	40.0	0	0	
81	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844122.1	817573.6	20.3	40.1	0	0	
82	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844122.1	817613.6	20.4	40.0	0	0	
83	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844011.9	817613.6	40.0	40.0	0	0	
84	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	843972.0	817613.6	40.0	40.0	0	0	
85	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844051.9	817573.6	40.0	40.0	0	0	
86	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844012.0	817580.3	40.0	26.6	0	0	
87	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844051.9	817613.6	40.0	40.0	0	0	
88	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844051.9	817653.6	40.0	40.1	0	0	
89	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844091.9	817653.6	39.9	40.1	0	0	
90	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844051.9	817693.6	40.0	40.0	0	0	
91	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844011.9	817693.6	40.0	40.0	0	0	
92	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	843972.0	817653.6	40.0	40.0	0	0	
93	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	843939.9	817633.6	24.0	45.8	0	0	
94	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	843971.9	817693.6	40.0	40.0	0	0	
95	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844523.6	818342.4	34.8	31.7	0	0	
96	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844488.7	818342.4	34.8	31.7	0	0	
97	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844527.4	818372.0	27.2	27.5	0	0	
98	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844527.4	818399.6	27.2	27.5	0	0	
99	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844500.2	818372.0	27.2	27.5	0	0	
100	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844500.2	818399.6	27.2	27.5	0	0	
101	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844473.0	818372.0	27.2	27.5	0	0	
102	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844473.0	818399.6	27.2	27.5	0	0	
103	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844445.7	818372.0	27.2	27.5	0	0	
104	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844445.7	818399.6	27.2	27.5	0	0	
105	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844420.0	818239.0	40.0	43.3	0	0	
106	2.59452E-05	2.69533E-06	7.78356E-06	8.08600E-07	844420.0	818195.8	40.0	43.3	0	0	



### Appendix 3.1 Calculations of Construction Dust Emission Rates

#### Justification of Percentage Active Works Area for Lam Tin Works Area

Total Area of Lam Tin Works Area = 108738.37 m<sup>2</sup>

#### Activity 1 - Topsoil Excavation

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Excavator	65%	3.2	8	3	76.8	49.92
Lorry	65%	2.4	10	3	72	46.8
Dump Truck	65%	2.4	10	3	72	46.8
<b>Total:</b>						<b>143.52</b>
<b>Activity 1</b>						<b>Percentage of Usage Area to Works Area: 0.1%</b>

#### Activity 2 - Surface Blasting at LTI & CKL Portal

##### Group A

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Lorry	65%	2.4	10	1	24	15.6
Mobile Crane	30%	2.6	10	1	26	7.8
Hydraulic breaker	80%	3.2	8	2	51.2	40.96
Dump Truck	65%	2.4	10	4	96	62.4
Generator	100%	-	-	2	-	-
Welding Set	100%	-	-	2	-	-
Drilling Rig	100%	2.3	6	3	41.4	41.4
Air Compressor	100%	-	-	3	-	-
Water Pump	100%	-	-	2	-	-
Mobile Crusher	100%	2.6	10	2	52	52
Water Truck	100%	2.4	10	1	24	24
Cherry Picker	100%	3.2	8	1	25.6	25.6
<b>Total:</b>						<b>269.76</b>

##### Group B

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Excavator	65%	3.2	8	6	153.6	99.84
Lorry	65%	2.4	10	1	24	15.6
Mobile Crane	30%	2.6	10	1	26	7.8
Dump Truck	65%	2.4	10	4	96	62.4
Generator	100%	-	-	2	-	-
Water Pump	100%	-	-	2	-	-
Mobile Crusher	100%	2.6	10	2	52	52
Water Truck	100%	2.4	10	1	24	24
Cherry Picker	100%	3.2	8	1	25.6	25.6
<b>Total:</b>						<b>287.24</b>
<b>Activity 2</b>						<b>Percentage of Usage Area to Works Area: 0.5%</b>

#### Activity 6 - Site Formation at LTI

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Excavator	65%	3.2	8	1	25.6	16.64
Dump Truck	65%	2.4	10	1	24	15.6
Lorry	65%	2.4	10	1	24	15.6
Air Compressor	100%	-	-	1	-	-
Generator	100%	-	-	1	-	-
Drilling Rig	100%	2.3	6	1	13.8	13.8
Grout Mixer and Pump	100%	-	-	1	-	-
Reverse-circulation drill	100%	-	-	1	-	-
Concrete mixer truck	100%	2.4	10	1	24	24
<b>Total:</b>						<b>85.64</b>
<b>Activity 6</b>						<b>Percentage of Usage Area to Works Area: 0.1%</b>

### Appendix 3.1 Calculations of Construction Dust Emission Rates

#### Justification of Percentage Active Works Area for Lam Tin Works Area

#### Activity 7 - Foundation Piers of Bridge Construction

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Concrete lorry mixer	80%	2.4	10	3	72	57.6
Dump Truck	50%	2.4	10	3	72	36
Backhoe	100%	3.2	8	3	76.8	76.8
Generator, Silenced	100%	-	-	3	-	-
Crane	100%	4.5	8	3	108	108
Poker, vibratory, hand-held	100%	-	-	6	-	-
Saw, circular, wood	100%	-	-	3	-	-
Vibrating Poker, hand-held (electric)	100%	-	-	3	-	-
Bar bender and cutter (electric)	50%	-	-	3	-	-
Pneumatic Breaker	70%	-	-	3	-	-
<b>Total:</b>						<b>278.4</b>
<b>Activity 7</b>						<b>Percentage of Usage Area to Works Area: 0.3%</b>

#### Activity 8 - Bridge Deck Construction

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Crane	30%	4.5	8	4	144	43.2
Lorry	30%	2.4	10	4	96	28.8
Generator, Silenced	100%	-	-	4	-	-
Ventilation Fans	100%	-	-	4	-	-
Cutter, circular, steel (electric)	50%	-	-	4	-	-
Drill, percussive, hand-held (electric)	50%	-	-	8	-	-
Bar bender and cutter (electric)	50%	-	-	4	-	-
Concrete lorry mixer	50%	2.4	10	4	96	48
Concrete Pump	50%	2.4	10	4	96	48
Poker, vibratory, hand-held	70%	-	-	12	-	-
<b>Total:</b>						<b>168</b>
<b>Activity 8</b>						<b>Percentage of Usage Area to Works Area: 0.2%</b>

#### Activity 10 - Roadworks, Signage and Noise Barrier Installation

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Dump Truck	50%	2.4	10	2	48	24
Asphalt Paver	100%	3.2	8	2	51.2	51.2
Roller, vibratory	100%	3.2	8	2	51.2	51.2
Generator, Silenced	100%	-	-	2	-	-
Paint line marker	80%	1	2	2	4	3.2
Lorry	100%	2.4	10	2	48	48
Crane	100%	4.5	8	2	72	72
<b>Total:</b>						<b>249.6</b>
<b>Activity 10</b>						<b>Percentage of Usage Area to Works Area: 0.2%</b>

#### Activity 11 - Landscape Works for Slope

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Excavator	65%	3.2	8	1	25.6	16.64
Loader	50%	4.5	8	1	36	18
Lorry	65%	2.4	10	1	24	15.6
<b>Total:</b>						<b>50.24</b>
<b>Activity 11</b>						<b>Percentage of Usage Area to Works Area: 0.0%</b>

### Appendix 3.1 Calculations of Construction Dust Emission Rates

#### Justification of Percentage Active Works Area for Lam Tin Works Area

##### Activity 12 - Footing of Translucent Noise Cover

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Concrete lorry mixer	60%	2.4	10	1	24	14.4
Dump Truck	35%	2.4	10	1	24	8.4
Backhoe	70%	3.2	8	1	25.6	17.92
Generator, Silenced	70%	-	-	1	-	-
Crane	70%	4.5	8	1	36	25.2
Poker, vibratory, hand-held	70%	-	-	3	-	-
Saw, circular, wood	70%	-	-	1	-	-
Bar bender and cutter (electric)	35%	-	-	1	-	-
Pneumatic Breaker	50%	-	-	1	-	-
<b>Total:</b>						<b>65.92</b>
<b>Activity 12</b>						<b>Percentage of Usage Area to Works Area: 0.1%</b>

