# **APPENDIX 10.II**

**Regional Air Emission Sources** 

### Summary of Daily Maximum (Winter) Emissions During the Construction Phase

|   |  | _                        |          |          |          |          |          |          | Emission Ra | ate (kg/day) |            |              |          |     |          |          |
|---|--|--------------------------|----------|----------|----------|----------|----------|----------|-------------|--------------|------------|--------------|----------|-----|----------|----------|
| Description   | Source   | Type                     | TSP      | PM10     | PM2.5    | SO2      | NOx      | СО       | VOC         | PAH          | CO2e       | DIOXIN/FURAN | As       | Bi  | Co       | Cu       |
|   | I.1 - General land clearing                        | A - Fugitive Emissions   | 1.50E+02 | 4.92E+01 | 1.58E+01 | N/A      | N/A      | N/A      | N/A         | N/A          | N/A        | N/A          | N/A      | N/A | N/A      | N/A      |
|   | i.i - General land clearing                        | B- Exhaust Emissions     | 5.06E-01 | 5.06E-01 | 4.91E-01 | 2.20E-02 | 1.00E+01 | 3.56E+00 | 6.02E-01    | 3.84E-03     | 2.63E+03   | N/A          | N/A      | N/A | N/A      | N/A      |
|   | 1.2 - Loading of land cleared debris into trucks   | A - Fugitive Emissions   | 1.06E+01 | 5.49E+00 | 1.11E+00 | N/A      | N/A      | N/A      | N/A         | N/A          | N/A        | N/A          | N/A      | N/A | N/A      | N/A      |
| I -Land Clearing and Debris Removal   | 1.2 - Edduling of failu cleared debris into trucks | B- Exhaust Emissions     | 4.30E-01 | 4.30E-01 | 4.17E-01 | 2.37E-02 | 9.09E+00 | 2.98E+00 | 4.50E-01    | 4.15E-03     | 2.83E+03   | N/A          | N/A      | N/A | N/A      | N/A      |
| I -Land Cleaning and Debris Removal   | I.3- Truck transport of debris (unpayed roads)     | A - Fugitive Emissions   | 4.04E+01 | 8.26E+00 | 8.26E-01 | N/A      | N/A      | N/A      | N/A         | N/A          | N/A        | N/A          | N/A      | N/A | N/A      | N/A      |
|   | 1.3- Truck transport of debits (unpaved roads)     | B- Exhaust Emissions     | 2.26E-01 | 2.26E-01 | 2.19E-01 | 1.03E-02 | 5.06E+00 | 1.73E+00 | 2.37E-01    | 1.81E-03     | 1.23E+03   | N/A          | N/A      | N/A | N/A      | N/A      |
|   | I.4 Dumping material onto overburden stockpile     | A - Fugitive Emissions   | 3.49E-01 | 1.65E-01 | 2.50E-02 | N/A      | N/A      | N/A      | N/A         | N/A          | N/A        | N/A          | N/A      | N/A | N/A      | N/A      |
|   | I.5 Wind erosion off of overburden stockpile       | A - Fugitive Emissions   | 8.84E+01 | 4.42E+01 | 6.63E+00 | N/A      | N/A      | N/A      | N/A         | N/A          | N/A        | N/A          | N/A      | N/A | N/A      | N/A      |
|   | II.1 - Drilling                                    | A - Fugitive Emissions   | 1.31E+00 | 5.82E-01 | 1.08E-01 | N/A      | N/A      | N/A      | N/A         | N/A          | N/A        | N/A          | N/A      | N/A | N/A      | N/A      |
|   | II.1 - Dillillig                                   | B- Exhaust Emissions     | 2.70E-02 | 2.70E-02 | 2.62E-02 | 2.19E-03 | 8.36E-01 | 1.77E-01 | 3.55E-02    | 3.83E-04     | 2.61E+02   | N/A          | N/A      | N/A | N/A      | N/A      |
|   | II.2 - Blasting                                    | A - Fugitive Emissions   | 5.16E-01 | 2.68E-01 | 1.55E-02 | 4.07E+00 | 6.93E+01 | 1.75E+02 | N/A         | N/A          | 1.28E+01   | N/A          | N/A      | N/A | N/A      | N/A      |
|   | II.3 - Bulldozing                                  | A - Fugitive Emissions   | 1.00E+02 | 3.28E+01 | 1.05E+01 | N/A      | N/A      | N/A      | N/A         | N/A          | N/A        | N/A          | N/A      | N/A | N/A      | N/A      |
| II.4 - Material handling  II - Site Preparation (earth moving)  II.5 - Compacting | II.3 - Bulluozilig                                 | B- Exhaust Emissions     | 4.59E-01 | 4.59E-01 | 4.45E-01 | 1.51E-02 | 8.27E+00 | 2.41E+00 | 4.62E-01    | 2.64E-03     | 1.80E+03   | N/A          | N/A      | N/A | N/A      | N/A      |
|   | A - Fugitive Emissions                             | 1.19E-01                 | 5.62E-02 | 8.52E-03 | N/A      | N/A      | N/A      | N/A      | N/A         | N/A          | N/A        | N/A          | N/A      | N/A | N/A      |          |
|   | II.4 - Material Hariding                           | B- Exhaust Emissions     | 3.12E-01 | 3.12E-01 | 3.03E-01 | 1.28E-02 | 5.37E+00 | 2.80E+00 | 3.52E-01    | 2.24E-03     | 1.53E+03   | N/A          | N/A      | N/A | N/A      | N/A      |
|   | A - Fugitive Emissions                             | 1.64E+01                 | 5.37E+00 | 1.72E+00 | N/A      | N/A      | N/A      | N/A      | N/A         | N/A          | N/A        | N/A          | N/A      | N/A | N/A      |          |
|   | B- Exhaust Emissions                               | 4.92E-02                 | 4.92E-02 | 4.77E-02 | 1.57E-03 | 7.64E-01 | 1.73E-01 | 5.43E-02 | 2.75E-04    | 1.88E+02     | N/A        | N/A          | N/A      | N/A | N/A      |          |
|   | II.6 - Grading                                     | A - Fugitive Emissions   | 1.68E+01 | 4.91E+00 | 5.20E-01 | N/A      | N/A      | N/A      | N/A         | N/A          | N/A        | N/A          | N/A      | N/A | N/A      | N/A      |
|   | II.0 - Grading                                     | B- Exhaust Emissions     | 2.75E-02 | 2.75E-02 | 2.67E-02 | 1.26E-03 | 5.68E-01 | 1.86E-01 | 5.33E-02    | 2.20E-04     | 1.50E+02   | N/A          | N/A      | N/A | N/A      | N/A      |
|   | II.7 - Loading of aggregate material into trucks   | A - Fugitive Emissions   | 6.54E+01 | 3.40E+01 | 6.87E+00 | N/A      | N/A      | N/A      | N/A         | N/A          | N/A        | N/A          | N/A      | N/A | N/A      | N/A      |
|   | 11.7 - Loading of aggregate material into trucks   | B- Exhaust Emissions     | 2.79E-01 | 2.79E-01 | 2.71E-01 | 1.54E-02 | 6.24E+00 | 2.13E+00 | 2.93E-01    | 2.70E-03     | 1.84E+03   | N/A          | N/A      | N/A | N/A      | N/A      |
|   | II.8 Hauling material                              | A - Fugitive Emissions   | 1.94E+02 | 3.97E+01 | 3.97E+00 | N/A      | N/A      | N/A      | N/A         | N/A          | N/A        | N/A          | N/A      | N/A | N/A      | N/A      |
|   | II.0 Hadiling Haterial                             | B- Exhaust Emissions     | 1.32E+00 | 1.32E+00 | 1.28E+00 | 6.02E-02 | 2.79E+01 | 9.13E+00 | 1.38E+00    | 1.05E-02     | 7.20E+03   | N/A          | N/A      | N/A | N/A      | N/A      |
|   | II.9 - Jaw crusher                                 | A - Fugitive Emissions   | 1.45E+02 | 5.82E+01 | 1.08E+00 | N/A      | N/A      | N/A      | N/A         | N/A          | N/A        | N/A          | N/A      | N/A | N/A      | N/A      |
|   | II.10 Material screening                           | A - Fugitive Emissions   | 1.82E+02 | 6.25E+01 | 3.64E-01 | N/A      | N/A      | N/A      | N/A         | N/A          | N/A        | N/A          | N/A      | N/A | N/A      | N/A      |
|   | III.1 - Vehicular traffic                          | A - Fugitive Emissions   | 3.54E+01 | 7.25E+00 | 7.25E-01 | N/A      | N/A      | N/A      | N/A         | N/A          | N/A        | N/A          | N/A      | N/A | N/A      | N/A      |
|   | III.1 - Verilculai trailic                         | B- Exhaust Emissions     | 8.74E+00 | 8.74E+00 | 8.48E+00 | 2.77E-01 | 1.73E+02 | 6.69E+01 | 7.94E+00    | 4.84E-02     | 3.31E+04   | N/A          | N/A      | N/A | N/A      | N/A      |
|   | III.2 - Air transport                              | A - Fugitive Emissions   | 4.66E+01 | 2.33E+01 | 3.50E+00 | N/A      | N/A      | N/A      | N/A         | N/A          | N/A        | N/A          | N/A      | N/A | N/A      | N/A      |
|   | III.3 -Offsite transport, access road              | A - Fugitive Emissions   | 4.46E+02 | 9.12E+01 | 9.12E+00 | N/A      | N/A      | N/A      | N/A         | N/A          | N/A        | N/A          | N/A      | N/A | N/A      | N/A      |
| III - General Construction  | iii.5 "Olisile transport, access road              | B- Exhaust Emissions     | 4.30E-02 | 4.30E-02 | 3.96E-02 | 3.57E-03 | 1.96E+00 | 8.98E-01 | 1.83E-01    | 1.37E-03     | 9.34E+02   | N/A          | N/A      | N/A | N/A      | N/A      |
|   | III.4 -Offsite transport, Tilcho road              | A - Fugitive Emissions   | 2.67E+02 | 5.47E+01 | 5.47E+00 | N/A      | N/A      | N/A      | N/A         | N/A          | N/A        | N/A          | N/A      | N/A | N/A      | N/A      |
|   | III.4 -Onaite transport, Filcho road               | B- Exhaust Emissions     | 2.58E-02 | 2.58E-02 | 2.37E-02 | 2.14E-03 | 1.17E+00 | 5.39E-01 | 1.10E-01    | 5.46E-04     | 3.73E+02   | N/A          | N/A      | N/A | N/A      | N/A      |
|   | III.5 - Power generation                           | C - Combustion Emissions | 6.66E+01 | 6.16E+01 | 6.16E+01 | 1.63E+00 | 3.44E+03 | 9.13E+02 | 4.46E+00    | 2.26E-01     | 1.86E+05   | N/A          | N/A      | N/A | N/A      | N/A      |
|   | III.6- Incineration                                | C - Combustion Emissions | 7.04E-01 | 6.42E-01 | 6.19E-01 | 1.53E+00 | 2.07E+01 | 5.17E+00 | 1.02E-01    | 1.26E-03     | 3.61E+03   | 8.50E-10     | 3.99E-05 | N/A | 6.45E-05 | 4.40E-03 |
| Total   |  |                          | 1,886.78 | 596.82   | 142.59   | 7.68     | 3,779.43 | 1,187.44 | 16.72       | 0.31         | 243,314.72 | 8.50E-10     | 3.99E-05 | N/A | 6.45E-05 | 0.0044   |

N/A- No applicable emissions

| Description                          |          |        |        |       |          | Emission Rate ( | kg/day) |       |            |              |          |     |          |        |
|--------------------------------------|----------|--------|--------|-------|----------|-----------------|---------|-------|------------|--------------|----------|-----|----------|--------|
| Description                          | TSP      | PM10   | PM2.5  | SO2   | NOx      | co              | VOC     | PAH   | CO2e       | DIOXIN/FURAN | As       | Bi  | Co       | Cu     |
| I -Land Clearing and Debris Removal  | 290.96   | 108.45 | 25.48  | 0.056 | 24.16    | 8.26            | 1.29    | 0.010 | 6,696.13   | N/A          | N/A      | N/A | N/A      | N/A    |
| II - Site Preparation (earth moving) | 724.33   | 240.85 | 27.56  | 4.18  | 119.20   | 192.20          | 2.63    | 0.019 | 12,986.18  | N/A          | N/A      | N/A | N/A      | N/A    |
| III - General Construction           | 871.50   | 247.52 | 89.55  | 3.44  | 3,636.07 | 986.98          | 12.80   | 0.28  | 223,632.41 | 8.50E-10     | 3.99E-05 | N/A | 6.45E-05 | 0.0044 |
| Total                                | 1,886.78 | 596.82 | 142.59 | 7.68  | 3,779.43 | 1,187.44        | 16.72   | 0.31  | 243,314.72 | 8.50E-10     | 3.99E-05 | N/A | 6.45E-05 | 0.0044 |

N/A- No applicable emissions



# I -Land Clearing and Debris Removal

I.1 - General land clearing

| A - Fugitive Emissions |
|------------------------|
|------------------------|

| Dust Control Technique            |       | No control |         |
|-----------------------------------|-------|------------|---------|
|                                   |       |            |         |
| Number of equipment               | рс    | A          | 3 (a)   |
| Hours of operation per day - peak | h/day | В          | 6.0 (b) |
| Material silt content             | (%)   | С          | 56 (c)  |
| Material moisture content         | (%)   | D          | 17 (d)  |
| Emission reduction efficiency     | (%)   | E          | 0       |

Source: (a) Information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx"; one skidder, harvester and one dozer was included in land clearing.

- (b) Number of work hours per day taken as the maximum construction equipment operation for a tractor/dozer.
- (c) Material silt content taken as average silt content of the tall and glacio-lacustrine deposit from Golder FEED document.
- (d) Moisture content taken as the maximum overburden moisture content from AP 42 chapter 11.9 Western surface Coal Mine/ Table 11.9-3 (Metric and English Units). Typical Values For Correction Factors Applicable to the Predictive Emission Factor Equations.

|                                      |       |                          | TSP <= 30 um | TSP <= 15 um | PM <sub>10</sub> | PM <sub>2,5</sub> |
|--------------------------------------|-------|--------------------------|--------------|--------------|------------------|-------------------|
|                                      |       |                          | 101 1 00 0   | 151 1 25 4   | 10               | 2.5               |
| Constant (a)                         |       | F                        | 2.6          | 0.45         | -                |                   |
| Constant (b)                         | -     | G                        | 1.2          | 1.5          | -                |                   |
| Constant (c)                         | ·     | Н                        | 1.3          | 1.4          | -                |                   |
| Scaling Factor                       |       | I                        |              | -            | 0.75             | 0.10              |
| Emission rate (uncontrolled)         | g/hr  | J = F*(C^G)/(D^H)*1000*A | 24,946.99    | 10,893.89    | 8,170.41         | 2,619.43          |
| Emission rate (controlled)           | g/hr  | K = J*(1-E/100)          | 24,946.99    | 10,893.89    | 8,170.41         | 2,619.43          |
| Daily emission rate (uncontrolled)   | g/day | L = J*B                  | 150,092.03   | 65,542.39    | 49,156.79        | 15,759.66         |
| Daily emission rate (controlled)     | g/day | M = K*B                  | 150,092.03   | 65,542.39    | 49,156.79        | 15,759.66         |
| Maximum emission rate (uncontrolled) | g/s   | N = L/(B*3600)           | 6.93         | 3.03         | 2.27             | 0.73              |
| Maximum emission rate (controlled)   | g/s   | O = M/(B*3600)           | 6.93         | 3.03         | 2.27             | 0.7               |
| Quality rating                       |       |                          | В            | _            | D                | D                 |

Source: (a) AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines (bulldozing overburden). According to recommendations in AP-42 / Section 13.2.3 - Heavy Construction Operations (USEPA, January 1995) / Table 13.2.3-1 - Recommended Emission Factors for Construction Operations (reference to dozer equation (overburden) in Section 11.9 / Table 11.9.2).

- (b) Scaling factor to convert TSP <= 30 um to PM  $_{2.5}$  and TSP <= 15 um to PM  $_{10}$ .
- (c) PM<sub>10</sub> and PM<sub>2.5</sub> calculated multiplying TSP emission rates by respective scaling factors.

| Equipment/Vehicle | Model   | Number of Equipment/Vehicle | Daily Use |
|-------------------|---|-----------------------------|-----------|
| Skidder           | Caterpillar 527; or equivalent                    | 1                           | 3.0       |
| Harvester         | Caterpillar 501 HD Track Harvester; or equivalent | 1                           | 3.0       |
| Track-dozer       | Caterpillar D8T/Komatsu D155AX-6                  | 1                           | 6.0       |

|                     |           |                                    | SO <sub>2</sub> | NO <sub>X</sub> | co     | PM <sub>2.5</sub> | PM <sub>10</sub> | VOC      | PAH      | CO <sub>2</sub> e |
|---------------------|-----------|------------------------------------|-----------------|-----------------|--------|-------------------|------------------|----------|----------|-------------------|
| Daily emission rate | tonne/day | (refer to Construction combustion) | 2.20E-05        | 0.010           | 0.0036 | 4.91E-04          | 5.06E-04         | 6.02E-04 | 3.84E-06 | 2.63              |
|                     |           |                                    |                 |                 |        |                   |                  |          | •        |                   |

# **Calculation of Emissions During the Construction Phase**

# I.2 - Loading of land cleared debris into trucks

#### A - Fugitive Emission

| Dust Control reclinique          |            | NO CONTROL |         |
|----------------------------------|------------|------------|---------|
|                                  |            |            |         |
| Hours of operation per day       | h/day      | A          | 6.0 (a) |
| Amount of debris removed per day | tonnes/day | В          | 586 (b) |
| Emission reduction efficiency    | (%)        | С          | 0       |

Source: (a) Work will be undertaken by a front end loader; operational hours relate to the front end loader from "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx".

(b) Information based Cost Summary Cost Estimate CDF, January 2011; 175,000 m<sup>3</sup> of overburden removed.

|                                      |          |                        | TSP       | PM <sub>10</sub> | PM <sub>2.5</sub> |             |
|--------------------------------------|----------|------------------------|-----------|------------------|-------------------|-------------|
| Emission factor (uncontrolled)       | kg/tonne | D                      | 0.0180    | 0.0094           | 0.0019            | (a) (b) (c) |
| Daily emission rate (controlled)     | g/day    | E = B*D*1000*(1-C/100) | 10,556.74 | 5,489.51         | 1,108.46          |             |
| Daily emission rate (uncontrolled)   | g/day    | F = B*D*1000           | 10,556.74 | 5,489.51         | 1,108.46          |             |
| Maximum emission rate (controlled)   | g/s      | G = E/(A*3600)         | 0.49      | 0.25             | 0.051             |             |
| Maximum emission rate (uncontrolled) | g/s      | H = F/(A*3600)         | 0.49      | 0.25             | 0.051             |             |
| Quality rating                       |          |                        | E         | -                | -                 |             |

Source: (a) TSP emission factor extracted from AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9.4 - Uncontrolled Particulate Emission Factors for Open Dust Sources at Western Surface Coal Mine (truck loading by power shovel (batch drop) / overburden).

(b) Emission factor for PM<sub>10</sub> based on the ratio between TSP and PM<sub>10</sub> emission factors for blasting in AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mining

(c) Emission factor for PM<sub>2.5</sub> based on the ratio between TSP and PM<sub>2.5</sub> emission factors for bulldozing overburden in AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines.

| Equipment/Vehicle        | Model                             | Number of Equipment/Vehicle | Daily Use |
|--------------------------|-----------------------------------|-----------------------------|-----------|
| Wheeled Front End Loader | Caterpillar 992K/Komatsu WA 900-3 | 1                           | 6.0       |

|                     |           |                                    | SO <sub>2</sub> | NO <sub>x</sub> | co     | PM <sub>2.5</sub> | PM <sub>10</sub> | voc      | PAH      | CO <sub>2</sub> e |  |
|---------------------|-----------|------------------------------------|-----------------|-----------------|--------|-------------------|------------------|----------|----------|-------------------|--|
| Daily emission rate | tonne/day | (refer to Construction combustion) | 2.37E-05        | 0.0091          | 0.0030 | 4.17E-04          | 4.30E-04         | 4.50E-04 | 4.15E-06 | 2.83              |  |

# I.3- Truck transport of debris (unpaved roads)

# A - Fugitive Emissions Dust Control Technique

| Dust Control Technique                      |  | Watering twice a day | (a)     |
|---|--|----------------------|---------|
| Source:                                     | (a) Information provided by Fortune in an email dated Feb. 15 $$ | , 2011.              | _       |
|   |  |                      | 1       |
| Hours of operation per day - peak           | h/day  | A                    | 2.0 (a) |
| Surface material silt content               | (%)  | В                    | 1.6 (b) |
| Mean vehicle weight                         | tonnes   | С                    | 58 (c)  |
| Vehicle kilometer traveled (VKT)            | km/day   | D                    | 36 (c)  |
| Number of working days                      | days/year  | E                    | 365     |
| Number of days with precipitation >= 0.2 mm | days/year  | F                    | 58 (d)  |
| Emission reduction efficiency               | (%)  | G                    | 55 (e)  |

Source: (a) Information provided by Fortune. Daily operating time assumed to the same as underground haulage construction vehicles.

(b) Roads are assumed to be lined with aggregate and it is expected to have a similar silt content as limestone; data available in AP 42 chapter 13.2.4/table 13.2.4-1.

(c) See Mean Vehicle Weight table below.

(d) Value derived from Fortune 2004-2007 onsite meteorological station (Fortune\_2004\_2007\_MetData(Oct8 04 - Sep27 07)\_MD.xls).

(e) Assumed watering based on the use of onsite water trucks. Unpaved Industrial Road Dust Calculator (Environment Canada website, accessed in December 2009).

|  |        |  | PM-30 (TSP) | PM <sub>10</sub> | PM <sub>2.5</sub> |     |
|--|--------|--|-------------|------------------|-------------------|-----|
| Constant (k)   | -      | Н  | 4.90        | 1.50             | 0.15              | (a) |
| Constant (a)   | -      | I  | 0.70        | 0.90             | 0.90              | (a) |
| Constant (b)   | -      | J  | 0.45        | 0.45             | 0.45              | (a) |
| Emission factor (uncontrolled)                                   | lb/VMT | $K = H*((B/12)^{1})*((C*1.1/3)^{1})*[(E-F)/E]$ | 3.97        | 0.81             | 0.08              | a)  |
| Emission factor (uncontrolled, metric)                           | g/VKT  | L = K*281.9                                    | 1120.08     | 229.16           | 22.92             | b)  |
| Emission factor (controlled)                                     | g/VKT  | M = K*281.9*(1-G/100)                          | 504.03      | 103.12           | 10.31             | b)  |
| Emission factor (uncontrolled, without precipitation correction) | g/VKT  | N = H*((B/12)^I)*((C*1.1/3)^J)*281.9           | 1330.24     | 272.15           | 27.22             |     |
| Emission factor (controlled, without precipitation correction)   | g/VKT  | O = N * (1- G/100)                             | 598.61      | 122.47           | 12.25             |     |
| Daily emission rate (controlled)                                 | g/day  | P = M*D  | 18,167.74   | 3,716.93         | 371.69            |     |
| Daily emission rate (uncontrolled)                               | g/day  | Q = L*D  | 40,372.76   | 8,259.84         | 825.98            |     |
| Daily emission rate (controlled, no precip. correction)          | g/day  | R= O*D   | 21,576.66   | 4,414.35         | 441.44            |     |
| Daily emission rate (uncontrolled, no precip correction)         | g/day  | S = N*D  | 47,948.13   | 9,809.67         | 980.97            |     |
| Maximum emission rate (control)                                  | g/s    | T = P/(A*3600)                                 | 2.52        | 0.51             | 0.051             |     |
| Maximum emission rate (uncontrolled)                             | g/s    | U = Q/(A*3600)                                 | 5.59        | 1.14             | 0.11              |     |
| Maximum emission rate (control, no precip. correction)           | g/s    | V = R/(A*3600)                                 | 2.99        | 0.61             | 0.061             |     |
| Maximum emission rate (uncontrolled, no precip. correction)      | g/s    | W = S/(A*3600)                                 | 6.64        | 1.36             | 0.14              |     |
| Quality rating   | -      |  | В           | В                | В                 |     |

Source: (a) AP-42 / Section 13.2.2 - Unpaved Roads (USEPA, November 2006)/ Equation (1a) - unpaved surfaces at industrial sites and Table 13.2.2-2.

(b) 281.9 constant to convert lb/VMT (pounds per vehicle mile travelled) to g/VKT (grams per vehicle kilometer travelled).

# **Calculation of Emissions During the Construction Phase**

Mean Vehicle Weight

| Equipment                        |        | Underground Haulage<br>Units | Total |     |
|----------------------------------|--------|------------------------------|-------|-----|
| Weight - Empty                   | tonne  | 32.50                        |       | (a) |
| Weight - Loaded                  | tonne  | 82.50                        |       | (a) |
| Mean Weight                      | tonne  | 58                           |       |     |
| Number of two way trips          | number | 11.73                        |       | (b) |
| Distance of two way trip         | km/day | 3.07                         |       | (c  |
| Vehicle kilometer traveled (VKT) | km/day | 36.04                        | 36.04 |     |
| Percentage of traffic            | %      | 100%                         | •     |     |
| Mean vehicle weight              | tonne  | 57.50                        | 57.50 |     |

Source: (a) Information provided in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx".

- (b) Information based Cost Summary Cost Estimate CDF, January 2011; 175,000 m<sup>3</sup> of overburden removed.
- (c) Assumed all land clearing vehicles will travel on the road once a day. Distance travelled will be approximately from plant area to centre of CDF.

B- Exhaust Emissions

| Underground Haulage Unit | Sandvik 50 | 2                                  | 2.0             |                 |        |                   |                  |          |          |                 |
|--------------------------|------------|------------------------------------|-----------------|-----------------|--------|-------------------|------------------|----------|----------|-----------------|
|                          |            |                                    |                 |                 |        |                   |                  |          |          |                 |
|                          |            |                                    | SO <sub>2</sub> | NO <sub>x</sub> | CO     | PM <sub>2.5</sub> | PM <sub>10</sub> | VOC      | PAH      | CO <sub>2</sub> |
| Daily emission rate      | tonne/day  | (refer to Construction combustion) | 1.03E-05        | 0.0051          | 0.0017 | 2.19E-04          | 2.26E-04         | 2.37E-04 | 1.81E-06 |                 |

Number of Equipment/Vehicle

#### I.4 Dumping material onto overburden stockpile

A - Fugitive Emissions

Dust Control Technique

| Hours of operation per day - maximum  | h/day      | А | 6.0 (a    |
|---------------------------------------|------------|---|-----------|
| Amount of material handled per day    | tonnes/day | В | 586 (b    |
| Mean wind speed - maximum daily value | m/s        | С | 13 (c     |
| Material moisture content             | %          | D | 17 (d     |
| Constant (a)                          | -          | E | 0.0016 (e |
| Constant (b)                          | -          | F | 1.3 (e    |
| Constant (c)                          | -          | G | 2.2 (e    |
| Constant (d)                          | -          | Н | 1.4 (e    |
| Constant (e)                          | -          |   | 2.0 (e    |
| Emission reduction efficiency         | (%)        | J | 0         |

Source: (a) Based on information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx" assumed the same operating time as the haul trucks.

- (b) Information based Cost Summary Cost Estimate CDF, January 2011; 175,000 m<sup>3</sup> of overburden removed.
- (c) Value derived from Fortune 2004-2007 onsite meteorological station (Fortune\_2004\_2007\_MetData(Oct8 04 Sep27 07)\_MD.xls).

No control

(d) Moisture content taken as the maximum overburden moisture content from AP 42 chapter 11.9 Western surface Coal Mine/ Table 11.9-3 (Metric and English Units). Typical Values For Correction Factors Applicable to the Predictive Emission Factor Equations.

(e) AP-42 / 13.2.4 - Aggregate Handling And Storage Piles (USEPA, November 2006)/ equation 1 - emission factor for drop operation.

|                                      |          |                                 | 15P <= 30 um | PIVI <sub>10</sub> | PIVI <sub>2.5</sub> |
|--------------------------------------|----------|---------------------------------|--------------|--------------------|---------------------|
| Particle size multiplier             | •        | K                               | 0.74         | 0.35               | 0.053               |
| Emission factor (uncontrolled)       | kg/tonne | $L = K*E*((C/G)^F)/((D/I)^H)$   | 5.95E-04     | 2.81E-04           | 4.26E-05            |
| Maximum emission rate (controlled)   | g/s      | M = B*L*(1-J/100)*1000/(A*3600) | 0.016        | 0.0076             | 0.0012              |
| Maximum emission rate (uncontrolled) | g/s      | N = B*L*1000/(A*3600)           | 0.016        | 0.0076             | 0.0012              |
| Quality rating                       | -        | -                               | А            | A                  | A                   |

Source: (a) AP-42 / 13.2.4 - Aggregate Handling And Storage Piles (USEPA, November 2006)/ equation 1 - emission factor for drop operation.



# **Calculation of Emissions During the Construction Phase**

### I.5 Wind erosion off of overburden stockpile

A - Fugitive Emissions

| Dust Control Technique                      |           | No Control |         |
|---|-----------|------------|---------|
|   |           |            |         |
| Pile surface area                           | ha        | A          | 4 (a)   |
| Percentage of time WS >19.3 km/h            | %         | В          | 31 (b)  |
| Material silt content                       | %         | С          | 7.5 (c) |
| Number of days with precipitation >= 0.2 mm | days/year | D          | 58 (d)  |
| Constant (a)                                | -         | E          | 1.9 (e) |
| Constant (b)                                | -         | F          | 1.5 (e) |
| Constant (c)                                | -         | G          | 365 (e) |
| Constant (d)                                | -         | Н          | 235 (e) |
| Constant (e)                                | -         |            | 15 (e)  |
| Emission reduction efficiency               | (%)       | J          | 0       |

Source: (a) Information based Cost Summary Cost Estimate CDF, January 2011; 175,000 m<sup>3</sup> of overburden removed and assuming a 5 m tall stockpiles.

(b) Value derived from Fortune 2004-2007 onsite meteorological station (Fortune\_2004\_2007\_MetData(Oct8 04 - Sep27 07)\_MD.xls).

(c) material silt content taken as the mean overburden silt content for Western surface coal mine in AP 42 chapter 13.2.4 Aggregate Handling and Storage Piles/ Table 13.2.4-1 Typical Silt and Moisture Contents of Materials at Various Industries.

(d) Value derived from Fortune 2004-2007 onsite meteorological station (Fortune 2004 2007 MetData(Oct8 04 - Sep27 07) MD.xls).

(e) Control of Open Fugitive Dust Source (USEPA, September 1988) / Equation (4-9).

(f) Constant of 1.7 lb/year/acre converted to 1.9 lb/day/ha by multiplying by 0.454 kg/lb, 1 acre/0.405 ha and 1 year/365 days. The 1 year/365 days cancels out the 365 day in the equation listed in EPA (1988).

|   |         |  | TSP <= 30 um | PM <sub>10</sub> | PM <sub>2.5</sub> | ı       |
|---|---------|--|--------------|------------------|-------------------|---------|
| Scaling factors   | -       | K  | -            | 0.5              | 0.075             | (a)     |
| Emission factor (uncontrolled)  | kg/d/ha | L = E*(C/F)*((G-D)/H)*(B/I)                            | 25.27        | 12.63            | 1.89              | (b) (c) |
| Maximum emission rate (controlled)                                    | g/s     | $M = L^*A^*1000^*(1-J/100)/(24^*3600)$                 | 1.02         | 0.51             | 0.077             | 1       |
| Maximum Emission rate (uncontrolled)                                  | g/s     | M' = L*A*1000/(24*3600)                                | 1.02         | 0.51             | 0.077             | l       |
| Maximum emission rate (controlled, removing precipitation correction) | g/s     | M"= E*(C/F)*((G-0)/H)*(B/I)*A*1000*(1-J/100)/(24*3600) | 1.22         | 0.61             | 0.091             | 1       |
| Maximum emission rate (uncontrolled, removing precip correction)      | g/s     | M"'= E*(C/F)*((G-0)/H)*(B/I)*A*1000/(24*3600)          | 1.22         | 0.61             | 0.091             | l       |

Source: (a) AP-42/Section 13.2.5 - Industrial Wind Erosion.