##### Activity 13 - Installation of Translucent Noise Cover

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Lorry	100%	2.4	10	2	48	48
Crane	100%	4.5	8	2	72	72
<b>Total:</b>						<b>120</b>
<b>Activity 13</b>						<b>Percentage of Usage Area to Works Area: 0.1%</b>

##### Activity 14 - Footing and Retaining Structure at Central Divider of Landscape Deck

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Concrete lorry mixer	70%	2.4	10	2	48	33.6
Dump Truck	45%	2.4	10	2	48	21.6
Backhoe	80%	3.2	8	2	51.2	40.96
Generator, Silenced	80%	-	-	2	-	-
Crane	80%	4.5	8	2	72	57.6
Poker, vibratory, hand-held	80%	-	-	6	-	-
Saw, circular, wood	80%	-	-	2	-	-
Bar bender and cutter (electric)	45%	-	-	2	-	-
Ventilation Fans	50%	-	-	2	-	-
Pneumatic Breaker	60%	-	-	1	-	-
<b>Total:</b>						<b>153.76</b>
<b>Activity 14</b>						<b>Percentage of Usage Area to Works Area: 0.1%</b>

##### Activity 15 - Civil works for Landscape Deck

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Concrete lorry mixer	70%	2.4	10	2	48	33.6
Dump Truck	45%	2.4	10	2	48	21.6
Backhoe	80%	3.2	8	2	51.2	40.96
Generator, Silenced	80%	-	-	2	-	-
Crane	80%	4.5	8	2	72	57.6
Poker, vibratory, hand-held	80%	-	-	6	-	-
Saw, circular, wood	80%	-	-	2	-	-
Bar bender and cutter (electric)	45%	-	-	2	-	-
Pneumatic Breaker	60%	-	-	2	-	-
Lorry	80%	2.4	10	2	48	38.4
Drill, percussive, hand-held (electric)	45%	-	-	2	-	-
Concrete Pump	100%	2.4	10	2	48	48
<b>Total:</b>						<b>240.16</b>
<b>Activity 15</b>						<b>Percentage of Usage Area to Works Area: 0.2%</b>

##### Activity 16 - Landscaping Works for Landscape Deck

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Excavator	65%	3.2	8	1	25.6	16.64
Loader	50%	4.5	8	1	36	18
Lorry	65%	2.4	10	1	24	15.6
<b>Total:</b>						<b>50.24</b>
<b>Activity 16</b>						<b>Percentage of Usage Area to Works Area: 0.0%</b>

### Appendix 3.1 Calculations of Construction Dust Emission Rates

#### Justification of Percentage Active Works Area for Lam Tin Works Area

##### Activity 17 - Construction of Admin Building, Vent Building

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Excavator	65%	3.2	8	2	51.2	33.28
Lorry	65%	2.4	10	2	48	31.2
Dump Truck	65%	2.4	10	2	48	31.2
Mobile Crane	30%	2.6	10	5	130	39
Compressor	100%	-	-	2	-	-
Bar Bender	100%	-	-	2	-	-
Concrete mixer truck	100%	2.4	10	2	48	48
Vibratory poker	100%	-	-	3	-	-
Piling, large diameter bored, grab and chisel	30%	2	2	3	12	3.6
Piling, large diameter bored, oscillator	30%	2	2	3	12	3.6
Piling, large diameter bored, reverse circulation drill	30%	2	2	3	12	3.6
<b>Total:</b>						<b>193.48</b>
<b>Activity 17</b>						<b>Percentage of Usage Area to Works Area: 0.2%</b>

##### Activity 18 - Blasting of Slip Roads S2, S3, EHC4

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Lorry	65%	2.4	10	2	48	31.2
Dump Truck	65%	2.4	10	2	48	31.2
Mobile Crane	30%	2.6	10	1	26	7.8
Conveyor Belts	100%	-	-	1	-	-
Ventilation Fans	100%	-	-	3	-	-
<b>Total:</b>						<b>70.2</b>
<b>Activity 18</b>						<b>Percentage of Usage Area to Works Area: 0.1%</b>

##### Activity 19 - Cover & Cut Slip Road and At-grade Road Construction

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Grader	50%	2.4	10	1	24	12
Bulldozer	100%	2.4	10	1	24	24
Lorry	65%	2.4	10	1	24	15.6
Hydraulic Breaker	80%	3.2	8	1	25.6	20.48
Compactor	100%	2.4	10	1	24	24
Roller	100%	3.2	8	1	25.6	25.6
Concrete mixer	100%	-	-	1	-	-
Vibratory poker	100%	-	-	1	-	-
Bar Bender	100%	-	-	1	-	-
Excavator	65%	3.2	8	1	25.6	16.64
Dump Truck	65%	2.4	10	1	24	15.6
<b>Total:</b>						<b>153.92</b>
<b>Activity 19</b>						<b>Percentage of Usage Area to Works Area: 0.1%</b>

##### Activity 20 - Roadworks & Signage

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Grader	50%	2.4	10	1	24	12
Bulldozer	100%	2.4	10	1	24	24
Lorry	20%	2.4	10	1	24	4.8
Compactor	100%	2.4	10	1	24	24
Roller	100%	3.2	8	1	25.6	25.6
Concrete mixer	100%	-	-	1	-	-
Vibratory poker	100%	-	-	1	-	-
<b>Total:</b>						<b>90.4</b>
<b>Activity 20</b>						<b>Percentage of Usage Area to Works Area: 0.1%</b>

##### Activity 21 - Drainage, E&M Works

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Excavator	65%	3.2	8	1	25.6	16.64
Lorry	20%	2.4	10	1	24	4.8
Mobile Crane	30%	2.6	10	1	26	7.8
<b>Total:</b>						<b>29.24</b>
<b>Activity 21</b>						<b>Percentage of Usage Area to Works Area: 0.0%</b>

### Appendix 3.1 Calculations of Construction Dust Emission Rates

#### Justification of Percentage Active Works Area for Lam Tin Works Area

##### Activity 22 - Remaining Roadworks & Signage at Mainline Below Viaduct & Noise Shelter

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Grader	50%	2.4	10	1	24	12
Bulldozer	100%	2.4	10	2	48	48
Lorry	65%	2.4	10	1	24	15.6
Compactor	100%	2.4	10	1	24	24
Roller	100%	3.2	8	2	51.2	51.2
Concrete mixer	100%	-	-	1	-	-
Vibratory poker	100%	-	-	2	-	-
<b>Total:</b>						<b>150.8</b>
<b>Activity 22</b>						<b>Percentage of Usage Area to Works Area: 0.1%</b>

##### Activity 23 - Conveyor Belt and Barging Point Construction

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Excavator	65%	3.2	8	1	25.6	16.64
Welding Set	100%	-	-	1	-	-
Mobile Crane	30%	2.6	10	1	26	7.8
Lorry	65%	2.4	10	1	24	15.6
Compressor	100%	-	-	1	-	-
Bar Bender	100%	-	-	1	-	-
Concrete mixer truck	100%	2.4	10	1	24	24
Vibratory poker	100%	-	-	1	-	-
<b>Total:</b>						<b>64.04</b>
<b>Activity 23</b>						<b>Percentage of Usage Area to Works Area: 0.1%</b>

##### Activity 24 - Stockpiling

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Dump Truck	30	2.4	10	2	48	14.4
Excavator	30	3.2	8	2	51.2	15.36
<b>Total:</b>						<b>29.76</b>
<b>Activity 24</b>						<b>Percentage of Usage Area to Works Area: 0.0%</b>