(b) TSP calculated according to Control of Open Fugitive Dust Source (USEPA, September 1988) / Equation (4-9). (c) PM<sub>10</sub> and PM<sub>2.5</sub> calculated by multiplying TSP emission rate by respective scaling factors.

# II - Site Preparation (earth moving)

# II.1 - Drilling

| Δ- | Fugitive | Emission    | • |
|----|----------|-------------|---|
| м- | rugitive | EIIIISSIUII | 3 |

| Source: (a) Assume wet drilling.     |            |   |            |  |
|--------------------------------------|------------|---|------------|--|
| Hours of operation per day - maximum | h/day      | A | 1.3 (a)    |  |
| Material throughput                  | tonnes/day | В | 14,541 (b) |  |
| Emission reduction efficiency        | (%)        | C | 0          |  |

Source: (a) Information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx/Road Construction Estimate". Operating time taken from Heavy Duty Equipment/blast hole drill for two drills.

(b) Assume same mass of material drilled that is blasted.

|   |          |                        | TSP      | PM <sub>10</sub> | PM <sub>2.5</sub> |             |
|---|----------|------------------------|----------|------------------|-------------------|-------------|
| Emission factor (controlled - wet drilling) | kg/tonne | D                      | 9.00E-05 | 4.00E-05         | 7.41E-06          | (a) (b) (c) |
| Daily emission rate (uncontrolled)          | g/day    | E = B*D*1000           | 1308.69  | 581.64           | 107.71            |             |
| Daily emission rate (controlled)            | g/day    | F = B*D*1000*(1-C/100) | 1308.69  | 581.64           | 107.71            |             |
| Maximum emission rate (uncontrolled)        | g/s      | G = E/(A*3600)         | 0.29     | 0.13             | 0.024             |             |
| Maximum emission rate (controlled))         | g/s      | H = F/(A*3600)         | 0.29     | 0.13             | 0.024             |             |
| Quality rating                              | =        |                        | С        | -                | -                 |             |

Wet drilling

Source: (a) Emission factor for TSP extracted from in AP-42 / 11.19.2 - Crushed Stone Processing and Pulverized Mineral Processing (USEPA, August 2004)/ Table 11.19.2.1 (value for Wet Drilling - Unfragmented Stone).

(b) Emission factor for TSP based on the ratio between TSP and PM<sub>10</sub> emission factors for tertiary crushing (uncontrolled) in AP-42 / 11.19.2 - Crushed Stone Processing and Pulverized Mineral Processing (USEPA, August 2004)/ Table 11.19.2.1.

(c) Emission factor for PM2.5 based on the ratio between PM10 and PM2.5 emission factors for tertiary crushing (controlled) in AP-42 / 11.19.2 - Crushed Stone Processing and Pulverized Mineral Processing (USEPA, August 2004)/ Table 11.19.2.1.

| Equipment/Vehicle               | Model                                      | Number of Equipment/Vehicle | Daily Use |
|---------------------------------|--|-----------------------------|-----------|
| Self-Propelled Blast Hole Drill | Sandvik D45KS; Atlas Copco DML; or similar | 1                           | 1.0       |
| Air Trac Drill                  | ATD 3100 B, Drifter Attachment PP 123      | 1                           | 0.3       |

|                     |           |                                    | SO <sub>2</sub> | NO <sub>x</sub> | co       | PM <sub>2.5</sub> | PM <sub>10</sub> | voc      | PAH      | CO <sub>2</sub> e |
|---------------------|-----------|------------------------------------|-----------------|-----------------|----------|-------------------|------------------|----------|----------|-------------------|
| Daily emission rate | tonne/day | (refer to Construction combustion) | 2.19E-06        | 8.36E-04        | 1.77E-04 | 2.62E-05          | 2.70E-05         | 3.55E-05 | 3.83E-07 | 0.26              |

### II.2 - Blasting

| Α- | Fugit | tive | Emi | ssion |  |
|----|-------|------|-----|-------|--|
|    |       |      |     |       |  |

| Dust Control Technique       |            | No control |            |
|------------------------------|------------|------------|------------|
|                              |            |            | -          |
| Blasting from ANFO           | tonne/year | A          | 185.88 (a) |
| Blasting from Emulsion blend | tonne/year | В          | 185.88 (a) |
| Number of Blasts per day     | blasts/day | С          | 18.76 (a)  |

Source: (a) Information provided by Fortune in "NICO estimated blasting quantities.xlsx".

|                    |           |                               | SO2    | NOx   | со   | CH4      | H2S    | CO <sub>2</sub> e |        |
|--------------------|-----------|-------------------------------|--------|-------|------|----------|--------|-------------------|--------|
| ANFO constant (a)  | kg/Mg     | D                             | 1      | 8     | 34   |          |        |                   | (a)    |
| Emulsion blend (b) | kg/Mg     | E                             | 1      | 26    | 52   | 0.3      | 2      |                   | (a)(b) |
| Emission rate      | tonne/day | F = (A*D+B*F)/10^3/(365*3/12) | 0.0041 | 0.069 | 0.18 | 6 11F-04 | 0.0041 | 0.013             |        |

Source: (a) Emission factors taken from AP-42 Section 13.3.

(b) Assumed that Emulsion blend is Dynamite Gelatin within AP-42, chapter 13.

|                                    |           |                                | TSP <= 30 um | PM <sub>10</sub> | PM <sub>2.5</sub> | ı      |
|------------------------------------|-----------|--------------------------------|--------------|------------------|-------------------|--------|
| Constant (a)                       | -         | Н                              | 0.00022      | -                | -                 | (a)    |
| Constant (b)                       | -         | I                              | 1.5          | -                | -                 | (a)    |
| Scaling factor                     | -         | J                              | -            | 0.52             | 0.03              | (b)    |
| Emission rate (uncontrolled)       | kg/year   | K = H*(1250/50)^I*C*(365*3/12) | 47.08        | 24.48            | 1.41              | (c)(d) |
| Daily emission rate (uncontrolled) | tonne/day | L= K/1000/(365*3/12)           | 5.16E-04     | 2.68E-04         | 1.55E-05          | (e)    |

Source: (a) AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998)/ Table 11.9-2 - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines (blasting).

(b) Scaling factor to convert TSP <= 30 um to  $PM_{2.5}$  and  $PM_{10}$ .

(c)  $\mathrm{PM}_{10}$  and  $\mathrm{PM}_{2.5}$  calculated multiplying TSP emission rate by respective scaling factors.

(d) Fortune provided that for 50 blasts results in 1250 m<sup>2</sup> of disturbed area in an email dated November 29, 2010.

(e) Fortune has specified that contruction blasting will only last 3 months ("NICO estimated blasting quantities.xlsx").

# **Calculation of Emissions During the Construction Phase**

# II.3 - Bulldozing

# A - Fugitive Emissions

| Dust Control Technique            | No control |   |      |
|-----------------------------------|------------|---|------|
|                                   |            |   |      |
| Number of equipment               | рс         | A | 2 (  |
| Hours of operation per day - peak | h/day      | В | 6.0  |
| Material silt content             | (%)        | С | 56 ( |
| Material moisture content         | (%)        | D | 16.8 |
| Emission reduction efficiency     | (%)        | E | 0    |

Source: (a) Information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx". Two dozers are assumed to perform this task.

- (b) Information provided by Fortune. Daily operating time assumed to be the same as the dozers.
- (c) Material silt content taken as average silt content of the till and glacio-lacustrine deposit from Golder FEED document.
- (d) Moisture content taken as the maximum overburden moisture content from AP-42 chapter 11.9 Western surface Coal Mine/ Table 11.9-3 (Metric and English Units). Typical Values For Correction Factors Applicable to the Predictive Emission Factor Equations.

|                                      |       |                          | TSP <= 30 um | TSP <= 15 um | PM <sub>10</sub> | PM <sub>2.5</sub> | i      |  |  |
|--------------------------------------|-------|--------------------------|--------------|--------------|------------------|-------------------|--------|--|--|
| Constant (a)                         |       | F                        | 2.6          | 0.45         | -                | -                 | (a)    |  |  |
| Constant (b)                         | -     | G                        | 1.2          | 1.5          |                  | -                 | (a)    |  |  |
| Constant (c)                         | -     | Н                        | 1.3          | 1.4          |                  | -                 | (a)    |  |  |
| Scaling factor                       |       | 1                        | -            | -            | 0.75             | 0.105             | (a) (l |  |  |
| Emission rate (uncontrolled)         | g/hr  | J = F*(C^G)/(D^H)*1000*A | 16,631.33    | 7,262.59     | 5,446.94         | 1,746.29          | (a) (  |  |  |
| Emission rate (controlled)           | g/hr  | K = J*(1-E/100)          | 16,631.33    | 7,262.59     | 5,446.94         | 1,746.29          | i      |  |  |
| Daily emission rate (controlled)     | g/day | L = K*B                  | 100,061.36   | 43,694.93    | 32,771.20        | 10,506.44         | i      |  |  |
| Daily emission rate (uncontrolled)   | g/day | M = J * B                | 100,061.36   | 43,694.93    | 32,771.20        | 10,506.44         | i      |  |  |
| Maximum emission rate (controlled)   | g/s   | N = L/(B*3600)           | 4.62         | 2.02         | 1.51             | 0.49              | i      |  |  |
| Maximum emission rate (uncontrolled) | g/s   | O = M / (B*3600)         | 4.62         | 2.02         | 1.51             | 0.49              | i      |  |  |
| Quality rating                       | -     |                          | В            | С            | D                | D                 | ı      |  |  |

Source: (a) AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines (bulldozing overburden). According to recommendations in AP-42 / Section 13.2.3 - Heavy Construction Operations (USEPA, January 1995) / Table 13.2.3-1 - Recommended Emission Factors for Construction Operations (reference to dozer equation (overburden) in Section 11.9 / Table 11.9.2).

(b) Scaling factor to convert TSP <= 30 um to  $PM_{2.5}$  and TSP <= 15 um to  $PM_{10}$ .

(c) PM<sub>10</sub> and PM<sub>2.5</sub> calculated multiplying TSP emission rates by respective scaling factors.

| Equipment/Vehicle | Model  | Number of Equipment/Vehicle | Daily Use |  |
|-------------------|--|-----------------------------|-----------|--|
| Tracked-Dozer     | Caterpillar D4H  | 1                           | 6.0       |  |
| Track-dozer       | Caterpillar D6T; Aker request; not req if D10 over ice | 1                           | 6.0       |  |

|                     |           |                                    | SO <sub>2</sub> | NO <sub>x</sub> | co     | PM <sub>2.5</sub> | PM <sub>10</sub> | voc      | PAH      | CO <sub>2</sub> e |  |
|---------------------|-----------|------------------------------------|-----------------|-----------------|--------|-------------------|------------------|----------|----------|-------------------|--|
| Daily emission rate | tonne/day | (refer to Construction combustion) | 1.51E-05        | 0.0083          | 0.0024 | 4.45E-04          | 4.59E-04         | 4.62E-04 | 2.64E-06 | 1.80              |  |

### II.4 - Material handling

# A - Fugitive Emissions

| Dust Control rechnique                |            |   |            |
|---------------------------------------|------------|---|------------|
|                                       |            |   |            |
| Hours of operation per day - peak     | h/day      | A | 6.0 (a)    |
| Amount of material handled per day    | tonnes/day | В | 200 (b)    |
| Mean wind speed - maximum daily value | m/s        | С | 12.82 (c)  |
| Material moisture content             | %          | D | 16.8 (d)   |
| Constant (a)                          | -          | E | 0.0016 (e) |
| Constant (b)                          | -          | F | 1.3 (e)    |
| Constant (c)                          | -          | G | 2.2 (e)    |
| Constant (d)                          | -          | Н | 1.4 (e)    |
| Constant (e)                          | -          | I | 2 (e)      |
| Emission reduction efficiency         | (%)        | J | 0          |

**Source:** (a) Information provided by Fortune. Daily operating time assumed to the same as construction haulage times.

- (b) Assumed that 50 tonne/day of material handled by each piece of equipment (Excavator, backhoe, dump truck and integrated tool carrier).
- (c) Value derived from Fortune 2004-2007 onsite meteorological station (Fortune\_2004\_2007\_MetData(Oct8 04 Sep27 07)\_MD.xls).
- (d) Moisture content taken as the maximum overburden moisture content from AP 42 chapter 11.9 Western surface Coal Mine/ Table 11.9-3 (Metric and English Units). Typical Values For Correction Factors Applicable to the Predictive Emission Factor Equations.
- (e) AP-42 / Section 13.2.4 Aggregate Handling And Storage Piles (USEPA, November 2006)/ equation 1 emission factor for drop operation.

|                                      |          |                                       | TSP <= 30 um | PM <sub>10</sub> | PM <sub>2.5</sub> | ĺ   |
|--------------------------------------|----------|---------------------------------------|--------------|------------------|-------------------|-----|
| Particle size multiplier             | T        | V                                     | 0.74         | 0.35             | 0.053             | (2) |
| Emission factor (uncontrolled)       | kg/tonne | L = K*E*((C/G)^F)/((D/I)^H)           | 5.95E-04     |                  | 4.26E-05          | · ' |
| Maximum emission rate (controlled)   | g/s      | $M = B^*L^*(1-J/100)^*1000/(A^*3600)$ | 0.0055       | 0.0026           | 3.93E-04          |     |
| Maximum emission rate (uncontrolled) | g/s      | N = B*L*1000/(A*3600)                 | 0.0055       | 0.0026           | 3.93E-04          | j   |
| Quality rating                       | -        |                                       | Α            | Α                | Α                 | İ   |

Source: (a) AP-42 / 13.2.4 - Aggregate Handling And Storage Piles (USEPA, November 2006)/ equation 1 - emission factor for drop operation.

| Equipment/Vehicle       | Model                               | Number of Equipment/Vehicle | Daily Use |  |
|-------------------------|-------------------------------------|-----------------------------|-----------|--|
| Dump Truck              | Western Star 4900 SA; or Equivalent | 1                           | 2.0       |  |
| Excavator               | Caterpillar 345 BL                  | 1                           | 2.0       |  |
| Backhoe                 | Caterpillar 450E; or Equivalent     | 1                           | 3.0       |  |
| Integrated Tool Carrier | Caterpillar IT24F                   | 1                           | 6.0       |  |

|                     |           |                                    | SO <sub>2</sub> | NO <sub>X</sub> | CO     | PM <sub>2.5</sub> | PM <sub>10</sub> | VOC      | PAH      | CO <sub>2</sub> e |
|---------------------|-----------|------------------------------------|-----------------|-----------------|--------|-------------------|------------------|----------|----------|-------------------|
| Daily emission rate | tonne/day | (refer to Construction combustion) | 1.28E-05        | 0.0054          | 0.0028 | 3.03E-04          | 3.12E-04         | 3.52E-04 | 2.24E-06 | 1.53              |

# II.5 - Compacting

# A - Fugitive Emissions

| Dust Control Technique            |       | 1 |          |
|-----------------------------------|-------|---|----------|
|                                   |       |   |          |
| Number of equipment               | рс    | A | 2 (a)    |
| Hours of operation per day - peak | h/day | В | 1.0 (a)  |
| Material silt content             | (%)   | С | 56 (b)   |
| Material moisture content         | (%)   | D | 16.8 (c) |
| Emission reduction efficiency     | (%)   | E | 0        |

Source: (a) Information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx".

(b) Material silt content taken as average silt content of the till and glacio-lacustrine deposit from Golder FEED document.

(c) Moisture content taken as the maximum overburden moisture content from AP-42 chapter 11.9 Western surface Coal Mine/ Table 11.9-3 (Metric and English Units). Typical Values For Correction Factors Applicable to the Predictive Emission Factor Equations.

|                                      |       |                          | TSP <= 30 um | TSP <= 15 um | PM <sub>10</sub> | PM <sub>2.5</sub> |
|--------------------------------------|-------|--------------------------|--------------|--------------|------------------|-------------------|
| Constant (a)                         | -     | F                        | 2.6          | 0.45         | -                | -                 |
| Constant (b)                         | -     | G                        | 1.2          | 1.5          | -                | -                 |
| Constant (c)                         | -     | Н                        | 1.3          | 1.4          | -                | -                 |
| Scaling Factor                       |       |                          | -            | -            | 0.75             | 0.105             |
| Emission rate (uncontrolled)         | g/hr  | J = F*(C^G)/(D^H)*A*1000 | 16631.33     | 7262.59      | 5446.94          | 1746.29           |
| Emission rate (controlled)           | g/hr  | K = J*(1-E/100)          | 16631.33     | 7262.59      | 5446.94          | 1746.29           |
| Daily emission rate (uncontrolled)   | g/day | L = J * B                | 16,403.50    | 7,163.10     | 5,372.33         | 1,722.37          |
| Daily emission rate (controlled)     | g/day | M= K*B                   | 16,403.50    | 7,163.10     | 5,372.33         | 1,722.37          |
| Maximum emission rate (uncontrolled) | g/s   | N = L/(B* 3600)          | 4.62         | 2.02         | 1.51             | 0.49              |
| Maximum Emission rate (controlled)   | g/s   | O = M/(B*3600)           | 4.62         | 2.02         | 1.51             | 0.49              |
| Quality rating                       | -     |                          | В            | С            | D                | D                 |

Source: (a) AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines (bulldozing overburden). According to recommendations in AP-42 / Section 13.2.3 - Heavy Construction Operations (USEPA, January 1995) / Table 13.2.3-1 - Recommended Emission Factors for Construction Operations (reference to dozer equation (overburden) in Section 11.9 / Table 11.9.2).

(b) Scaling factor to convert TSP <= 30 um to PM  $_{2.5}$  and TSP <= 15 um to PM  $_{10}$ .

(c) PM10 and PM2.5 calculated multiplying TSP emission rates by respective scaling factors.

|                | Equipment/Vehicle | Model  | Number of Equipment/Vehicle | Daily Use |
|----------------|-------------------|--|-----------------------------|-----------|
| Compactor, Sh  | neep Foot         | Caterpillar 815F/Komatsu CP76; or equivalent | 1                           | 1.0       |
| Compactor, Vib | brating Soil      | Caterpillar CS-323C; or equivalent           | 1                           | 1.0       |

|                     |           |                                    | SO <sub>2</sub> | NO <sub>X</sub> | CO       | PM <sub>2.5</sub> | PM <sub>10</sub> | VOC      | PAH      | CO₂e |
|---------------------|-----------|------------------------------------|-----------------|-----------------|----------|-------------------|------------------|----------|----------|------|
| Daily emission rate | tonne/day | (refer to Construction combustion) | 1.57E-06        | 7.64E-04        | 1.73E-04 | 4.77E-05          | 4.92E-05         | 5.43E-05 | 2.75E-07 | 0.19 |

### II.6 - Grading

# A - Fugitive Emissions

| Dust Control Technique           | No control |           |         |
|----------------------------------|------------|-----------|---------|
|                                  |            |           |         |
| Hours of operation per day       | hr/day     | A         | 1.0 (a  |
| Number of graders                | number     | В         | 1 (a    |
| Mean vehicle speed               | km/hr      | С         | 11.4 (b |
| Vehicle kilometer traveled (VKT) | VKT/day    | D = A*B*C | 11      |
| Emission reduction efficiency    | (%)        | E         | 0       |

Source: (a) Information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx".

(b) Calculated assuming an average speed of 11.4 km/h, taken from AP-42 chapter 11.9 Western Surface Coal Mining.

|                                      |        |                       | ISP <= 30 um | 15P <= 15 um | PIVI <sub>10</sub> | PIVI <sub>2.5</sub> |         |
|--------------------------------------|--------|-----------------------|--------------|--------------|--------------------|---------------------|---------|
| Constant (a)                         |        | F                     | 0.0034       | 0.0056       | -                  | -                   | (a)     |
| Constant (b)                         | -      | G                     | 2.5          | 2            | -                  | -                   | (a)     |
| Scaling Factor                       |        | Н                     | -            | -            | 0.60               | 0.031               | (a) (b) |
| Emission factor (uncontrolled)       | kg/VKT | I = F*(C^G)           | 1.49         | 0.73         | 0.44               | 0.046               | (a) (c) |
| Daily emission rate (uncontrolled)   | g/day  | J = D* I*1000         | 16,774.73    | 8,182.99     | 4,909.80           | 520.02              |         |
| Daily emission rate (controlled)     | g/day  | K= D*I*1000*(1-E/100) | 16,774.73    | 8,182.99     | 4,909.80           | 520.02              |         |
| Maximum emission rate (uncontrolled) | g/s    | L = J/(A*3600)        | 4.72         | 2.30         | 1.38               | 0.15                |         |
| Maximum emission rate (controlled)   | g/s    | M = K/(A*3600)        | 4.72         | 2.30         | 1.38               | 0.15                |         |
| Quality rating                       | -      |                       | С            | С            | D                  | D                   |         |

Source: (a) AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines (grading). According to recommendations in Section 13.2.3 Heavy Construction Operations (USEPA, January 1995) / Table 13.2.3-1 - Recommended Emission Factors for Construction Operations (reference to grading equation in Table 11.9.2).

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(b) Scaling factor to convert TSP <= 30 um to PM  $_{2.5}$  and TSP <= 15 um to PM  $_{10}$ .

(c)  ${\rm PM_{10}}$  and  ${\rm PM_{2.5}}$  calculated multiplying TSP emission rates by respective scaling factors.

| Grader              | Caterpillar 14M/Komatsu GD675-3 |                                    | 1.0             |                 |          |                   |                  |          |     |      |
|---------------------|---------------------------------|------------------------------------|-----------------|-----------------|----------|-------------------|------------------|----------|-----|------|
|                     |                                 |                                    |                 |                 |          |                   |                  |          |     |      |
|                     |                                 |                                    | SO <sub>2</sub> | NO <sub>x</sub> | СО       | PM <sub>2.5</sub> | PM <sub>10</sub> | voc      | PAH | CO₂e |
| Daily amission sate | tonne/day                       | (refer to Construction combustion) | 1 26F-06        | E 60E 04        | 1 965 04 | 2 675 05          | 2 75F-05         | E 22E 0E |     | 0.15 |

Number of Equipment/Vehicle



# II.7 - Loading of aggregate material into trucks

# A - Fugitive Emissions Dust Control Technique

| Dust control reclinique          |            |   |          |
|----------------------------------|------------|---|----------|
|                                  |            |   |          |
| Hours of operation per day       | h/day      | А | 6.0 (a   |
| Amount of debris removed per day | tonnes/day | В | 3,635 (b |
| Emission reduction efficiency    | (%)        | С | 0        |

**Source:** (a) Data provided by Fortune. Numbers of work hours per day taken as the front end loader operational hours.

(b) Information provided by Fortune in "NICO estimated blasting quantities.xlsx".

|                                      |          |                        | TSP       | PM <sub>10</sub> | PM <sub>2.5</sub> | ľ           |
|--------------------------------------|----------|------------------------|-----------|------------------|-------------------|-------------|
| Emission factor (uncontrolled)       | kg/tonne | D                      | 0.018     | 0.0094           | 0.0019            | (a) (b) (c) |
| Daily emission rate (controlled)     | g/day    | E = B*D*1000*(1-C/100) | 65,434.50 | 34,025.94        | 6,870.62          | i           |
| Daily emission rate (uncontrolled)   | g/day    | F = B*D*1000           | 65,434.50 | 34,025.94        | 6,870.62          | i           |
| Maxium emission rate (controlled)    | g/s      | G = E/(A*3600)         | 3.02      | 1.57             | 0.32              | i           |
| Maximum emission rate (uncontrolled) | g/s      | H = F/(A*3600)         | 3.02      | 1.57             | 0.32              | i           |
| Quality rating                       | -        |                        | E         | -                | -                 | ı           |

Source: (a) TSP emission factor extracted from AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9.4 - Uncontrolled Particulate Emission Factors for Open Dust Sources at Western Surface Coal Mine (truck loading by power shovel (batch drop) / overburden).

(b) Emission factor for PM<sub>10</sub> based on the ratio between TSP and PM10 emission factors for blasting in AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines.

(c) Emission factor for PM<sub>2.5</sub> based on the ratio between TSP and PM2.5 emission factors for bulldozing overburden in AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines.

| - W  | Equipment/Vehicle        | Model                           | Number of Equipment/Vehicle | Daily Use |
|--|--------------------------|---------------------------------|-----------------------------|-----------|
| Wheeled Front End Loader Caterpillar 988H/Komatsu WA 600 1 | Wheeled Front End Loader | Caterpillar 988H/Komatsu WA 600 | 1                           | 6.0       |

|                     |           |                                    | SO <sub>2</sub> | NO <sub>X</sub> | CO     | PM <sub>2.5</sub> | PM <sub>10</sub> | VOC      | PAH      | CO₂e |
|---------------------|-----------|------------------------------------|-----------------|-----------------|--------|-------------------|------------------|----------|----------|------|
| Daily emission rate | tonne/day | (refer to Construction combustion) | 1.54E-05        | 0.0062          | 0.0021 | 2.71E-04          | 2.79E-04         | 2.93E-04 | 2.70E-06 | 1.84 |

# **Calculation of Emissions During the Construction Phase**

# II.8 Hauling material

# A - Fugitive Emission Dust Control T

| Dust Control Technique                      |  |       |            |
|---|--|-------|------------|
| Source:                                     | (a) Information provided by Fortune in an email dated Feb. 15, | 2011. |            |
| Hours of operation per day - peak           | h/day  | A     | 6.0 (a)    |
| Surface material silt content               | (%)  | В     | 1.6 (b)    |
| Mean vehicle weight                         | tonnes   | С     | 118.63 (c) |
| Vehicle kilometer traveled (VKT)            | km/day   | D     | 125.07 (c) |
| Number of working days                      | days/year  | E     | 365        |
| Number of days with precipitation >= 0.2 mm | days/year  | F     | 58 (d)     |
| Emission reduction officiency               | (%)  | G     | 55 (a)     |

Source: (a) Information provided by Fortune. Daily operating time assumed to the same as construction haulage times.
(b) Roads are assumed to be lined with aggregate and it is expected to have a similar silt content as limestone; data available in AP 42 chapter 13.2.4/Table 13.2.4-1.

(c) See Mean Vehicle Weight table below.

(d) Value derived from Fortune 2004-2007 onsite meteorological station (Fortune\_2004\_2007\_MetData(Oct8 04 - Sep27 07)\_MD.xls).

(e) Assumed wet suppression based on the water trucks being present onsite. Unpaved Industrial Road Dust Calculator (Environment Canada website, accessed in December 2009).

|   |        |  | PM-30 (TSP) | PM <sub>10</sub> | PM <sub>2.5</sub> |
|---|--------|--|-------------|------------------|-------------------|
| Constant (k)  |        | Н  | 4.9         | 1.5              | 0.15              |
| Constant (a)  | -      | I I  | 0.7         | 0.9              | 0.9 (             |
| Constant (b)  |        | J  | 0.45        | 0.45             | 0.45 (            |
| Emission factor (uncontrolled)                        | lb/VMT | $K = H^*((B/12)^1)^*((C^*1.1/3)^J)^*[(E-G)/E]$ | 5.50        | 1.13             | 0.11              |
| Emission factor (metric uncontrolled)                 | g/VKT  | L = K * 281.9                                  | 1551.64     | 317.45           | 31.74 (           |
| Emission factor (controlled)                          | g/VKT  | M = L*281.9*(1-G/100)                          | 698.24      | 142.85           | 14.29 (           |
| Emission factor (metric uncontrolled, without precip) | g/VKT  | $N = H*((B/12)^{1})*((C*1.1/3)^{J})*281.9$     | 1,842.79    | 377.01           | 37.70             |
| Emission factor (controlled, without precip)          | g/VKT  | O = N * (1-G/100)                              | 829.25      | 169.66           | 16.97             |
| Daily emission rate (uncontrolled)                    | g/day  | P = L *D                                       | 194,064.29  | 39,703.48        | 3,970.35          |
| Daily emission rate (controlled)                      | g/day  | Q= M*D   | 87,328.93   | 17,866.56        | 1,786.66          |
| Daily emission rate (uncontrolled, without precip)    | g/day  | R = N*D  | 230,477.65  | 47,153.26        | 4,715.33          |
| Daily emission rate (controlled, without precip)      | g/day  | S = O*D  | 103,714.94  | 21,218.97        | 2,121.90          |
| Maximum emission rate (uncontrolled)                  | g/s    | T = P/(A*3600)                                 | 8.96        | 1.83             | 0.18              |
| Maximum emission rate (controlled)                    | g/s    | U = Q/(A*3600)                                 | 4.03        | 0.82             | 0.08              |
| Maximum emission rate (uncontrolled, without precip)  | g/s    | V = R/(A*3600)                                 | 10.64       | 2.18             | 0.22              |
| Maximum emission rate (controlled, without precip)    | g/s    | W = S/(A*3600)                                 | 4.79        | 0.98             | 0.10              |
| Quality rating  | -      |  | В           | В                | В                 |

Source: (a) AP-42 / Section 13.2.2 - Unpaved Roads (USEPA, November 2006)/ Equation (1a) - unpaved surfaces at industrial sites and Table 13.2.2-2.

(b) 281.9 constant to convert lb/VMT (pounds per vehicle mile travelled) to g/VKT (grams per vehicle kilometer travelled).



# **Calculation of Emissions During the Construction Phase**

### Mean Vehicle Weight

| Equipment                        | -      | Haulage Unit | Total  |      |
|----------------------------------|--------|--------------|--------|------|
| Weight - Empty                   | tonne  | 73.98        |        | (a)  |
| Weight - Loaded                  | tonne  | 163.29       |        | (b)  |
| Mean Weight                      | tonne  | 119          |        | ]    |
| Number of two way trips          | number | 41           |        | ( c) |
| Distance of two way trip         | km/day | 3.07         |        | ( d  |
| Vehicle kilometer traveled (VKT) | km/day | 125.07       | 125.07 | ]    |
| Percentage of traffic            | %      | 100%         |        | ]    |
| Mean vehicle weight              | tonne  | 118.63       | 118.63 | ]    |

Source: (a) Information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx".

(b) Haul truck's loaded weight was taken as the maximum specified load in CAT 777F specification sheet.

(c) Information provided by Fortune in "NICO estimated blasting quantities.xlsx".

(d) Distance taken from Golder Proposed site layout figure 4-1 FEED document.

| Surrace rock naulage trucks | Caterpillar 777F/Komatsu HD 785-7 | <br>6.0         |     |    |                   |     |     |     |
|-----------------------------|-----------------------------------|-----------------|-----|----|-------------------|-----|-----|-----|
|                             |                                   |                 |     |    |                   |     |     |     |
|                             |                                   |                 |     |    |                   |     |     |     |
|                             |                                   | SO <sub>2</sub> | NO. | CO | PM <sub>o.c</sub> | PM. | VOC | PΔH |

| Baily emission rate         SO2         NOX         CO         PM25         PM06         VOC         PAH         CO2e           Daily emission rate         tonne/day         (refer to Construction combustion)         6.02E-05         0.028         0.091         0.0013         0.0013         0.0014         1.05E-05         7.20 |                     |           | _                                  |          |                 |        |        |                  |        |          |                   |
|--|---------------------|-----------|------------------------------------|----------|-----------------|--------|--------|------------------|--------|----------|-------------------|
| Daily emission rate         tonne/day         (refer to Construction combustion)         6.02E-05         0.028         0.091         0.0013         0.0013         0.0014         1.05E-05         7.20   |                     |           |                                    |          | NO <sub>x</sub> | CO     | Pivias | PM <sub>10</sub> | VOC    | PAH      | CO <sub>2</sub> e |
|  | Daily emission rate | tonne/day | (refer to Construction combustion) | 6.02E-05 | 0.028           | 0.0091 | 0.0013 | 0.0013           | 0.0014 | 1.05E-05 | 7.20              |

Daily Use

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Number of Equipment/Vehicle



# **Calculation of Emissions During the Construction Phase**

### II.9 - Jaw crusher

# A - Fugitive Emissions

| bust control recinique               |            | 140 CONTROL | i      |        |
|--------------------------------------|------------|-------------|--------|--------|
|                                      |            |             |        |        |
| Hours of operation per day - maximum | h/day      | A           | 1.5    | (a)(b) |
| Amount of material processed per day | tonnes/day | В           | 14,541 | (b)    |
| Emission reduction efficiency        | (%)        | ſ           | 0      | (c)    |

Source: (a) Information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx". The hours of operation is the average between the jaw crusher and cone crusher.