##### Activity 25 - Erection of Construction Shaft & Cut and Cover Tunnel at CKLPCA

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Grader	50%	2.4	10	1	24	12
Bulldozer	100%	2.4	10	1	24	24
Lorry	65%	2.4	10	1	24	15.6
Hydraulic Breaker	80%	3.2	8	1	25.6	20.48
Compactor	100%	2.4	10	1	24	24
Roller	100%	3.2	8	1	25.6	25.6
Concrete mixer	100%	-	-	1	-	-
Vibratory poker	100%	-	-	1	-	-
Bar Bender	100%	-	-	1	-	-
Excavator	65%	3.2	8	1	25.6	16.64
Dump Truck	65%	2.4	10	1	24	15.6
<b>Total:</b>						<b>153.92</b>
<b>Activity 25</b>						<b>Percentage of Usage Area to Works Area: 0.1%</b>

##### Activity 26 - Mechanical Breaking at CKLR & CKLV including Pile Roofing Works

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Hydraulic Breaker	80%	3.2	8	1	25.6	20.48
Dump Truck	65%	2.4	10	1	24	15.6
Bar bender and cutter (electric)	50%	-	-	3	-	-
Grout Mixer and Pump	100%	-	-	1	-	-
Concrete Mixer Truck	100%	2.4	10	1	24	24
<b>Total:</b>						<b>60.08</b>
<b>Activity 26</b>						<b>Percentage of Usage Area to Works Area: 0.1%</b>

### Appendix 3.1 Calculations of Construction Dust Emission Rates

#### Justification of Percentage Active Works Area for Lam Tin Works Area

##### Activity 27 - Remaining Mechanical Breaking for CKL Tunnel

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Hydraulic Breaker	80%	3.2	8	1	25.6	20.48
Dump Truck	65%	2.4	10	1	24	15.6
Bar bender and cutter (electric)	50%	-	-	3	-	-
Grout Mixer and Pump	100%	-	-	1	-	-
Concrete Mixer Truck	100%	2.4	10	1	24	24
<b>Total:</b>						<b>60.08</b>
<b>Activity 27</b>						<b>Percentage of Usage Area to Works Area: 0.1%</b>

##### Activity 28 - Tunnel Lining, Utilities, Drainage, Ventilating, E&M Works

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Excavator	65%	3.2	8	3	76.8	49.92
Lorry	65%	2.4	10	3	72	46.8
Mobile Crane	30%	2.6	10	2	52	15.6
Hydraulic breaker	80%	3.2	8	2	51.2	40.96
Compressor	100%	-	-	4	-	-
Bar Bender	100%	-	-	2	-	-
Concrete mixer truck	100%	2.4	10	2	48	48
Vibratory poker	100%	-	-	6	-	-
<b>Total:</b>						<b>201.28</b>
<b>Activity 28</b>						<b>Percentage of Usage Area to Works Area: 0.2%</b>

##### Activity 29 - Roadworks and Signage

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Grader	50%	2.4	10	1	24	12
Bulldozer	100%	2.4	10	2	48	48
Lorry	65%	2.4	10	1	24	15.6
Compactor	100%	2.4	10	1	24	24
Roller	100%	3.2	8	2	51.2	51.2
Concrete mixer	100%	-	-	1	-	-
Vibratory poker	100%	-	-	2	-	-
<b>Total:</b>						<b>150.8</b>
<b>Activity 29</b>						<b>Percentage of Usage Area to Works Area: 0.1%</b>

As a worst case assumption, all construction activities are assumed to be carried out at the same time

<b>Total Percentage of Usage Area to Lam Tin Works Area</b>	<b>3.3%</b>
<b>Percentage adopted in Dust model</b>	<b>30%</b>

## Appendix 3.1 Calculations of Construction Dust Emission Rates

### Justification of Percentage Active Works Area for Tseung Kwan O Works Area

Total Area of Tseung Kwan O Works Area = 83211.06 m<sup>2</sup>

#### Activity 1 - Construction of Seawall

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Tug Boat	100%	7	24	2	336	3.36
Derrick Barge	100%	21	49	2	2058	20.58
<b>Total:</b>						<b>23.94</b>
<b>Activity 1</b>						<b>Percentage of Usage Area to Works Area: 0.0%</b>

#### Activity 2 - Recalvation Filling behind Seawall

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Barge	60%	21	49	9	9261	5556.6
Lorry	100%	2.4	10	3	72	72
Bulldozer	100%	2.4	10	3	72	72
Mechanical Compactors	100%	-	-	3	-	-
<b>Total:</b>						<b>5700.6</b>
<b>Activity 2</b>						<b>Percentage of Usage Area to Works Area: 6.9%</b>

#### Activity 3 - Placing Surcharge

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Grader	50%	2.4	10	2	48	24
Excavator	65%	3.2	8	1	25.6	16.64
Bulldozer	100%	2.4	10	2	48	48
Roller	100%	3.2	8	2	51.2	51.2
Dump Truck	65%	2.4	10	2	48	31.2
<b>Total:</b>						<b>171.04</b>
<b>Activity 3</b>						<b>Percentage of Usage Area to Works Area: 0.2%</b>

#### Activity 5 - Removal of Surcharge

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Grader	50%	2.4	10	2	48	24
Excavator	65%	3.2	8	1	25.6	16.64
Bulldozer	100%	2.4	10	2	48	48
Roller	100%	3.2	8	2	51.2	51.2
Dump Truck	65%	2.4	10	2	48	31.2
<b>Total:</b>						<b>171.04</b>
<b>Activity 5</b>						<b>Percentage of Usage Area to Works Area: 0.2%</b>

## Appendix 3.1 Calculations of Construction Dust Emission Rates

### Justification of Percentage Active Works Area for Tseung Kwan O Works Area

#### Activity 6 - Construction of Landscape Deck and Depressed Road

##### Group A

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Excavator	65%	3.2	8	2	51.2	33.28
Dump Truck	65%	2.4	10	1	24	15.6
Compressor	100%	-	-	3	-	-
<b>Total:</b>						<b>48.88</b>

##### Group B

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Dump Truck	65%	2.4	10	1	24	15.6
Compressor	100%	-	-	3	-	-
Bar Bender	100%	-	-	2	-	-
Concrete Pump	100%	2.4	10	3	72	72
Concrete mixer truck	100%	2.4	10	3	72	72
Vibratory poker	100%	-	-	6	-	-
<b>Total:</b>						<b>159.6</b>

##### Group C

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Grader	50%	2.4	10	1	24	12
Bulldozer	100%	2.4	10	1	24	24
Roller	100%	3.2	8	2	51.2	51.2
<b>Total:</b>						<b>87.2</b>
<b>Activity 6</b>						<b>Percentage of Usage Area to Works Area: 0.4%</b>

#### Activity 8 - Footpath, Cycle Track and Landscape Works

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Dump Truck	50%	2.4	10	1	24	12
Asphalt Paver	100%	3.2	8	1	25.6	25.6
Roller, vibratory	100%	3.2	8	1	25.6	25.6
Generator, Silenced	100%	-	-	1	-	-
Paint line marker	80%	1	2	1	2	1.6
<b>Total:</b>						<b>64.8</b>
<b>Activity 8</b>						<b>Percentage of Usage Area to Works Area: 0.1%</b>

#### Activity 9 - Roadworks, Signage, Drainage, E&M

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Grader	50%	2.4	10	1	24	12
Bulldozer	100%	2.4	10	1	24	24
Lorry	20%	2.4	10	1	24	4.8
Compactor	100%	2.4	10	1	24	24
Roller	100%	3.2	8	1	25.6	25.6
Concrete mixer	100%	-	-	1	-	-
Vibratory poker	100%	-	-	1	-	-
Excavator	65%	3.2	8	1	25.6	16.64
Mobile Crane	30%	2.6	10	1	26	7.8
<b>Total:</b>						<b>114.84</b>
<b>Activity 9</b>						<b>Percentage of Usage Area to Works Area: 0.1%</b>

#### Activity 10 - Noise Barrier at Road P2

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Lorry	100%	2.4	10	2	48	48
Crane	100%	4.5	8	2	72	72
<b>Total:</b>						<b>120</b>
<b>Activity 10</b>						<b>Percentage of Usage Area to Works Area: 0.1%</b>