(b) Assume blasted material is sent to jaw crusher. Information provided by Fortune in "NICO estimated blasting quantities.xlsx".

(c) Assumed no wet suppression.

|                                    |          |                        | TSP       | PM <sub>10</sub> | PM <sub>2.5</sub> | 1       |
|------------------------------------|----------|------------------------|-----------|------------------|-------------------|---------|
| Emission factor (uncontrolled)     | kg/tonne | D                      | 0.01      | 0.004            | 0.00007           | (a) (b) |
| Daily emission rate (controlled)   | g/day    | E = B*D*1000*(1-C/100) | 145,410.0 | 58,164.0         | 1,077.1           | ]       |
| Maximum emission rate controlled   | g/s      | F = E/(A*3600)         | 27.30     | 10.92            | 0.20              | ]       |
| Maximum emission rate uncontrolled | g/s      | F' = B*D*1000/(A*3600) | 27.30     | 10.92            | 0.20              | ]       |
| Quality rating                     | -        |                        | С         | С                | -                 | (a)     |

Source: (a) AP-42 / 11.24 - Metallic Minerals Processing (USEPA, August 1982)/ Table 11.24-1 (Metric Units). Emission factors for metallic minerals processing (value for high moisture ore / primary crushing; high moisture ore defined as >= 4% in weight).

(b) Emission factor for PM<sub>2.5</sub> based on the ratio between PM<sub>10</sub> and PM<sub>2.5</sub> emission factors for tertiary crushing (controlled) in AP-42 / 11.19.2 Crushed Stone Processing and Pulverized Mineral Processing (USEPA, August 2004)/ Table 11.19.2.1.

#### II.10 Material screening

# A - Fugitive Emission

| Dust Control Technique               |            | No control | i          |
|--------------------------------------|------------|------------|------------|
|                                      |            |            |            |
| Hours of operation per day - maximum | h/day      | A          | 1.0 (a)    |
| Amount of material processed per day | tonnes/day | В          | 14,541 (b) |
| Emission reduction efficiency        | (%)        | С          | 0 (c )     |

Source: (a) Information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx".

(b) Assume blasted material is sent to jaw crusher. Information provided by Fortune in "NICO estimated blasting quantities.xlsx".

(c) No dust controls methods were assumed.

|                                      |          |                        | TSP        | PM <sub>10</sub> | PM <sub>2.5</sub> | l       |
|--------------------------------------|----------|------------------------|------------|------------------|-------------------|---------|
| Emission factor (uncontrolled)       | kg/tonne | D                      | 0.0125     | 0.0043           | 0.000025          | (a) (b) |
| Daily emission rate (controlled)     | g/day    | E = B*D*1000*(1-C/100) | 181,762.50 | 62,526.30        | 363.53            | l       |
| Daily emission rate (uncontrolled)   | g/day    | F = B*D*1000           | 181,762.50 | 62,526.30        | 363.53            | j       |
| Maximum emission rate (controlled)   | g/s      | G = E/(A*3600)         | 51.19      | 17.61            | 0.10              | l       |
| Maximum emission rate (uncontrolled) | g/s      | H = F/(A*3600)         | 51.19      | 17.61            | 0.10              | j       |
| Quality rating                       | -        |                        | E          | С                | -                 | l       |

Source: (a) AP-42 / 11.19.2 Crushed Stone Processing and Pulverized Mineral Processing (USEPA, August 2004)/ Table 11.19.2-1 (Metric Units) - Emission factors for crushed stone processing operations (value for screening - uncontrolled). (b) Assumed PM<sub>2.5</sub> emission factor taken from Screening for wet suppression.

### III - General Construction

### III.1 - Vehicular traffic

| F | Funioni |  |
|---|---------|--|

| Past control recinique   |           |   |           |  |  |  |  |  |
|--|-----------|---|-----------|--|--|--|--|--|
| Source: (a) Information provided by Fortune in an email dated Feb. 15, 2011. |           |   |           |  |  |  |  |  |
| Hours of operation per day   | h/day     | А | 6.0 (a)   |  |  |  |  |  |
| Surface material silt content  | (%)       | В | 1.6 (b)   |  |  |  |  |  |
| Mean vehicle weight  | (tons)    | С | 8.83 (c)  |  |  |  |  |  |
| Vehicle kilometer traveled (VKT)   | km/day    | D | 76.82 (c) |  |  |  |  |  |
| Number of working days   | days/year | E | 365       |  |  |  |  |  |
| Number of days with precipitation >= 0.2 mm                                  | days/year | F | 58 (d)    |  |  |  |  |  |
| Emission reduction efficiency  | (%)       | G | 55 (e)    |  |  |  |  |  |

Source: (a) Based on information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx" assumed the same operating time as the haul trucks.

- (b) Roads are assumed to be lined with aggregate and it is expected to have a similar silt content as limestone; data available in AP 42 chapter 13.2.4/table 13.2.4-1.
- (c ) See Mean Vehicle Weight table below.
- (d) Value derived from Fortune 2004-2007 onsite meteorological station (Fortune\_2004\_2007\_MetData(Oct8 04 Sep27 07)\_MD.xls).
- (e) Unpaved Industrial Road Dust Calculator (Environment Canada website, accessed in December 2009).

|   |        |  | PM-30 (TSP) | PM <sub>10</sub> | PM <sub>2.5</sub> |
|---|--------|--|-------------|------------------|-------------------|
| Constant (k)  | -      | Н                                      | 4.9         | 1.5              | 0.15              |
| Constant (a)  | -      | I                                      | 0.7         | 0.9              | 0.9               |
| Constant (b)  |        | J                                      | 0.45        | 0.45             | 0.45              |
| Emission factor (uncontrolled)                              | lb/VMT | $K = H*((B/12)^1)*((C/3)^J)*[(E-G)/E]$ | 1.64        | 0.33             | 0.03              |
| Emission factor (uncontrolled, metric)                      | g/VKT  | L = K * 281.9                          | 461.45      | 94.41            | 9.44              |
| Emission factor (controlled)                                | g/VKT  | M = L*281.9*(1-G/100)                  | 207.65      | 42.48            | 4.25              |
| Emission factor (uncontrolled, without precipitation)       | g/VKT  | N=H*((B/12)^I)*((C/3)^J)*281.9         | 548.03      | 112.12           | 11.21             |
| Emission factor (controlled, without precipitation)         | g/VKT  | O = N*(1-G/100)                        | 246.61      | 50.45            | 5.05              |
| Daily emission rate (uncontrolled)                          | g/day  | P= L * D                               | 35449.81    | 7252.65          | 725.27            |
| Daily emission rate (controlled)                            | g/day  | Q = M*D                                | 15952.42    | 3263.69          | 326.37            |
| Daily emission rate (uncontrolled, without precipitation)   | g/day  | R = N * D                              | 42101.46    | 8613.51          | 861.35            |
| Daily emission rate (controlled, without precipitation)     | g/day  | S = O* D                               | 18945.66    | 3876.08          | 387.61            |
| Maximum emission rate (uncontrolled)                        | g/s    | T = P/(A*3600)                         | 1.64        | 0.33             | 0.033             |
| Maximum emission rate (controlled)                          | g/s    | U = Q/(A*3600)                         | 0.74        | 0.15             | 0.015             |
| Maximum emission rate (uncontrolled, without precipitation) | g/s    | V = R/(A*3600)                         | 1.94        | 0.40             | 0.040             |
| Maximum emission rate (controlled, without precipitation)   | g/s    | W = S/(A*3600)                         | 0.87        | 0.18             | 0.018             |
| Quality rating  | -      |  | В           | В                | В                 |

Source: (a) AP-42 / Section 13.2.2 - Unpaved Roads (USEPA, November 2006)/ Equation (1a) - unpaved surfaces at industrial sites and Table 13.2.2-2.

(b) 281.9 constant to convert lb/VMT (pounds per vehicle mile travelled) to g/VKT (grams per vehicle kilometer travelled).

#### Mean Vehicle Weight

| iviean venicle weight            |        |                   |                      |                   |                     |            |       | _   |
|----------------------------------|--------|-------------------|----------------------|-------------------|---------------------|------------|-------|-----|
| Equipment                        | -      | Light Duty Trucks | Heavy Duty<br>Trucks | Concrete<br>Truck | Fuel and Lube Truck | Boom Truck | Total |     |
| Weight - Empty                   | tonne  | 4.26              | 6.58                 | 28.12             | 27.27               | 18.01      |       | (a) |
| Weight - Loaded                  | tonne  | 4.26              | 6.58                 | 28.12             | 47.27               | 18.01      |       | (b) |
| Mean Weight                      | tonne  | 4                 | 7                    | 28                | 37                  | 18         | 94.24 |     |
| Number of two way trips          | number | 12                | 10                   | 1                 | 1                   | 1          |       | (c) |
| Distance of two way trip         | km/day | 3.07              | 3.07                 | 3.07              | 3.07                | 3.07       |       | (d) |
| Vehicle kilometer traveled (VKT) | km/day | 36.88             | 30.73                | 3.07              | 3.07                | 3.07       | 76.82 |     |
| Percentage of traffic            | %      | 48%               | 40%                  | 4%                | 4%                  | 4%         |       | _   |
| Mean vehicle weight              | tonne  | 2.05              | 2.63                 | 1.12              | 1.49                | 0.72       | 8.01  | 1   |

- Source: (a) Information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx".
  - (b) Assume all vehicles loaded and empty weight are the same except for fuel lube truck where assumed loaded weight is 20 tonnes heavier.
  - (c ) Assume number of all trucks undergo one trip/day, and there are 12 LDT and 10 HDT.
  - (d) Distance travelled will be approximately from plant area to centre of CDF.

| Equipment/Vehicle                     | Model  | Number of Equipment/Vehicle | Daily Use |
|---------------------------------------|--|-----------------------------|-----------|
| Concrete Truck                        | Western Star 4900 SA Mixer                     | 1                           | 2.0       |
| Fuel & Lube Truck                     | Western Star 4900 SA; or Equivalent            | 1                           | 2.0       |
| Water Truck                           | Western Star 4900 SA; or Equivalent            | 1                           | 2.0       |
| Light Duty Truck, Diesel              | Ford F-250 Supercab, or equivalent             | 1                           | 2.6       |
| Light Duty Truck, Diesel              | Ford F-250 Supercab, or equivalent             | 1                           | 2.6       |
| Light Duty Truck                      | Ford F-250, or equivalent                      | 4                           | 2.6       |
| Light Duty Truck                      | Ford F-250, or equivalent                      | 1                           | 2.6       |
| Light Duty Truck                      | Ford F-250, or equivalent                      | 1                           | 5.3       |
| Light Duty Truck                      | Ford F-250, or equivalent                      | 1                           | 5.3       |
| Light Duty Truck                      | Ford F-250 Crewcab, or equivalent              | 3                           | 5.3       |
| Heavy Duty Truck, Diesel              | Ford F-450 Crew Cab Flat Deck; or equivalent   | 1                           | 5.3       |
| Heavy Duty Truck, Diesel              | Ford F-450 Crew Cab Flat Deck; or equivalent   | 1                           | 5.3       |
| Heavy Duty Truck, Diesel              | Ford F-450 Crew Cab Flat Deck; or equivalent   | 1                           | 5.3       |
| Heavy Duty Truck, Diesel              | Ford F-450 Crew Cab Flat Deck; or equivalent   | 2                           | 5.3       |
| Heavy Duty Truck, Diesel              | Ford F-450 Crew Cab Flat Deck; or equivalent   | 1                           | 5.3       |
| Heavy Duty Truck, Diesel              | Ford F-450 Crew Cab Flat Deck; or equivalent   | 2                           | 5.3       |
| Heavy Duty Truck, Diesel              | Ford F-450 Crew Cab Flat Deck; or equivalent   | 1                           | 5.3       |
| Welding Truck                         | Ford F-450 Crew Cab Flat Deck; or equivalent   | 1                           | 5.3       |
| Welding Truck                         | Ford F-450 Crew Cab Flat Deck; or equivalent   | 2                           | 5.3       |
| Personnel Carrier                     | Chevrolet Express 2500 Standard, or equivalent | 1                           | 5.3       |
| Mine Ambulance                        | Chevrolet Express 2500 Standard, or equivalent | 1                           | 0.3       |
| Fire Truck                            | Ford F-450 Crew Cab Flat Deck; or equivalent   | 1                           | 0.3       |
| Rough Terrain Vehicle                 | Kubota RTV900; or equivalent                   | 1                           | 0.3       |
| Self Propelled Telescopic Boom        | Terex Genie; or Equivalent                     | 1                           | 4.0       |
| Self Propelled Telescopic Boom        | Terex Genie; or Equivalent                     | 2                           | 4.0       |
| Rough Terrain Crane; 135 tonnes       | Grove RT9150E; or equivalent                   | 1                           | 4.0       |
| Rough Terrain Crane; 36.2 tonnes      | Manitowoc (Grove) RT540E type; or Equivalent   | 1                           | 6.0       |
| Boom Truck (Alternative "Hiab Truck") | Western Star 4900 SA; or Equivalent            | 1                           | 6.0       |
| Telescopic Handler                    | Caterpillar TL943; or Equivalent               | 1                           | 5.3       |
| Telescopic Handler                    | Caterpillar TL943; or Equivalent               | 1                           | 5.3       |
| Telescopic Handler                    | Caterpillar TL642                              | 1                           | 5.3       |
| Medium Forklift                       | Clark, ECX 32                                  | 1                           | 0.0       |
| Walkie Straddle Pallet Truck          | Clark, CSM 15                                  | 1                           | 0.0       |
| Scissor Lift, Rough Terrain           | Genie Scissorlift RT 2668; or Equivalent       | 1                           | 4.0       |
| Scissor Lift, Rough Terrain           | Genie Scissorlift RT 2668; or Equivalent       | 2                           | 4.0       |
| Skid Steer-Loader                     | Bobcat S150                                    | 1                           | 4.0       |
| Skid Steer-Loader                     | Bobcat S70                                     | 1                           | 4.0       |
| Skid Steer-Loader                     | Bobcat S150                                    | 1                           | 4.0       |
| Skid Steer-Loader                     | Bobcat S150                                    | 1                           | 4.0       |

|                     |           |                                    | SO <sub>2</sub> | NO <sub>x</sub> | СО    | PM <sub>2.5</sub> | PM <sub>10</sub> | voc    | PAH      | CO <sub>2</sub> e |
|---------------------|-----------|------------------------------------|-----------------|-----------------|-------|-------------------|------------------|--------|----------|-------------------|
| Daily emission rate | tonne/day | (refer to Construction combustion) | 2.77E-04        | 0.17            | 0.067 | 0.0085            | 0.0087           | 0.0079 | 4.84E-05 | 33.10             |



### III.2 - Air transport

| Dust Control Technique                      |           | Chemical suppressant (EK35) |      |        |
|---|-----------|-----------------------------|------|--------|
|   |           |                             |      | _      |
| Pile surface area                           | ha        | A                           | 8.6  | (a)    |
| Percentage of time WS >19.3 km/h            | %         | В                           | 30.5 | (b)    |
| Material silt content                       | %         | С                           | 1.6  | (c)    |
| Number of days with precipitation >= 0.2 mm | days/year | D                           | 58   | (d)    |
| Constant (a)                                |           | E                           | 1.9  | (e)(g) |
| Constant (b)                                |           | F                           | 1.5  | (e)    |
| Constant (c)                                |           | G                           | 365  | (e)    |
| Constant (d)                                | -         | Н                           | 235  | (e)    |
| Constant (e)                                | -         | I                           | 15   | (e)    |
| Emission reduction efficiency               | (%)       | J                           | 80   | (f)    |

**Source:** (a) Surface area estimated from Golder (2010) Proposed site layout. Assumed runway is elevated 2 m off the ground.

(b) Value derived from Fortune 2004-2007 onsite meteorological station (Fortune\_2004\_2007\_MetData(Oct8 04 - Sep27 07)\_MD.xls).

(c) The pile is assumed to be lined with limestone. Range of limestone silt content available in AP 42 chapter 13.2.4/table 13.2.4-1.

(d) Value derived from Fortune 2004-2007 onsite meteorological station (Fortune\_2004\_2007\_MetData(Oct8 04 - Sep27 07)\_MD.xls).

(e) Control of Open Fugitive Dust Source (USEPA, September 1988) / Equation (4-9).
(f) Emission reduction of 80% from chemical suppressant (EK35) extracted from Unpaved Industrial Road Dust Calculator (Environment Canada website, accessed in December 2010).