## Appendix 3.1 Calculations of Construction Dust Emission Rates

### Justification of Percentage Active Works Area for Tseung Kwan O Works Area

#### Activity 11 - Site Formation and Slope Stabilization

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Excavator	65%	3.2	8	3	76.8	49.92
Truck	100%	2.4	10	3	72	72
Lorry	65%	2.4	10	2	48	31.2
Air Compressor	100%	-	-	2	-	-
Generator	100%	-	-	2	-	-
Drilling Rig	100%	2.3	6	3	41.4	41.4
Grout Mixer and Pump	100%	-	-	2	-	-
<b>Total:</b>						<b>194.52</b>
<b>Activity 11</b>						<b>Percentage of Usage Area to Works Area: 0.2%</b>

#### Activity 12 - Surface Blasting for TKO Portal

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Excavator	65%	3.2	8	4	102.4	66.56
Lorry	65%	2.4	10	4	96	62.4
Mobile Crane	30%	2.6	10	1	26	7.8
Hydraulic Breaker	80%	3.2	8	1	25.6	20.48
Dump Truck	65%	2.4	10	5	120	78
Generator	100%	-	-	2	-	-
Welding Set	100%	-	-	2	-	-
Drilling Rig	100%	2.3	6	3	41.4	41.4
Air Compressor	100%	-	-	2	-	-
Water Pump	100%	-	-	1	-	-
Mobile Crusher	100%	2.6	10	1	26	26
Water Truck	100%	2.4	10	1	24	24
Cherry Picker	100%	3.2	8	2	51.2	51.2
<b>Total:</b>						<b>377.84</b>
<b>Activity 12</b>						<b>Percentage of Usage Area to Works Area: 0.5%</b>

#### Activity 13 - Diversion of JBCPC footpath

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Excavator	65%	3.2	8	2	51.2	33.28
Truck	100%	2.4	10	2	48	48
Compactor	100%	2.4	10	1	24	24
Roller	100%	3.2	8	1	25.6	25.6
Bar Bender	100%	-	-	2	-	-
Concrete mixer truck	100%	2.4	10	2	48	48
Vibratory poker	100%	-	-	3	-	-
Mobile Crane	30%	2.6	10	1	26	7.8
Grader	50%	2.4	10	2	48	24
Bulldozer	100%	2.4	10	1	24	24
<b>Total:</b>						<b>234.68</b>
<b>Activity 13</b>						<b>Percentage of Usage Area to Works Area: 0.3%</b>

#### Activity 14 - Demolition of existing JBCPC footpath

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Bulldozer	100%	2.4	10	2	48	48
Lorry	65%	2.4	10	2	48	31.2
Mobile Crane	30%	2.6	10	2	52	15.6
Hydraulic breaker	80%	3.2	8	1	25.6	20.48
Dump Truck	65%	2.4	10	2	48	31.2
<b>Total:</b>						<b>146.48</b>
<b>Activity 14</b>						<b>Percentage of Usage Area to Works Area: 0.2%</b>

## Appendix 3.1 Calculations of Construction Dust Emission Rates

### Justification of Percentage Active Works Area for Tseung Kwan O Works Area

#### Activity 15 - E&M Works, Roadworks & Signage

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Grader	50%	2.4	10	1	24	12
Bulldozer	100%	2.4	10	1	24	24
Lorry	65%	2.4	10	1	24	15.6
Compactor	100%	2.4	10	1	24	24
Roller	100%	3.2	8	1	25.6	25.6
Concrete mixer	100%	-	-	1	-	-
Vibratory poker	100%	-	-	1	-	-
Excavator	65%	3.2	8	1	25.6	16.64
Mobile Crane	30%	2.6	10	1	26	7.8
<b>Total:</b>						<b>125.64</b>
<b>Activity 15</b>						<b>Percentage of Usage Area to Works Area: 0.2%</b>

#### Activity 16 - Ventilation Building Construction

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Excavator	65%	3.2	8	2	51.2	33.28
Lorry	65%	2.4	10	2	48	31.2
Dump Truck	65%	2.4	10	2	48	31.2
Mobile Crane	30%	2.6	10	5	130	39
Compressor	100%	-	-	2	-	-
Bar Bender	100%	-	-	2	-	-
Concrete mixer truck	100%	2.4	10	2	48	48
Vibratory poker	100%	-	-	3	-	-
Piling, large diameter bored, grab and chisel	30%	2	2	3	12	3.6
Piling, large diameter bored, oscillator	30%	2	2	3	12	3.6
Piling, large diameter bored, reverse circulation drill	30%	2	2	3	12	3.6
<b>Total:</b>						<b>193.48</b>
<b>Activity 16</b>						<b>Percentage of Usage Area to Works Area: 0.2%</b>

#### Activity 17 - Landscape Works

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Excavator	65%	3.2	8	1	25.6	16.64
Loader	50%	4.5	8	1	36	18
Lorry	65%	2.4	10	1	24	15.6
<b>Total:</b>						<b>50.24</b>
<b>Activity 17</b>						<b>Percentage of Usage Area to Works Area: 0.1%</b>

#### Activity 18 - Stockpiling

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Dump Truck	30	2.4	10	2	48	14.4
Excavator	30	3.2	8	2	51.2	15.36
<b>Total:</b>						<b>29.76</b>
<b>Activity 18</b>						<b>Percentage of Usage Area to Works Area: 0.0%</b>

#### Activity 19 - Stockpiling

Plant	Percentage of Usage (%)	Plan Size				Area in term of Time of Usage (m <sup>2</sup> )
		B (m)	L (m)	No. of Item	Area(m <sup>2</sup> )	
Dump Truck	30	2.4	10	2	48	14.4
Excavator	30	3.2	8	2	51.2	15.36
<b>Total:</b>						<b>29.76</b>
<b>Activity 19</b>						<b>Percentage of Usage Area to Works Area: 0.0%</b>

As a worst case assumption, all construction activities are assumed to be carried out at the same time

<b>Tseung Kwan O Works Area Total Percentage</b>	<b>9.7%</b>
<b>Percentage adopted in Dust model</b>	<b>30%</b>

## CONTROL OF OPEN FUGITIVE DUST SOURCES

## FINAL REPORT

by

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 Research Triangle Park, North Carolina

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3.3.3 Surface Treatments

3.3.3.1 Watering. The control efficiency of unpaved road watering depends upon (a) the amount of water applied per unit area of road surface, (b) the time between reapplications, (c) traffic volume during that period, and (d) prevailing meteorological conditions during the period. While several investigations have estimated or studied watering efficiencies, few have specified all the factors listed above.

An empirical model for the performance of watering as a control technique has been developed.<sup>8</sup> The supporting data base consists of 14 tests performed in four states during five different summer and fall months. The model is:

$$C = 100 - \frac{0.8 p d t}{i} \quad (3-2)$$

where: C = average control efficiency, percent

P = potential average hourly daytime evaporation rate, mm/h

d = average hourly daytime traffic rate, (h<sup>-1</sup>)

i = application intensity, L/m<sup>2</sup>

t = time between applications, h

Estimates of the potential average hourly daytime evaporation rate may be obtained from

$$P = \begin{cases} 0.0049 \times (\text{value in Figure 3-2}) \text{ for annual conditions} \\ 0.0065 \times (\text{value in Figure 3-2}) \text{ for summer conditions} \end{cases}$$

An alternative approach (which is potentially suitable for a regulatory format) is shown as Figure 3-3. This figure is adapted from 11 field tests conducted at a coal-fired power plant. Measured control efficiencies did not correlate well with either time or vehicle passes after application. However, this is believed due to reduced evening evaporation (logistics delayed the start of testing until 3 p.m. and testing continued through the early evening). Surface moisture grab samples were taken throughout the testing period, and not surprisingly, these show a strong correlation with control efficiency.

Figure 3-3 shows that between the average uncontrolled moisture content and a value of twice that, a small increase in moisture content results in a large increase in control efficiency. Beyond this point, control efficiency grows slowly with increased moisture content. Although

Annual O&M costs: \$6,600-\$11,900/mile

These estimates are based on resurfacing every 5 years and "15 percent opportunity costs." Reference 7 estimates a cost of \$140,000/mile (1983 dollars) to paved industrial unpaved roads. Because of the variety of cost estimates, it is strongly recommended that the reader obtain quotes from local paving contractors.