(g) Constant of 1.7 lb/year/acre converted to 1.9 lb/day/ha by multiplying by 0.454 kg/lb, 1 acre/0.405 ha and 1 year/365 days. The 1 year/365 days cancels out the 365 day in the equation listed in EPA (1988).

**NOTE:** Since Air strip will be elevated it is assumed that the strip will behave as a storage pile.

|   |         |   | TSP <= 30 um | PM <sub>10</sub> | PM <sub>2.5</sub> | ı       |
|---|---------|---|--------------|------------------|-------------------|---------|
| Scaling factors   | -       | K   | -            | 0.5              | 0.075             | (a)     |
| Emission factor (uncontrolled)  | kg/d/ha | L = E*(C/F)*((G-D)/H)*(B/I)                                     | 5.39         | 2.69             | 0.40              | (b) (c) |
| Maximum emission rate (controlled)  | g/s     | M = L*A*1000*(1-J/100)/(24*3600)                                | 0.11         | 0.054            | 0.0081            | i       |
| Maximum emission rate (uncontrolled)                                      | g/s     | M' = L*A*1000/(24*3600)   | 0.54         | 0.27             | 0.040             | i       |
| Maximum emission rate (controlled, removing precip correction)            | g/s     | $N = E^*(C/F)^*((G-0)/H)^*(B/I)^*A^*1000^*(1-J/100)/(24^*3600)$ | 0.13         | 0.064            | 0.010             | i       |
| Maximum emission rate (uncontrolled, 24 hour, removing precip correction) | g/s     | N' = E*(C/F)*((G-0)/H)*(B/I)*A*1000/(24*3600)                   | 0.64         | 0.32             | 0.048             | 1       |

Source: (a) AP-42/Section 13.2.5 - Industrial Wind Erosion.

(b) TSP calculated according to Control of Open Fugitive Dust Source (USEPA, September 1988) / Equation (4-9).

(c) PM<sub>10</sub> and PM<sub>2.5</sub> calculated multiplying TSP emission rate by respective scaling factors.

# **Calculation of Emissions During the Construction Phase**

# III.3 -Offsite transport, access road

A - Fugitive Emissions

| Dust Control Technique |  | Assume no control | (a) |
|------------------------|--|-------------------|-----|
| Source:                | (a) Information provided by Fortune in an email dated Feb. 15, | 2011.             |     |

| Surface material silt content                 | (%)       | A | 1.6 (a)    |
|---|-----------|---|------------|
| Mean vehicle weight                           | tonnes    | В | 64 (b) (c) |
| Access Road, Vehicle kilometer traveled (VKT) | km/day    | С | 381 (b)    |
| Number of working days                        | days/year | D | 365        |
| Number of days with precipitation >= 0.2 mm   | days/year | E | 58 (d)     |
| Emission reduction, Access Road               | (%)       | F | 0          |

Source: (a) AP-42 / 13.2.4 - Aggregate Handling And Storage Piles (USEPA, November 2006)/ Table 13.2.4-1. Typical silt content of overburden for Western surface

- (b) Refer to mean vehicle weight table below.
- (c) Conservatively assume trucks return loaded with fuel and supplies.
- (d) Value derived from Fortune 2004-2007 onsite meteorological station (Fortune\_2004\_2007\_MetData(Oct8 04 Sep27 07)\_MD.xls).

|                                       |        |  | PM-30 (TSP) | PM <sub>10</sub> | PM <sub>2.5</sub> | l   |
|---------------------------------------|--------|--|-------------|------------------|-------------------|-----|
| Constant (k)                          | ·      | G  | 4.9         | 1.5              | 0.15              | (a) |
| Constant (a)                          | -      | Н  | 0.7         | 0.9              | 0.9               | (a) |
| Constant (b)                          | -      |  | 0.45        | 0.45             | 0.45              | (a) |
| Emission factor (uncontrolled)        | lb/VMT | $J = G^*((A/12)^H)^*((B^*1.1/3)^I)^*((D-E)/D)$ | 4.15        | 0.85             | 0.085             | (a) |
| Emission factor (metric uncontrolled) | g/VKT  | K = J * 281.9                                  | 1,171.24    | 239.62           | 23.96             | (b) |
| Daily emission rate (uncontrolled)    | g/day  | L = K * C                                      | 445,879.48  | 91,222.17        | 9,122.22          | ı   |
| Quality rating                        | -      |  | В           | В                | В                 | (a) |

Source: (a) AP-42 / Section 13.2.2 - Unpaved Roads (USEPA, November 2006)/ Equation (1a) - unpaved surfaces at industrial sites and Table 13.2.2-2.

(b) 281.9 constant to convert lb/VMT (pounds per vehicle mile travelled) to g/VKT (grams per vehicle kilometer travelled).

#### Mean Vehicle Weight

| Equipment                                     | -         | B-train | Total  | ]   |
|---|-----------|---------|--------|-----|
| Weight - Empty                                | tonne     | 63.50   |        | (a) |
| Weight - Loaded                               | tonne     | 63.50   |        | (b) |
| Mean Weight                                   | tonne     | 63.50   |        |     |
| Number of loads per day                       | loads/day | 6       |        | 1   |
| Access Road vehicle kilometer travelled (VKT) | km/day    | 380.69  | 380.69 | (c) |
| Access Road Percentage of traffic             | %         | 100%    |        |     |
| Mean vehicle weight                           | tonne     | 63.50   | 63.50  |     |

Source: (a) Assumed B-trains will transport material. B-train weight taken as maximum allowable weight from NWT motor vehicles act Section 36 (f)(ii).

(b) Conservatively assume trucks return loaded with fuel and supplies.

(c ) Length of access road taken from EBA report, NICO Mine Access Route Evaluation.

# **Calculation of Emissions During the Construction Phase**

### **B- Exhaust Emissions**

| Number of loads                               | loads/day  | A | 6 (a   |
|---|------------|---|--------|
| Vehicle kilometer traveled, Access road (VKT) | km/day     | В | 381 (b |
| Daily fuel consumption                        | L fuel/day | С | 311 (c |

Source: (a) Data provided by Fortune in an email dated November 26, 2010.
(b) Refer to mean vehicle weight above.
(c) Assumed B-train horsepower of 75 hp and vehicles travel at 20 km/h. Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling—Compression-Ignition (EPA, April 2004).

|   |       |               | SO <sub>2</sub> | NO <sub>x</sub> | СО     | VOC    | PM <sub>2.5</sub> | PM <sub>10</sub> |
|---|-------|---------------|-----------------|-----------------|--------|--------|-------------------|------------------|
| Emission factor for HDDV8b (modelled in MOBILE) | g/VMT | D             | 0.015           | 8.27            | 3.80   | 0.77   | 0.17              | 0.18 (a)         |
| Emission factor for HDDV8b (modelled in MOBILE) | g/VKT | E= D/1.609344 | 0.0094          | 5.14            | 2.36   | 0.48   | 0.10              | 0.11             |
| Access road daily emission rate                 | g/day | F = E*B       | 3.57            | 1956.27         | 897.94 | 183.09 | 39.60             | 43.00            |

**Source:** (a) Emission rates based on MOBILE simulation saved to Winter\_Road\_Traffic\_Emissions.xls

|                     |           |           | PAH      | CO2    | CH4      | N2O      | CO2e     |
|---------------------|-----------|-----------|----------|--------|----------|----------|----------|
| Emission factor     | tonne/L   | Н         | 4.40E-09 | 0.0027 | 1.50E-07 | 1.10E-06 | (a) (b)  |
| Daily emission rate | tonne/day | I = H * C | 1.37E-06 | 0.83   | 4.66E-05 | 3.42E-04 | 9.34E-01 |

Source: (a) Technical reference (Golder Associates and Conor Pacific), Table 3-51, p. 94.

(b) Environment Canada, National Inventory Report (1990-2008).

# **Calculation of Emissions During the Construction Phase**

### III.4 -Offsite transport, Tilcho road

A - Fugitive Emissions

| Dust Control Technique |  | Assume no control | (a) |
|------------------------|--|-------------------|-----|
| Source:                | (a) Information provided by Fortune in an email dated Feb. 15. | 2011.             |     |

| Surface material silt content                 | (%)       | A | 1.6 (a) |
|---|-----------|---|---------|
| Mean vehicle weight                           | tonnes    | В | 64 (b)  |
| Tilcho road, vehicle kilometer traveled (VKT) | km/day    | С | 228 (b) |
| Number of working days                        | days/year | D | 365     |
| Number of days with precipitation >= 0.2 mm   | days/year | E | 58 (d)  |
| Emission reduction, Tilcho Road               | (%)       | F | 0       |

Source: (a) AP-42 / 13.2.4 - Aggregate Handling And Storage Piles (USEPA, November 2006)/ Table 13.2.4-1. Typical silt content of overburden for Western surface

(b) Refer to mean vehicle weight table below.

(c ) Conservatively assume trucks return loaded with fuel and supplies.

(d) Value derived from Fortune 2004-2007 onsite meteorological station (Fortune\_2004\_2007\_MetData(Oct8 04 - Sep27 07)\_MD.xls).

|                                       |        |   | PM-30 (TSP) | PM <sub>10</sub> | PM <sub>2.5</sub> |     |
|---------------------------------------|--------|---|-------------|------------------|-------------------|-----|
| Constant (k)                          | -      | G                                       | 4.9         | 1.5              | 0.15              | (a) |
| Constant (a)                          |        | Н                                       | 0.7         | 0.9              | 0.9               | (a) |
| Constant (b)                          | -      | l                                       | 0.45        | 0.45             | 0.45              | (a) |
| Emission factor (uncontrolled)        | lb/VMT | J =G*((A/12)^H)*((B*1.1/3)^I)*((D-E)/D) | 4.15        | 0.85             | 0.09              | (a) |
| Emission factor (metric uncontrolled) | g/VKT  | K = J * 281.9                           | 1,171.24    | 239.62           | 23.96             | (b) |
| Daily emission rate                   | g/day  | L = K * C                               | 267,414.74  | 54,710.19        | 5,471.02          | j   |
| Quality rating                        | -      |   | В           | В                | В                 | (a) |

Source: (a) AP-42 / Section 13.2.2 - Unpaved Roads (USEPA, November 2006)/ Equation (1a) - unpaved surfaces at industrial sites and Table 13.2.2-2.

(b) 281.9 constant to convert lb/VMT (pounds per vehicle mile travelled) to g/VKT (grams per vehicle kilometer travelled).

#### Mean Vehicle Weight

| mean venior velbic                                 |           |         |        |     |
|--|-----------|---------|--------|-----|
| Equipment  | -         | B-train | Total  | ı   |
| Weight - Empty                                     | tonne     | 63.50   |        | (a) |
| Weight - Loaded                                    | tonne     | 63.50   |        | (b) |
| Mean Weight  | tonne     | 63.50   |        | ı   |
| Number of loads per day                            | loads/day | 6       |        | ı   |
| All weather road vehicle kilometer travelled (VKT) | km/day    | 228.32  | 228.32 | (c) |
| Access Road Percentage of traffic                  | %         | 100%    |        | ı   |
| Mean vehicle weight                                | tonne     | 63.50   | 63.50  | 1   |

Source: (a) Assumed B-trains will transport material. B-train weight taken as maximum allowable weight from NWT motor vehicles act Section 36 (f)(ii).

(b) Conservatively assume trucks return loaded with fuel and supplies.

(c ) Length of Tilcho road taken from  $\,$  EBA report, NICO Mine Access Route Evaluation.

# **Calculation of Emissions During the Construction Phase**

# B- Exhaust Emissions

| Number of loads                               | loads/day  | A  | 6 (    |
|---|------------|----|--------|
| Vehicle kilometer traveled, Tilcho road (VKT) | km/day     | В  | 228 (  |
| Daily fuel consumption                        | L fuel/day | C. | 124.16 |

Source: (a) Data provided by Fortune in an email dated November 26, 2010.

(b) Refer to mean vehicle weight above.

(c) Assumed B-train horsepower of 75 hp and vehicle travels tat 30 km/h. Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling -- Compression-Ignition (EPA, April 2004).

|   |       |               |        |         | co     | VOC    | PM <sub>2.5</sub> | PM <sub>10</sub> | ı   |
|---|-------|---------------|--------|---------|--------|--------|-------------------|------------------|-----|
| Emission factor for HDDV8b (modelled in MOBILE) | g/VMT | D             | 0.015  | 8.27    | 3.80   | 0.77   | 0.17              | 0.18             | (a) |
| Emission factor for HDDV8b (modelled in MOBILE) | g/VKT | E= D/1.609344 | 0.0094 | 5.14    | 2.36   | 0.48   | 0.10              | 0.11             | ı   |
| Tilcho road daily emission rate                 | g/day | F = E*B       | 2.14   | 1173.27 | 538.54 | 109.81 | 23.75             | 25.79            | ı   |

**Source:** (a) Emission rates based on MOBILE simulation saved to Winter\_Road\_Traffic\_Emissions.xls.

|                     |           |           | PAH      | CO2      | CH4      | N2O      | CO2e     |
|---------------------|-----------|-----------|----------|----------|----------|----------|----------|
| Emission factor     | tonne/L   | Н         | 4.40E-09 | 0.0027   | 1.50E-07 | 1.10E-06 | (a) (b   |
| Daily emission rate | tonne/day | I = H * C | 5.46E-07 | 3.31E-01 | 1.86E-05 | 1.37E-04 | 3.73E-01 |

**Source:** (a) Technical reference (Golder Associates and Conor Pacific), Table 3-51, p. 94.

(b) Environment Canada, National Inventory Report (1990-2008).



### III.5 - Power generation

#### C - Combustion Emission

| Control Technique           |         | NO CONTROL              |            |
|-----------------------------|---------|-------------------------|------------|
|                             |         |                         |            |
| Hours of operation per day  | h/day   | A                       | 24 (a)     |
| Sulphur content in the fuel | %       | В                       | 0.0015 (b) |
| Number of power generators  | -       | С                       | 8 (c)      |
| Maximum fuel consumption    | g/bkW-h | D                       | 200 (c)    |
| Generator power Rating      | kW      | E                       | 1,450 (c)  |
| Maximum 1 hour power output | KW      | F= C*E                  | 11,600     |
| Diesel heating value        | Btu/lb  | G                       | 19,300 (d) |
| Maximum fuel consumption    | g/h     | H=F*D                   | 2.32E+06   |
| Power within fuel           | GW      | I=H/453.5924*G*2.93e-10 | 0.029      |

Source: (a) Assumed continuous operation.

(b)Based on Canada's Sulphur in Diesel Fuel Regulations for off-road diesel Fuel effective from October 1, 2010 (Environmental Canada website last updated December 2, 2010, accessed in December, 2010).

(c) Assumed the same power generation as the operational phase.

(d) AP-42 / 3.4 - Large Stationary Diesel And All Stationary Dual-fuel Engines (USEPA, October 2006).

|                                  |            |                        | TSP (a)   | PM <sub>10</sub> | PM <sub>2.5</sub> (c) | NO <sub>x</sub> (d) | со           | SO <sub>x</sub> (e) | CO <sub>2</sub> | voc      | PAH          |
|----------------------------------|------------|------------------------|-----------|------------------|-----------------------|---------------------|--------------|---------------------|-----------------|----------|--------------|
| Emission factor (uncontrolled)   | lb/MMBTU   | J                      | 0.062     | 0.057            | 0.057                 | 3.20                | 0.85         | 0.0015              | 165.00          | 0.0042   | 2.11E-04 (b) |
| Emission factor (uncontrolled)   | g/GW-h     | K= J*453.59/0.00029307 | 95,958.72 | 88,684.43        | 88,684.43             | 4,952,708.34        | 1,315,563.15 | 2,344.80            | 255,374,023.57  | 6,426.11 | 326.01       |
| Maximum emission rate            | g/s        | L=K*I/3600             | 0.77      | 0.71             | 0.71                  | 39.80               | 10.57        | 0.019               | 2052.23         | 0.052    | 0.0026       |
| Maximum emission rate per boiler | g/s/boiler | M=L/C                  | 0.10      | 0.089            | 0.089                 | 4.98                | 1.32         | 0.0024              | 256.53          | 0.0065   | 3.27E-04     |
| Daily emission rate              | tonne/day  | L' = L*(A*3600)/10^6   | 0.067     | 0.062            | 0.062                 | 3.44                | 0.91         | 0.0016              | 177.31          | 0.0045   | 2.26E-04     |

Source: (a) TSP is for filterable particulates.