3.3.2.2 Gravel/Slag Improvements. As noted earlier, these types of improvements replace the present road surface material with a lower silt content material. Note that this method may increase road maintenance costs as the new aggregate fractures. This cost may be avoided by installing a "road carpet." Because Equation (3-1) indicates a linear relationship between silt content and emission levels, control efficiency can be estimated by determining the reduction in silt content. For example, if a road with a 12 percent silt content is recovered with a gravel (with an equilibrium silt content of 5 percent; see Table 3-1), then a 58 percent control efficiency would be expected.

Identified cost elements for these improvements follow:

Capital: Material (including "road carpet," if applicable), application equipment, and labor

O&M: Periodic grading including equipment and labor

No cost estimates were found in the reference documents used as the basis for this document. Because of the differences in local availability of cover materials (and civil engineering fabrics) and the amount of surface preparation, compaction, and maintenance required for various road types, it is recommended that the reader obtain quotes from local contractors.

3.3.2.3 Vegetative Cover. As noted by Turner et al., ". . . vegetative covers are obviously impractical for roads and facilities with construction activity . . . vegetative covering may be a practical control option for many inactive sites, but it is likely to be impractical for areas of continuing activity and areas that will not support a relatively dense vegetative cover."<sup>5</sup>

Consequently, vegetation is probably a viable control option only for inactive area wind erosion and is discussed elsewhere in this manual.

# Control Techniques for Particulate Emissions from Stationary Sources — Volume 2

Emission Standards and Engineering Division

U.S. ENVIRONMENTAL PROTECTION AGENCY  
Office of Air, Noise, and Radiation  
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facilities (which EPA designated F, P, Q, R, S, T); EPA used wet dust suppression techniques to control particulate emissions generated at these plant process facilities. Emissions generated by 13 crushers, 14 screens, 7 transfer points, 1 impact mill and 1 storage bin were visually measured by EPA Methods 9 and 22. Facilities R and T are portable crushing facilities. Facilities P, Q, R, and T process crushed limestone, while facility F processes crushed traprock, and facility S produces crushed granite.

The results of the tests for non-crushing sources (e.g., screens, transfer points, and storage bins) are summarized in Table 9.7-5. These results indicate that visible emissions occur less than 10 percent of the time. The results of the tests for crushing sources from the best controlled stationary (facility S) and portable (facility R) plants are summarized in Figures 9.7-3 to 9.7-7. The data are reported in 6-minute averaging of Method 9 data. For each testing set (approximately 1 hour), the results of the two observers simultaneously measuring visible emissions are indicated by a solid and a dashed line. Even though facility R is designated the best controlled portable crushing plant, the secondary crusher exceeded 15 percent opacity several times, according to one observer. This is attributed to the fact that during the test, there was no spray bar located near the crusher outlet. Had the spray bar for the crusher been relocated closer to the crusher than its present position some 5 feet from the crusher, emissions might have dropped below 15 percent opacity for all observer readings.

In general, the positioning and number of spray bars at all plants except facilities F and S were judged to be inadequate. Even though all the facilities tested were reasonably controlled, they might have achieved the low level of emissions seen at facilities F and S with more careful placement of the bars, and in some cases, additional spray bars.

9.7.1.2.2 Dry collection. Particulate emissions from process operations (such as dust from crushing, screening equipment, and transfer points) may be controlled by capturing and ducting the emissions to a collection device. Collection systems consist of an exhaust system utilizing hoods to capture emissions, fan and ducting to convey the emissions to a collection device, and the collection device to remove the particulate emissions prior to exhausting the air stream. Collection devices include fabric filters, cyclones, and low-energy scrubbers.



TABLE 9.7-5. SUMMARY OF VISIBLE EMISSION MEASUREMENTS FROM FUGITIVE NONCRUSHING SOURCES CONTROLLED BY WET SUPPRESSION (ACCORDING TO EPA METHOD 22)<sup>1</sup>

Plant	Rock type processed	Date of test	Process facility	Accumulated observation time, minutes	Accumulated emission time, minutes <sup>a</sup>	Percent of time with visible emissions
P	Crushed limestone (S) <sup>b</sup>	10/02/79	Secondary screen	60	0	0
			Transfer point	60	< 1	1
Q	Crushed limestone (S)	10/10/79	Three process screens	270	2	< 1
R	Crushed limestone (P) <sup>c</sup>	10/15/79	Three process screens	210	11	5
			Two transfer points	120	1	< 1
S	Crushed granite (S)	10/23/79	Two process screens	240	10	4
			Two transfer points	240	< 1	0
T	Crushed limestone (P)	10/29/79	Process screen	120	0	0
			Transfer point	120	3	2
			Storage bin	120	0	0

<sup>a</sup>Data from observer with highest readings.  
<sup>b</sup>(S) = Stationary plant.  
<sup>c</sup>(P) = Portable plant.

9.7-12

9.7-13

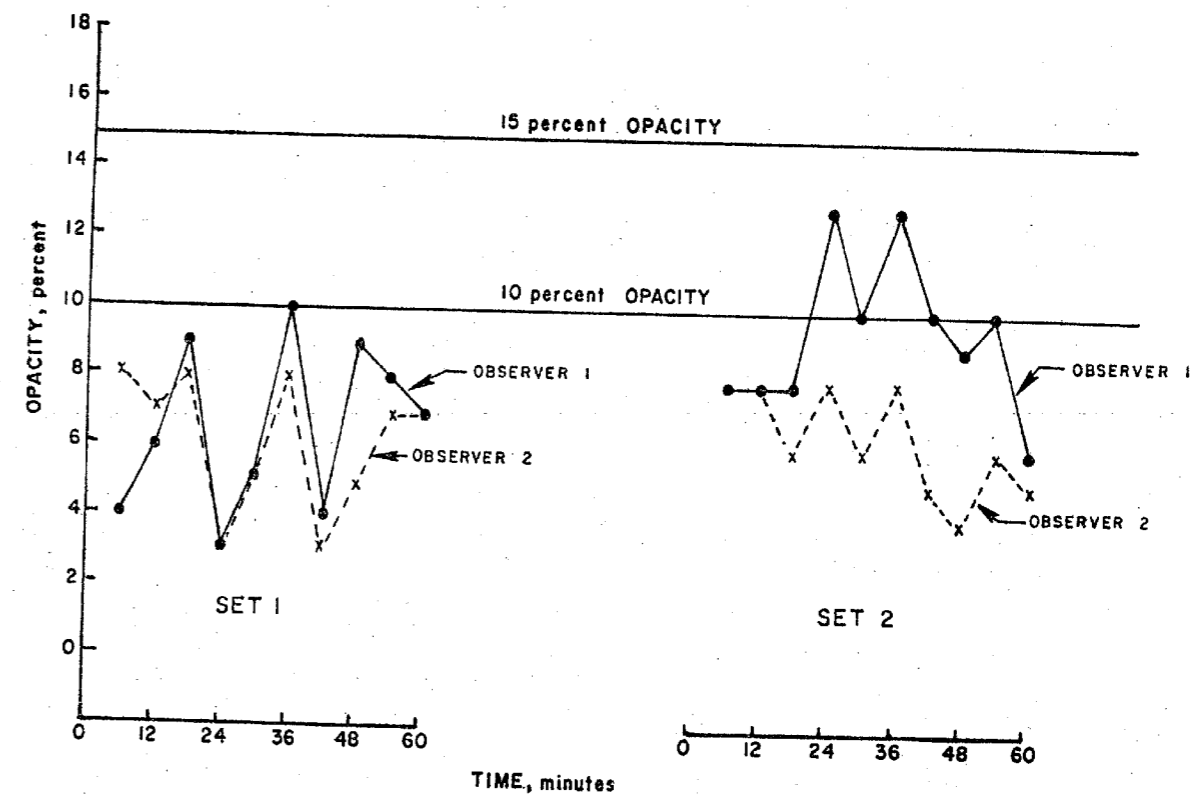


Figure 9.7-3. Summary of visible emission measurements from best controlled fugitive primary crushing source (portable-facility T) by means of wet suppression (according to EPA Method 9).<sup>1</sup>