(b) AP-42 / 3.4 - Large Stationary Diesel And All Stationary Dual-fuel Engines (USEPA, October 2006)/ Table 3.4-1 - Table 3.4-4.

(c) Emission factors for  $PM_{10}$  and  $PM_{2.5}$  are assumed to be the same.

(d ) Emission factor for  $NO_x$  corresponds to uncontrolled equipment (i.e., without ignition timing retard).

(e) Emission factor for SO<sub>2</sub> calculated based on the equation EF\_SO<sub>2</sub> =1.01\*S, where S is the fuel sulphur content, according to AP-42 / 3.4 - Large Stationary Diesel And All Stationary Dual-fuel Engines (USEPA, October 2006)/ Table 3.4-1.

|   |            |                              | N <sub>2</sub> O | CH <sub>4</sub> | CO₂e   | ı   |
|---|------------|------------------------------|------------------|-----------------|--------|-----|
| GHG Emission factor for fuel combustion | g/L        | N                            | 0.4              | 0.133           |        | (a) |
| GHG emissions                           | g/s        | O=H/(7.1*453/3.78)*N/3600    | 0.30             | 0.10            |        | (b) |
| GHG emissions                           | g/s/boiler | P=O/C                        | 0.038            | 0.013           |        | ]   |
| GHG daily emissions                     | tonne/day  | Q = O * (A*3600)/10^6        | 0.026            | 0.0087          |        | ]   |
| Total equivalent daily GHG emissions    | tonne/day  | R = N20*310 + CH4 * 21 + CO2 |                  |                 | 185.61 | l   |

Source: (a) Emission factors for N<sub>2</sub>O and CH<sub>4</sub> taken from Environment Canada, National Inventory Report 1990-2008, Part 2 (2010), Table A8-4.

(b) Diesel fuel density used was 7.1 lb/gallon as specified in AP-42 Chapter 3, table 3.4-1.

#### III.6- Incineration

### C - Combustion Emissions

| Control Lechnique           |           | No Scrubber |            |
|-----------------------------|-----------|-------------|------------|
|                             |           |             |            |
| Waste Generation, Operation | kg/day    | A           | 1030 (a)   |
| Operation hours             | hour/day  | В           | 8.0 (a)    |
| Waste Oil Burning           | L/hour    | С           | 10 (a)     |
| Sulphur Content of Oil      | %         | D           | 1 (b)      |
| Diesel Burning              | L/hour    | E           | 45 (a)     |
| Sulphur Content of diesel   | %         | F           | 0.0015 (c) |
| Diesel heating value        | Btu/lb    | G           | 19,300 (d) |
| Diesel density              | lb/gallon | Н           | 7.1 (d)    |

**Source:** (a) Information provided by Fortune in an email dated November 29, 2010, burns 8 hours every day.

(b) Assumed that the sulphur content was the 1 % as regulated in Ontario.

(c) Based on Canada's Sulphur in Diesel Fuel Regulations for off-road diesel Fuel effective from October 1, 2010 (Environmental Canada website last updated December 2, 2010, accessed in December, 2010).

(d) AP-42 / 3.4 - Large Stationary Diesel And All Stationary Dual-fuel Engines (USEPA, October 2006).

### C.1 Incinerator Fuel oil Combustion

|  |      |                   | NO <sub>x</sub> | со | SO <sub>2</sub> | F     | PM PM <sub>10</sub> |      | PM <sub>2.5</sub> | VOC    | PAH      | DIOXIN/FURAN | P      | Se       |
|--|------|-------------------|-----------------|----|-----------------|-------|---------------------|------|-------------------|--------|----------|--------------|--------|----------|
| AP-42 Emission factors for pollutants not included in stack test | g/L  | 1                 | 6.              | 9  | 0.60            | 18.81 | 1.49                | 1.05 | 0.77              | 0.0040 | 1.43E-04 | 3.71E-10     | 0.0011 | 8.18E-05 |
| Maximum emission rate  | mg/s | J = I*C/3600*1000 | 18.             | 1  | 1.66            | 52.26 | 4.13                | 2.93 | 2.13              | 0.011  | 3.96E-04 | 1.03E-09     | 0.0031 | 2.27E-04 |

Source: (a) NO<sub>x</sub>, CO, SO<sub>2</sub>, and PM emissions are assumed to be for boilers<100 Million BTU/hour burning Fuel Oil 6.

(b)  $PM_{10}$  and  $PM_{2.5}$  are assumed to be for utility boiler firing residual oil for fuel oil 6.

(c) For Fuel Oil Combustion VOC included are for Benzene, Ethyl benzene, Formaldehyde, 1,1,1-trichlorethane and o-xylene from AP-42 chapter 1.3/Table 1.3.9.

(d) For Fuel Oil PAH included are Naphthalene, Acenaphthene, Acenaphthene, Acenaphthene, Acenaphthene, Benzo(b,k)fluoranthene, 
(e) Dioxins/Furans included is octachlorodibenzodioxin from AP-42 chapter 1.3/Table 1.3.9.

(f) For Fuel Oil metal emissions taken from AP-42 chapter 1.3/Table 1.3-11.

(g) Emission factors for CO<sub>2</sub>, N<sub>2</sub>O and CH<sub>4</sub> taken from Environment Canada, National Inventory Report 1990-2008, Part 2 (2010), Table A8-4, Industrial.

|  |      |                  | Sb       | As       | Ba       | Be       | Cd       | Cr       | Cr 6     | Co       | Cu       | Pb       | Mn       |
|--|------|------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| AP-42 Emission factors for pollutants not included in stack test | g/L  | K                | 6.29E-04 | 1.58E-04 | 3.08E-04 | 3.33E-06 | 4.77E-05 | 1.01E-04 | 2.97E-05 | 7.21E-04 | 2.11E-04 | 1.81E-04 | 3.59E-04 |
| Maximum emission rate  | mg/s | L= D*C/3600*1000 | 0.0017   | 4.39E-04 | 8.55E-04 | 9.25E-06 | 1.32E-04 | 2.81E-04 | 8.25E-05 | 0.0020   | 5.86E-04 | 5.03E-04 | 9.99E-04 |

Source: (a) Emission factors taken from AP-42 chapter 1, Table 1.3-11.

# C.2 Incinerator Diesel Fuel Combustion

|                                       |                       |                                     | TSP (a) | PM10  | PM2.5 (c ) | NOx (d) | со     | SOx (e) | CO2      | PAH      | VOC        |
|---------------------------------------|-----------------------|-------------------------------------|---------|-------|------------|---------|--------|---------|----------|----------|------------|
| AP-42 Emission factors for Pollutants | lb/MMBtu (fuel input) | M                                   | 0.062   | 0.057 | 0.057      | 3.20    | 0.85   | 0.0015  | 165.00   | 2.11E-04 | 0.0042 (b) |
| Maximum emission Rate                 | mg/s                  | N=E*H/3.785*G/10^6*M*453,592.4/3600 | 12.73   | 11.76 | 11.76      | 656.79  | 174.46 | 0.31    | 33865.87 | 0.043    | 0.85       |

Source: (a) TSP is for filterable particulates.

(b) AP-42 / 3.4 - Large Stationary Diesel And All Stationary Dual-fuel Engines (USEPA, October 2006)/ Table 3.4-1 - Table 3.4-4.

(c) Emission factors for  $PM_{10}$  and  $PM_{2.5}$  are assumed to be the same.

(d) Emission factor for NO<sub>x</sub> corresponds to uncontrolled equipment (i.e., without ignition timing retard).

(e) Emission factor for SO<sub>2</sub> calculated based on the equation EF\_SO<sub>2</sub> = 1.01\*S, where S is the fuel sulphur content, according to AP-42 / 3.4 - Large Stationary Diesel And All Stationary Dual-fuel Engines (USEPA, October 2006)/ Table 3.4-1.

|   |      |                 | N2O  | CH4  | l   |
|---|------|-----------------|------|------|-----|
| GHG Emission factor for diesel combustion | g/L  | 0               | 0.40 | 0.13 | (a) |
| Maximum GHG emissions                     | mg/s | P=E*O/3600*1000 | 5.00 | 1.66 | l   |

Source: (a) Emission factors for N2O and CH4 taken from Environment Canada, National Inventory Report 1990-2008, Part 2 (2010), Table A8-4.

#### C.3 Incinerator Stack Test Data

|   |                |   | SVOC1 | SVOC 2 | SVOC 3 | Part/M-1 | Part/M-2 | Part/M-3  |
|---|----------------|---|-------|--------|--------|----------|----------|-----------|
| Flow Rate, at stack O2 content, dry, 25'C and 101.325 kPa | m³/min         | Q | 71.64 | 65.73  | 67.74  | 66.79    | 66.72    | 67.04 (a) |
| Oxygen Content  | % volume of O2 | R | 13.90 | 13.90  | 14.80  | 15.20    | 14.70    | 14.30 (a) |

Source: (a) Cianciarelli, D. & C. House. 2003. Characterization of Emissions From the Eco Waste Solutions Thermal Waste Oxidizer Burlington, Ontario. Report ERMD 2002-03. Prepared for Emissions Research and Measurement Division a department of Environment Canada.

|                                      |           |                         | SO <sub>2</sub> | NO <sub>x</sub> | со       | PM       | voc      | HCI    | HF       | PCDD/PCDF | PAH      | CO2              |
|--------------------------------------|-----------|-------------------------|-----------------|-----------------|----------|----------|----------|--------|----------|-----------|----------|------------------|
| SVOC1, stack test concentration      | mg/m3     | S                       | 0.00            | 33.88           | 0.00     | -        | 4.03     | -      | -        | 7.05E-09  | 3.86E-05 | 80,953.51 (a)(b) |
| SVOC 2, stack test concentration     | mg/m3     | Т                       | 3.70            | 38.68           | 2.43     | -        | 1.97     | -      | -        | 2.53E-08  | 3.49E-05 | 80,953.51 (a)(b) |
| SVOC 3, stack test concentration     | mg/m3     | U                       | 0.00            | 33.71           | 2.82     | -        | 0.95     | -      | -        | 4.37E-08  | 1.47E-05 | 66,561.77 (a)(b  |
| Part/M-1, stack test concentration   | mg/m3     | V                       | 0.00            | 39.64           | 5.93     | 3.45     | -        | 55.85  | 1.90     | -         | -        | 57,566.94 (a)(b  |
| Part/M-2, stack test concentration   | mg/m3     | W                       | 0.00            | 39.64           | 4.30     | 1.82     | -        | 70.77  | 2.51     | -         | -        | 64,762.80 (a)(b  |
| Part/M-3, stack test concentration   | mg/m3     | X                       | 0.00            | 41.81           | 3.05     | 15.13    | -        | 174.67 | 1.13     | -         | -        | 80,953.51 (a)(b  |
| SVOC1, stack test flow rate          | mg/s.     | Y= Q*S/60               | 0.00            | 40.5            | 0.00     | -        | 4.81     | -      | -        | 8.42E-09  | 4.61E-05 | 96658.49         |
| SVOC 2, stack test flow rate         | mg/s.     | Z = Q*T/60              | 4.06            | 42.4            | 2.66     | -        | 2.15     | -      | -        | 2.77E-08  | 3.82E-05 | 88684.57         |
| SVOC 3, stack test flow rate         | mg/s.     | A' = Q*U/60             | 0.00            | 38.1            | 3.19     | -        | 1.07     | -      | -        | 4.94E-08  | 1.66E-05 | 75148.24         |
| Part/M-1, stack test flow rate       | mg/s.     | B' = Q*V/60             | 0.00            | 44.1            | 6.60     | 3.85     | -        | 62.17  | 2.12     | -         | -        | 64081.60         |
| Part/M-2, stack test flow rate       | mg/s.     | C' = Q*W/60             | 0.00            | 44.1            | 4.78     | 2.02     | -        | 78.69  | 2.79     | -         | -        | 72016.24         |
| Part/M-3, stack test flow rate       | mg/s.     | D' = Q*X/60             | 0.00            | 46.7            | 3.41     | 16.91    | -        | 195.16 | 1.27     | -         | -        | 90452.05         |
| Number of samples for each pollutant | number    | E'                      | 6               | 6               | 6        | 3        | 3        | 3      | 3        | 3         | 3        | , 6              |
| Average flow rate                    | mg/s      | F'=(Y+Z+A'+B'+C'+D')/E' | 0.68            | 42.63           | 3.44     | 7.59     | 2.68     | 112.01 | 2.06     | 2.85E-08  | 3.36E-05 | 81,173.53        |
| Daily flow rate                      | tonne/day | G' = E'/10^9*3600*B     | 1.95E-05        | 0.0012          | 9.91E-05 | 2.19E-04 | 7.71E-05 | 0.0032 | 5.92E-05 | 8.21E-13  | 9.69E-10 | 2.34             |

Source: (a) Cianciarelli, D. & C. House. 2003. Characterization of Emissions From the Eco Waste Solutions Thermal Waste Oxidizer Burlington, Ontario. Report ERMD 2002-03. Prepared for Emissions Research and Measurement Division a department of Environment Canada. (b) Concentrations have been corrected to dry, 25°C, 101.325 kPa and sample O<sub>2</sub> content.



|                                      |           |                     | Hg       | Sb       | As       | Ва       | Be   | Cd       | Cr       | Со       | Cu       | Pb       | Mn       |
|--------------------------------------|-----------|---------------------|----------|----------|----------|----------|------|----------|----------|----------|----------|----------|----------|
| Part/M-1, stack test concentration   | mg/m3     | V                   | 0.0064   | 0.019    | 5.18E-04 | 1.15E-04 | 0.00 | 0.012    | 0.033    | 1.73E-04 | 0.079    | 0.036    | 0.0067   |
| Part/M-2, stack test concentration   | mg/m3     | W                   | 0.045    | 0.058    | 5.64E-04 | 0.0020   | 0.00 | 0.022    | 0.031    | 1.25E-04 | 0.10     | 0.10     | 0.0065   |
| Part/M-3, stack test concentration   | mg/m3     | X                   | 0.0031   | 0.061    | 0.0015   | 0.0035   | 0.00 | 0.20     | 0.036    | 3.33E-04 | 0.23     | 0.34     | 0.014    |
| Part/M-1, stack test flow rate       | mg/s.     | B' = Q*V/60         | 0.0072   | 0.021    | 5.77E-04 | 1.28E-04 | 0.00 | 0.014    | 0.036    | 1.92E-04 | 0.088    | 0.040    | 0.0074   |
| Part/M-2, stack test flow rate       | mg/s.     | C' = Q*W/60         | 0.050    | 0.064    | 6.27E-04 | 0.0022   | 0.00 | 0.025    | 0.034    | 1.39E-04 | 0.11     | 0.11     | 0.0072   |
| Part/M-3, stack test flow rate       | mg/s.     | D' = Q*X/60         | 0.0035   | 0.068    | 0.0016   | 0.0039   | 0.00 | 0.23     | 0.040    | 3.72E-04 | 0.26     | 0.38     | 0.016    |
| Number of samples for each pollutant | number    | E'                  | 3        | 3        | 3        | 3        | 3    | 3        | 3        | 3        | 3        | 3        | 3        |
| Average flow rate                    | mg/s.     | F'=(B'+C'+D')/E'    | 0.020    | 0.051    | 9.47E-04 | 0.0021   | 0.00 | 0.088    | 0.037    | 2.35E-04 | 0.15     | 0.18     | 0.010    |
| Daily flow rate                      | tonne/day | G' = E'/10^9*3600*B | 5.85E-07 | 1.47E-06 | 2.73E-08 | 6.05E-08 | 0.00 | 2.54E-06 | 1.06E-06 | 6.76E-09 | 4.38E-06 | 5.13E-06 | 2.91E-07 |

Source: (a) Cianciarelli, D. & C. House. 2003. Characterization of Emissions From the Eco Waste Solutions Thermal Waste Oxidizer Burlington, Ontario. Report ERMD 2002-03. Prepared for Emissions Research and Measurement Division a department of Environment Canada.

(b) Concentrations have been corrected to dry, 25'C, 101.325 kPa and sample O<sub>2</sub> content.