9.7-14

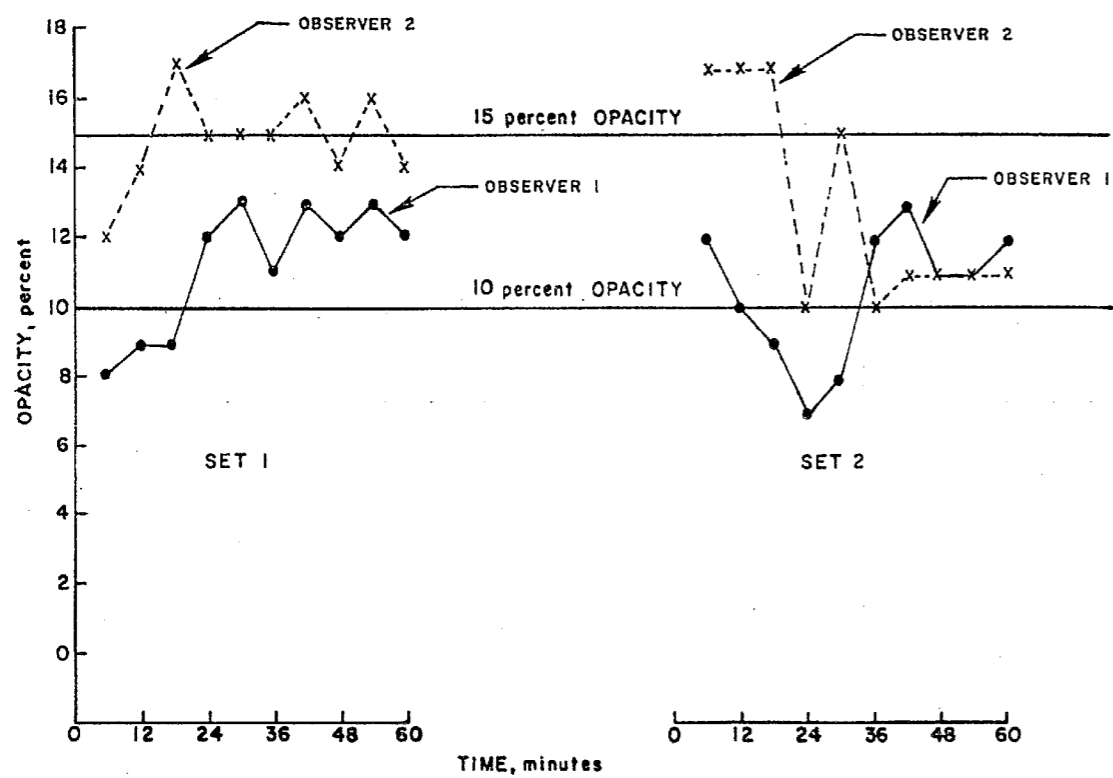


Figure 9.7-4 Summary of visible emission measurements from best controlled fugitive secondary crushing source (portable-facility R) by means of wet suppression (according to EPA Method 9).<sup>1</sup>

9.7-15

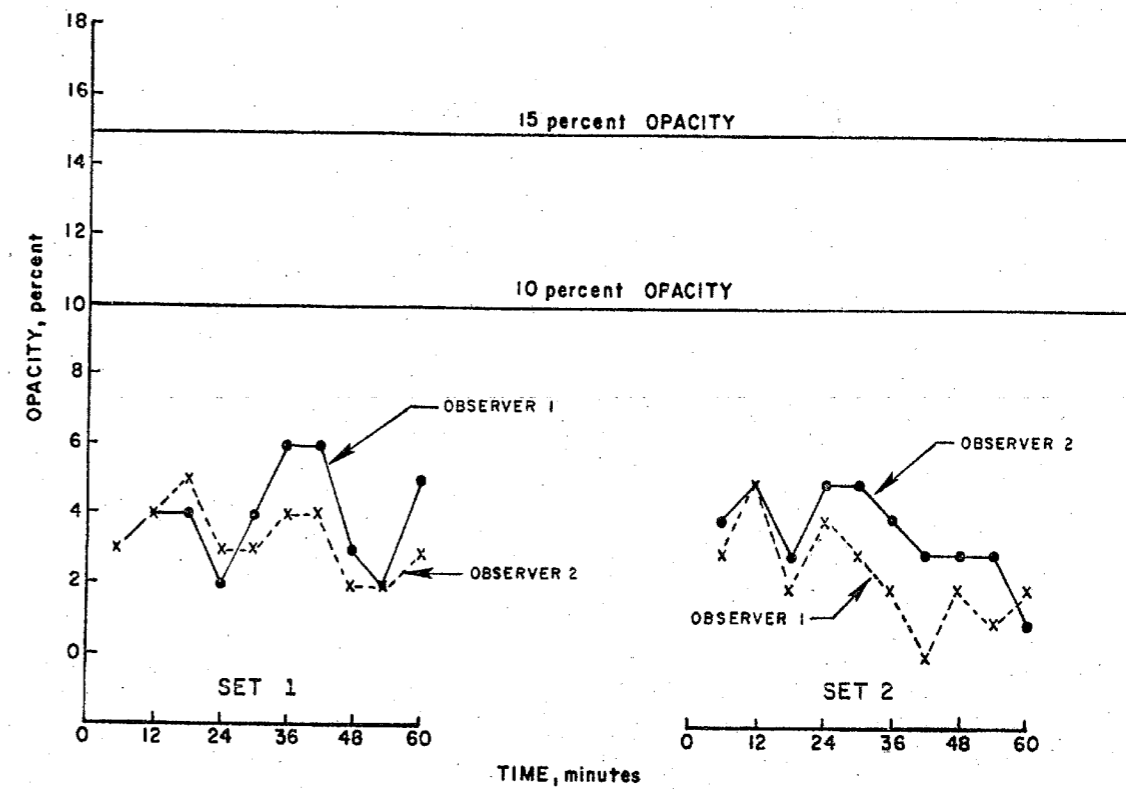


Figure 9.7-5 Summary of visible emission measurements from best controlled fugitive secondary crusher (small, stationary-facility S) by means of wet suppression (according to EPA Method 9).<sup>1</sup>

9.7-16

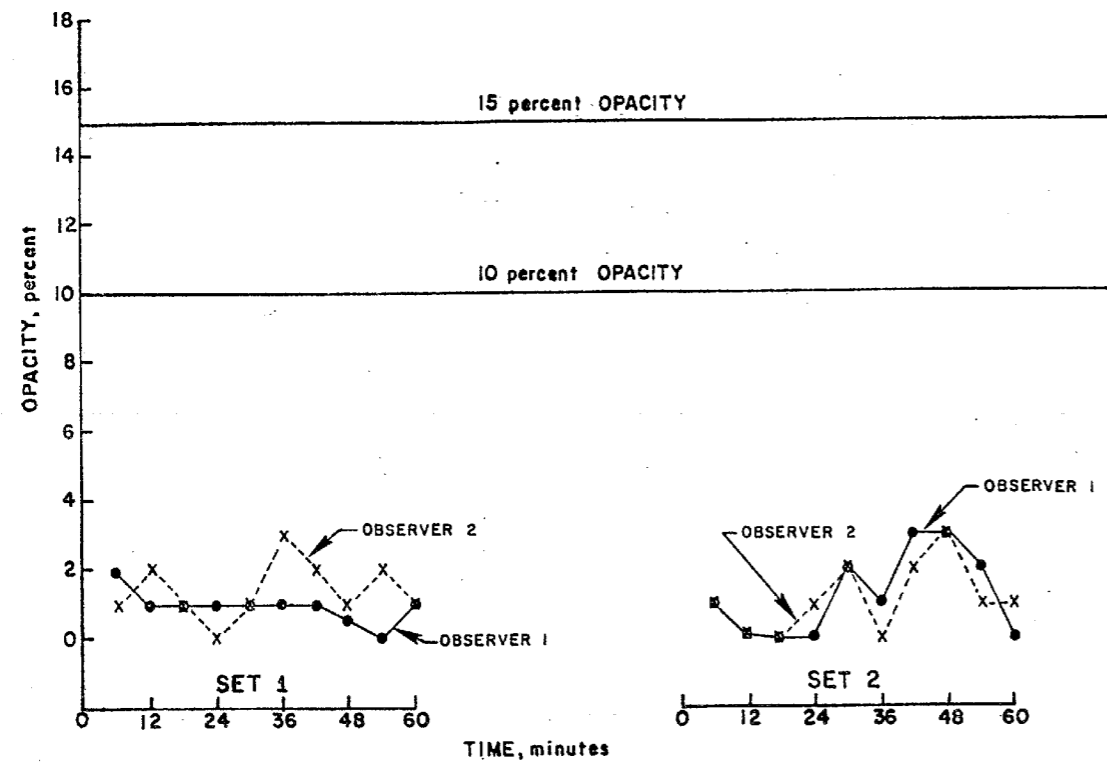


Figure 9.7-6 Summary of visible emission measurements from best controlled fugitive primary crushing source (stationary-facility S) by means of wet suppression (according to EPA Method 9).<sup>1</sup>

9.7-17

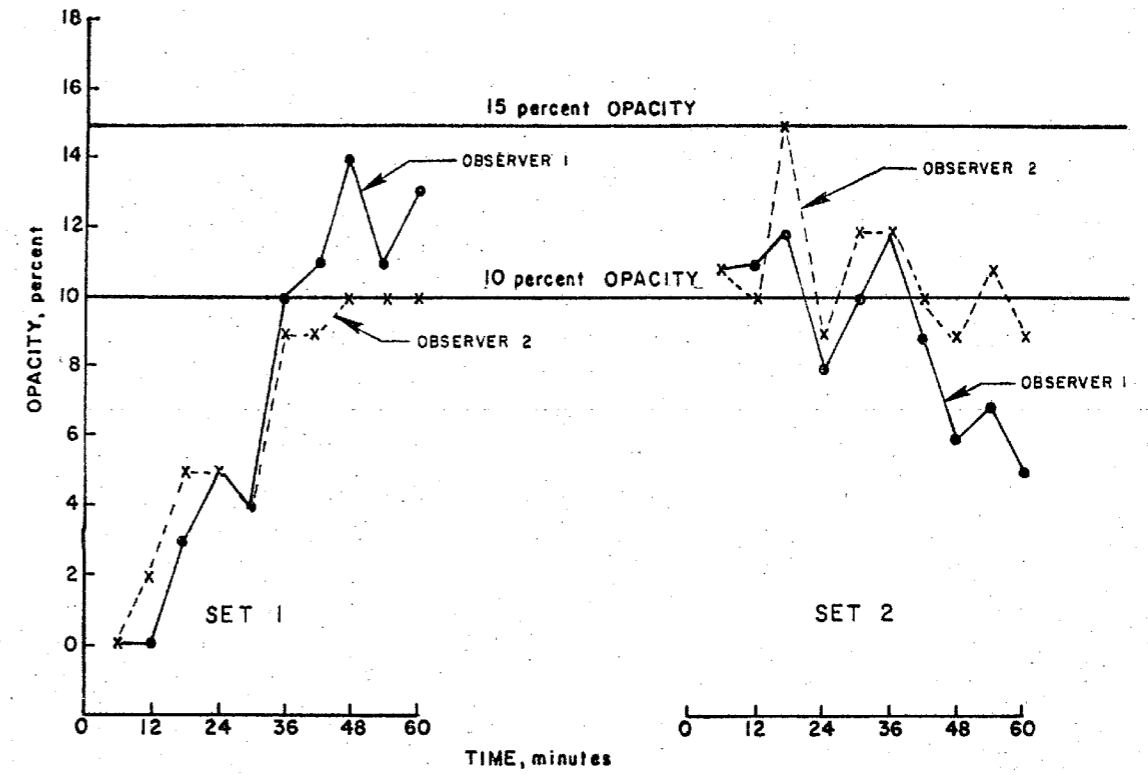


Figure 9.7-7 Summary of visible emission measurements from best controlled fugitive secondary crushing source (large, secondary-facility S) by means of wet suppression (according to EPA Method 9).<sup>1</sup>

To maximize collection system efficiency, exhaust systems must be properly designed and balanced. Process equipment should be enclosed as completely as possible, allowing access for operation and maintenance. Indraft velocities should be maintained at a minimum of 61 meters per minute.<sup>1</sup> Proper hood design will minimize the effects of cross drafts and reduce power consumption by minimizing exhaust volumes. Ducting must be designed for adequate conveying velocities to prevent settling of dust particles. Based on data for the crushed stone industry, conveying velocities recommended for mineral particles range from 1100 to 1400 meters/min.<sup>7</sup> For proper dust control from process sources, hoods should be installed at conveyor transfer points, screens, crushers, grinders, and bagging operations. Hood configurations and exhaust rates are discussed in Reference 1.

Fabric filters are generally the most effective dust collection devices used in the mineral mining and processing industry. In most crushing plant applications, mechanical shaker type collectors which require periodic shut-down for cleaning (usually after 4 to 5 hours of operation) are used. Collector bags are made of cotton sateen and operated at a filtering velocity of 0.6 to 0.9 m/min. When it is impractical to turn off the collector for cleaning, fabric filters with continuous cleaning are used. Fabric filters, using wool or synthetic felts as filtering media, provide continuous cleaning and may be operated at a filtering velocity of 1.8 to 3.0 m/min. Table 9.7-6 gives standard air-to-cloth ratios suggested for the collection of different material dusts. Efficiencies for well maintained baghouses, regardless of type (jet pulse or mechanical shaker), are greater than 99 percent, even on submicrometer particle sizes.<sup>7</sup>

Particulate emission measurements were conducted by EPA on 16 baghouse collectors used to control emissions generated at crushing, screening, and conveying (transfer points) operations at five crushed stone installations, one kaolin plant, one fuller's earth installation, and on one baghouse collector used to control emissions generated at grinding, classifying, and fine product loading operations at a feldspar installation. Table 9.7-7 briefly summarizes the process operations controlled by each baghouse tested, along with specifications for each baghouse. The results of these measurements are summarized in Figure 9.7-8.

Table 9.7-6. AIR-TO-CLOTH RATIOS FOR FABRIC FILTERS USED FOR EXHAUST EMISSION CONTROL<sup>1</sup>

Industrial segment	Filtering velocity, <sup>a</sup> meters/min
Sand and gravel	2.1
Clay	1.8
Gypsum	1.8
Lightweight aggregate (Perlite and Vermiculite)	2.3
Pumice	1.4
Feldspar	1.2
Borate	1.5
Talc and soapstone	1.5
Barite	1.4
Diatomite	1.2
Rock salt	1.5
Fluorspar	1.5
Mica	1.8
Kyanite	1.8
Sodium compounds	1.4
Gilsonite	N.R. <sup>b</sup>
Crushed and broken stone	7.0

<sup>a</sup>Ratio is based on operating surface required to obtain a particulate concentration of 0.05 g/m<sup>3</sup> in the outlet stream from the filter. In all cases, the filter is a pulse-jet type operating at 1.5 kPa w.c. differential pressure. The filtering medium is felted polypropylene or polyester.

<sup>b</sup>No recommendation for this segment.

TABLE 9.7-7. BAGHOUSE UNITS TESTED BY EPA<sup>1</sup>

Facility	Rock type processed	Baghouse specifications Type	Capacity		Process operations controlled
			Filtering ratio	scms scfm	
A1	Limestone	Jet pulse	5.3 to 1	12.5 (26,472)	Primary impact crusher
A2	Limestone	Jet pulse	7.0 to 1	7.5 (15,811)	Primary screen
A3	Limestone	Jet pulse	7.0 to 1	1.1 (2,346)	Conveyor transfer point
A4	Limestone	Jet pulse	5.2 to 1	5.0 (10,532)	Secondary cone crusher, screen
B1	Limestone	Shaker	3.1 to 1	2.7 (5,784)	Primary impact crusher
B2	Limestone	Shaker	2.1 to 1	8.6 (18,197)	Scalping screen, secondary cone crusher, two finishing screens, hammer mill, five storage bins, six conveyor transfer points
C1	Limestone	Shaker	2.3 to 1	3.5 (7,473)	Primary jaw crusher, scalping screen, hammer mill
C2	Limestone	Shaker	2.0 to 1	3.1 (6,543)	Two finishing screens, two conveyor transfer points
D1	Traprock	Shaker	2.8 to 1	15.0 (31,863)	One scalping and two sizing screens, secondary cone crusher, two tertiary cone crushers, several conveyor transfer points
D2	Traprock	Shaker	2.8 to 1	12.3 (25,960)	Finishing screen, several conveyor transfer points
E1	Traprock	Jet pulse	5.2 to 1	7.0 (14,748)	Two sizing screens, four tertiary cone crushers, several conveyor transfer points
E2	Traprock	Jet Pulse	7.5 to 1	10.0 (21,122)	Five finishing screens, eight storage bins
M1	Fuller's earth	Reverse air	6.0 to 1	0.9 (1,800)	Raymond mill system
M2	Fuller's earth	Reverse air	5.2 to 1	1.6 (3,300)	Fluid energy system
G1	Feldspar	Reverse air	3.0 to 1	1.9 (3,960)	Pebble mill, bucket elevator, two conveyor transfer points, fine product loading
L1	Kaolin	Unknown	Unknown	6.6 (14,040)	Raymond impact mill
L2	Kaolin	Unknown	Unknown	3.3 (6,960)	Roller mill

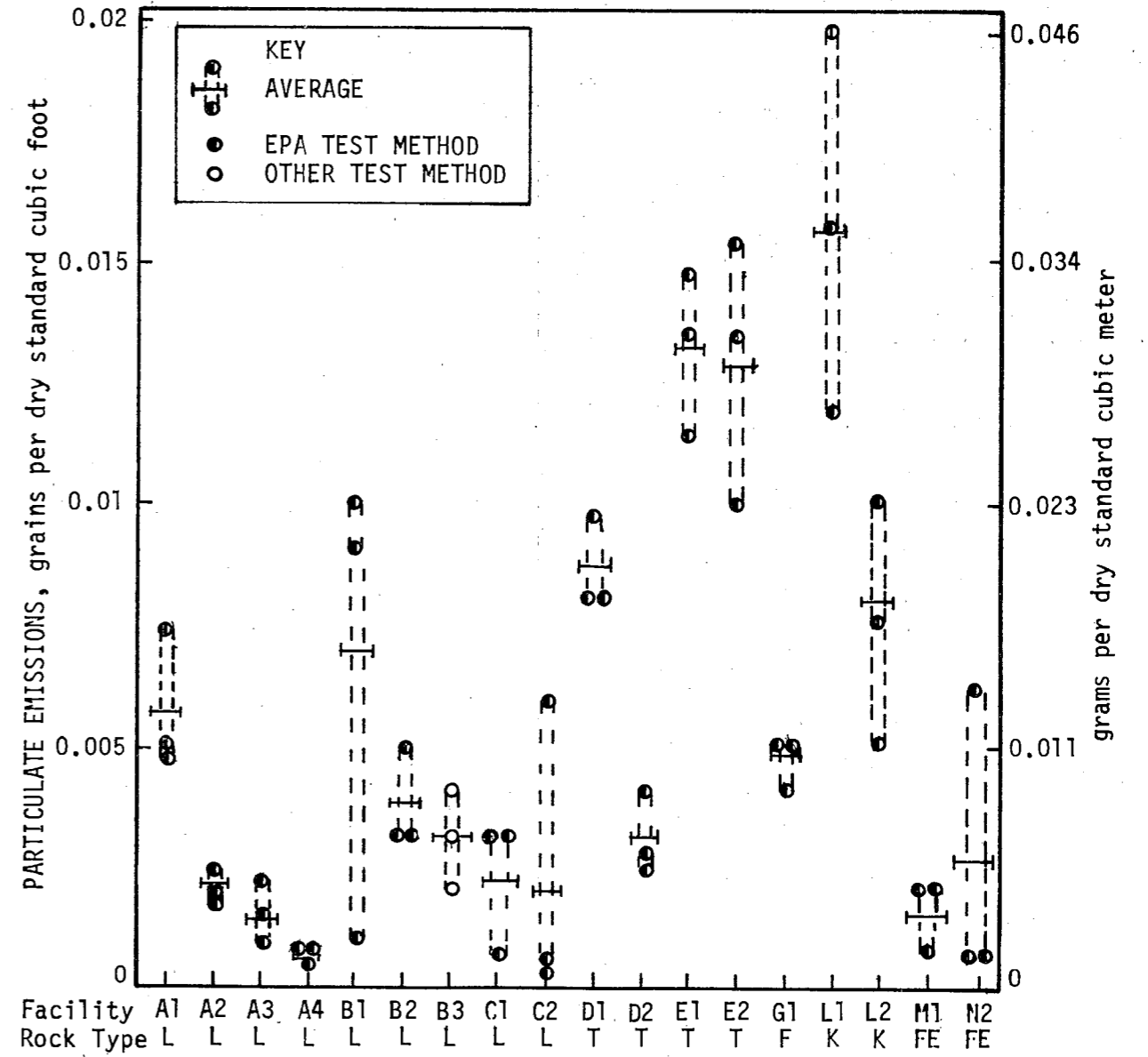


Figure 9.7-8 Particulate emissions from non-metallic minerals processing operations.<sup>1</sup>

Observations for visible emissions were also made at hoods and enclosures to record the presence and opacity of emissions escaping capture. The results of these measurements are summarized in Table 9.7-8. In most instances, essentially no visible emission were observed at adequately hooded or enclosed process facilities.

The other collection devices used in the industry, cyclones and low-energy scrubbers, have efficiencies of 95 to 99 percent for coarse particles (greater than 40 micrometers). These efficiencies, however, drop to less than 85 percent for particles under 20 micrometers in size.<sup>1</sup>

Wet dust suppression and dry collection techniques are often used in combination to control particulate emissions. A typical control method combines wet dust suppression at primary crushers, screens, transfer points, and crusher inlets, with dry collection at the discharge of secondary and tertiary crushers, where new dry surfaces and fine particles are formed. A specific combined method controls fugitive dust from abandoned tailing dumps by using combinations of water, chemical stabilizers, and vegetative cover. Efficiency is reported at 90 to 95 percent.<sup>6</sup> For drilling operations, water injection or aspiration connected to a control device such as a cyclone or fabric filter, preceded by a settling chamber, is common.<sup>8</sup>

For crushing, screening, and transfer operations, controls include the use of wetting agents and fine water sprays at critical transfer and unloading points.

9.7.1.3 Secondary Environmental Impact. The utilization of dry collection techniques (particulate capture combined with a dry emission control device) for control generates no water effluent discharge. In cases where wet dust suppression techniques could be used, the water is absorbed by the material processed. Thus, wet suppression systems do not result in a water discharge.<sup>9</sup>

The impact of solid waste upon the environment depends on the type of control used. With the use of fabric filters, approximately 1.4 Mg of solid waste is collected per 250 Mg of mineral processed. Often this material can be recycled back into the process, sold, or used for a variety of purposes.<sup>1</sup> If no market exists for the collected wastes, they are often discharged to the tailings pond or disposed of in the mine or an isolated location in the

Table 9.12-11. POSSIBLE CONTROL TECHNOLOGY APPLICATIONS FOR OPEN STORAGE PILES<sup>10</sup>

Emission points	Control Procedures	Efficiency, %
Loading onto piles	Enclosure	70 to 99
	Chemical wetting agents or foam	80 to 90
	Adjustable chutes	75
Movement of pile	Enclosure	95 to 99
	Chemical wetting agents	90
	Watering	50
	Traveling booms to distribute material	No estimate
Wind erosion	Enclosure	95 to 99
	Wind screens	Very low
	Chemical wetting agents or foam	90
	Screening of material prior to storage, with fines sent directly to processing or a storage silo	No estimate