### TOTAL INCINERATOR

|                        |           |                     | SO <sub>2</sub> | NO <sub>x</sub> | со     | PM       | PM <sub>2.5</sub> | PM <sub>10</sub> | VOC      | HCI    | HF       | PCDD/PCDF | PAH      |
|------------------------|-----------|---------------------|-----------------|-----------------|--------|----------|-------------------|------------------|----------|--------|----------|-----------|----------|
| Average flow rate mg/s | mg/s      | H'=F'+P+N+L+J       | 53.24           | 717.73          | 179.57 | 24.45    | 21.48             | 22.28            | 3.54     | 112.01 | 2.06     | 2.95E-08  | 0.044    |
| Daily flow rate        | tonne/day | I' = H'/10^9*3600*B | 0.0015          | 0.021           | 0.0052 | 7.04E-04 | 6.19E-04          | 6.42E-04         | 1.02E-04 | 0.0032 | 5.92E-05 | 8.50E-13  | 1.26E-06 |
|                        |           |                     |                 |                 |        |          |                   |                  |          |        |          |           |          |

|                        |           |                     | Hg       | Sb       | As       | Ba       | Be       | Cd       | Cr       | Co       | Cu       | Pb       | Mn       |
|------------------------|-----------|---------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Average flow rate mg/s | mg/s      | H'=F'+P+N+L+J       | 0.020    | 0.053    | 0.0014   | 0.0030   | 9.25E-06 | 0.088    | 0.037    | 0.0022   | 0.15     | 0.18     | 0.011    |
| Daily flow rate        | tonne/day | I' = H'/10^9*3600*B | 5.86E-07 | 1.52E-06 | 3.99E-08 | 8.52E-08 | 2.66E-10 | 2.54E-06 | 1.07E-06 | 6.45E-08 | 4.40E-06 | 5.15E-06 | 3.20E-07 |

|                        |           |                     | Мо       | CO₂e     |
|------------------------|-----------|---------------------|----------|----------|
| Average flow rate mg/s | mg/s      | H'=F'+P+N+L+J       | 2.62E-04 | 1.25E+05 |
| Daily flow rate        | tonne/day | I' = H'/10^9*3600*B | 7.54E-09 | 3.61     |



### IV - Access Road Construction

IV.1 - General land clearing

| A - Fugitive Emissions |
|------------------------|
|------------------------|

| Dust Control Technique            |       | No control |          |
|-----------------------------------|-------|------------|----------|
|                                   |       |            | ·        |
| Number of equipment               | рс    | A          | 1 (a)    |
| Hours of operation per day - peak | h/day | В          | 0.9 (b)  |
| Material silt content             | (%)   | С          | 56 (c)   |
| Material moisture content         | (%)   | D          | 16.8 (d) |
| Emission reduction efficiency     | (%)   | E          | 0        |

- Source: (a) Information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx"; assumed only Harvester used.
  - (b) Numbers of work hours per day taken as the harvester work hours in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx".
  - (c) Material silt content taken as average silt content of the till and glacio-lacustrine deposit from Golder FEED document.
  - (d) Moisture content taken as the maximum overburden moisture content from AP 42 chapter 11.9 Western surface Coal Mine/ Table 11.9-3 (Metric and English Units). Typical Values For Correction Factors Applicable to the Predictive Emission Factor Equations.

|                                      |       |                          | TSP <= 30 um | TSP <= 15 um | PM <sub>10</sub> | PM <sub>2.5</sub> | 1     |
|--------------------------------------|-------|--------------------------|--------------|--------------|------------------|-------------------|-------|
|                                      |       |                          |              |              |                  |                   |       |
| Constant (a)                         |       | F                        | 2.6          | 0.45         | -                | -                 | (a)   |
| Constant (b)                         |       | G                        | 1.2          | 1.5          | -                | -                 | (a)   |
| Constant (c)                         |       | Н                        | 1.3          | 1.4          | -                | -                 | (a)   |
| Scaling Factor                       |       | I                        | -            | -            | 0.75             | 0.105             | (a) ( |
| Emission rate (uncontrolled)         | g/hr  | J = F*(C^G)/(D^H)*1000*A | 8,315.66     | 3,631.30     | 2,723.47         | 873.14            | (a) ( |
| Emission rate (controlled)           | g/hr  | K = J*(1-E/100)          | 8,315.66     | 3,631.30     | 2,723.47         | 873.14            | İ     |
| Daily emission rate (uncontrolled)   | g/day | L = J*B                  | 7,654.97     | 3,342.78     | 2,507.09         | 803.77            |       |
| Daily emission rate (controlled)     | g/day | M = K*B                  | 7,654.97     | 3,342.78     | 2,507.09         | 803.77            |       |
| Maximum emission rate (uncontrolled) | g/s   | N = L/(B*3600)           | 2.31         | 1.01         | 0.76             | 0.24              | İ     |
| Maximum emission rate (controlled)   | g/s   | O = M/(B*3600)           | 2.31         | 1.01         | 0.76             | 0.24              | 1     |
| Quality rating                       |       |                          | В            | C.           | D                | D                 |       |

Source: (a) AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mining (USEPA, January 1995) / Table 13.2.3-1 - Recommended Emission Factors for Construction Operations (reference to dozer equation (overburden) in Section 11.9 / Table 11.9.2).

(b) Scaling factor to convert TSP <= 30 um to PM  $_{\rm 2.5}$  and TSP <= 15 um to PM  $_{\rm 10}$ 

(c) PM10 and PM2.5 calculated multiplying TSP emission rates by respective scaling factors.

| Equipment/Vehicle | Model   | Number of Equipment/Vehicle | Daily Use |
|-------------------|---|-----------------------------|-----------|
| Harvester         | Caterpillar 501 HD Track Harvester; or equivalent | 1                           | 1.00      |

|                     |           |   | SO <sub>2</sub> | NO <sub>x</sub> | СО       | PM <sub>2.5</sub> | PM <sub>10</sub> | voc      | PAH      | CO <sub>2</sub> e |
|---------------------|-----------|---|-----------------|-----------------|----------|-------------------|------------------|----------|----------|-------------------|
| Daily emission rate | tonne/day | (refer to Road_Construction_combustion) | 7.74E-07        | 3.92E-04        | 6.46E-05 | 2.14E-05          | 2.20E-05         | 2.55E-05 | 1.35E-07 | 0.093             |



### IV.2 - Drilling

#### A - Fugitive Emissions

| Dust Control Technique               |            | Wet Drilling | (a)     |  |  |  |  |  |  |
|--------------------------------------|------------|--------------|---------|--|--|--|--|--|--|
| Source: (a) Assume wet drilling.     |            |              |         |  |  |  |  |  |  |
|                                      |            |              | ,       |  |  |  |  |  |  |
| Hours of operation per day - maximum | h/day      | А            | 6.0 (a) |  |  |  |  |  |  |
| Material throughput                  | tonnes/day | В            | 337 (b) |  |  |  |  |  |  |
| Emission reduction efficiency        | (%)        | С            | 0       |  |  |  |  |  |  |

Source: (a) Information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx". Operating time taken from Road Construction Estimate drilling equipment.

(b) Estimated from 0.3 m depth of aggregate used on the road (7.5 m wide) and 31.58 km length (road length taken from EBA, Nico Mine Access Route Evaluation). Assuming the average unit weight of the aggregate material of 17 kN/m <sup>3</sup> (FEED document).

|   |          |                        | TSP      | PM <sub>10</sub> | PM <sub>2.5</sub> |             |
|---|----------|------------------------|----------|------------------|-------------------|-------------|
| Emission factor (controlled - wet drilling)                   | kg/tonne | D                      | 9.00E-05 | 4.00E-05         | 7.41E-06          | (a) (b) (c) |
| Daily emission rate (controlled - wet drilling and retention) | g/day    | E = B*D*1000*(1-C/100) | 30.36    | 13.49            | 2.50              |             |
| Daily emission rate (uncontrolled)                            | g/day    | F = B*D*1000           | 30.36    | 13.49            | 2.50              |             |
| Maximum emission rate (controlled)                            | g/s      | G = E/(A*3600)         | 0.0014   | 6.25E-04         | 1.16E-04          |             |
| Maximum emission rate (uncontrolled)                          | g/s      | H = F/(A*3600)         | 0.0014   | 6.25E-04         | 1.16E-04          |             |
| Quality rating  | -        |                        | -        | E                | -                 |             |

Source: (a) Emission factor for TSP extracted from in AP-42 / 11.19.2 - Crushed Stone Processing and Pulverized Mineral Processing (USEPA, August 2004)/ Table 11.19.2.1 (value for Wet Drilling - Unfragmented Stone).

(b) Emission factor for PM<sub>10</sub> based on the ratio between TSP and PM10 emission factors for tertiary crushing (uncontrolled) in AP-42 / 11.19.2 - Crushed Stone Processing and Pulverized Mineral Processing (USEPA, August 2004)/ Table 11.19.2.1.

(c) Emission factor for PM<sub>2.5</sub> based on the ratio between PM10 and PM2.5 emission factors for tertiary crushing (controlled) in AP-42 / 11.19.2 - Crushed Stone Processing and Pulverized Mineral Processing (USEPA, August 2004)/ Table 11.19.2.1.

|   | Daily Use |
|---|-----------|
| 2 | 20.4      |
|   | 2         |

|                     |           |   | SO <sub>2</sub> | NO <sub>x</sub> | CO     | PM <sub>2.5</sub> | PM <sub>10</sub> | voc    | PAH      | CO <sub>2</sub> e |  |
|---------------------|-----------|---|-----------------|-----------------|--------|-------------------|------------------|--------|----------|-------------------|--|
| Daily emission rate | tonne/day | (refer to Road Construction combustion) | 4.52E-05        | 0.023           | 0.0033 | 0.0011            | 0.0011           | 0.0014 | 7.91E-06 | 5.41              |  |

### IV.3 - Bulldozing

A - Fugitive Emissions

| Dust Control Technique            |       | NO CONTROL |           |
|-----------------------------------|-------|------------|-----------|
|                                   |       |            |           |
| Number of equipment               | рс    | A          | 2 (a)     |
| Hours of operation per day - peak | h/day | В          | 20.4 (b)  |
| Material silt content             | (%)   | С          | 56.0 (c ) |
| Material moisture content         | (%)   | D          | 16.8 (d)  |
| Emission reduction efficiency     | (%)   | E          | 0         |

Source: (a) Information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx". Number of vehicles assumed to be for construction dozers only.

- (b) Information provided by Fortune. Daily operating time assumed to the same as tracktor bulldozer. Assumed continuous operations.
- (c) Material silt content taken as average silt content of the till and glacio-lacustrine deposit from Golder FEED document.
- (d) Moisture content taken as the maximum overburden moisture content from AP 42 chapter 11.9 Western surface Coal Mine/ Table 11.9-3 (Metric and English Units). Typical Values For Correction Factors Applicable to the Predictive Emission Factor Equations.

|                                      |       |                          | TSP <= 30 um | TSP <= 15 um | PM <sub>10</sub> | PM <sub>2.5</sub> |  |  |
|--------------------------------------|-------|--------------------------|--------------|--------------|------------------|-------------------|--|--|
| Constant (a)                         | -     | F                        | 2.6          | 0.45         | -                | -                 |  |  |
| Constant (b)                         |       | G                        | 1.2          | 1.5          | -                | -                 |  |  |
| Constant (c)                         | -     | Н                        | 1.3          | 1.4          | -                | -                 |  |  |
| Scaling Factor                       |       | 1                        | -            | -            | 0.75             | 0.105             |  |  |
| Emission rate (uncontrolled)         | g/hr  | J = F*(C^G)/(D^H)*1000*A | 16,631.33    | 7,262.59     | 5,446.94         | 1,746.29          |  |  |
| Emission rate (controlled)           | g/hr  | K = J*(1-E/100)          | 16,631.33    | 7,262.59     | 5,446.94         | 1,746.29          |  |  |
| Daily emission rate (controlled)     | g/day | L = K*B                  | 339,279.08   | 148,156.85   | 111,117.63       | 35,624.30         |  |  |
| Daily emission rate (uncontrolled)   | g/day | M = J * B                | 339,279.08   | 148,156.85   | 111,117.63       | 35,624.30         |  |  |
| Maximum emission rate (controlled)   | g/s   | N = L/(B*3600)           | 4.62         | 2.02         | 1.51             | 0.49              |  |  |
| Maximum emission rate (uncontrolled) | g/s   | O = M / (B*3600)         | 4.62         | 2.02         | 1.51             | 0.49              |  |  |
| Quality rating                       | -     |                          | В            | С            | D                | D                 |  |  |

Source: (a) AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines (bulldozing overburden). According to recommendations in AP-42 / Section 13.2.3 -

Heavy Construction Operations (USEPA, January 1995) / Table 13.2.3-1 - Recommended Emission Factors for Construction Operations (reference to dozer equation (overburden) in Section 11.9 / Table 11.9.2).

(b) Scaling factor to convert TSP <= 30 um to PM  $_{2.5}$  and TSP <= 15 um to PM  $_{10}$ .

(c) PM10 and PM2.5 calculated multiplying TSP emission rates by respective scaling factors.

| į  | Equipment/Vehicle           | Model                           | Number of Equipment/Vehicle | Daily Use       |     |                 |                    |                                      |   |   |   |
|----|-----------------------------|---------------------------------|-----------------------------|-----------------|-----|-----------------|--------------------|--------------------------------------|---|---|---|
| ac | ked-Type tractor, bulldozer | Caterpillar D10T/Komatsu 375A-6 | 2                           | 2               | 0.4 | 0.4             | 0.4                | 0.4                                  | 0.4   | 0.4   | 0.4   |
|    |                             | •                               | •                           |                 |     |                 | ·                  |                                      |   |   |   |
|    |                             |                                 |                             | SO <sub>2</sub> |     | NO <sub>x</sub> | NO <sub>x</sub> CO | NO <sub>x</sub> CO PM <sub>2.5</sub> | NO <sub>x</sub> CO PM <sub>2.5</sub> PM <sub>10</sub> | NO <sub>X</sub> CO PM <sub>2.5</sub> PM <sub>10</sub> VOC | NO <sub>X</sub> CO PM <sub>2.5</sub> PM <sub>10</sub> VOC PAH |

|                     |           |   | SO <sub>2</sub> | NO <sub>X</sub> | CO    | PM <sub>2.5</sub> | PM <sub>10</sub> | VOC    | PAH      | CO <sub>2</sub> e |
|---------------------|-----------|---|-----------------|-----------------|-------|-------------------|------------------|--------|----------|-------------------|
| Daily emission rate | tonne/day | (refer to Road_Construction_combustion) | 1.17E-04        | 0.080           | 0.030 | 0.0037            | 0.0038           | 0.0033 | 2.04E-05 | 13.94             |

# **Calculation of Emissions During the Construction Phase**

# IV.4 - Material handling

### A - Fugitive Emission

| Dust Control Technique                |            | No control |            |
|---------------------------------------|------------|------------|------------|
|                                       |            |            |            |
| Hours of operation per day - peak     | h/day      | A          | 15.6 (a)   |
| Amount of material handled per day    | tonnes/day | В          | 337 (b)    |
| Mean wind speed - maximum daily value | m/s        | С          | 12.82 (c)  |
| Material moisture content             | %          | D          | 16.8 (d)   |
| Constant (a)                          |            | E          | 0.0016 (e) |
| Constant (b)                          |            | F          | 1.3 (e)    |
| Constant (c)                          |            | G          | 2.2 (e)    |
| Constant (d)                          |            | Н          | 1.4 (e)    |
| Constant (e)                          | -          | I          | 2 (e)      |
| Emission reduction efficiency         | (%)        | J          | 0          |

**Source:** (a) Information provided by Fortune. Daily operating time assumed to the same as loader times.

(b) Estimated from 0.3 m depth of aggregate used on the road (7.5 m wide) and 31.58 km length. Assuming the average unit weight of the aggregate material of 17 kN/m <sup>3</sup>.

(c) Value derived from Fortune 2004-2007 onsite meteorological station (Fortune\_2004\_2007\_Metbalad(oct8 04 - Sep27 07)\_MD.xls).

(d) Moisture content taken as the maximum overburden moisture content from AP 42 chapter 11.9 Western surface Coal Mine/ Table 11.9-3 (Metric and English Units). Typical Values For Correction Factors Applicable to the Predictive Emission Factor Equations.

(e) AP-42 / Section 13.2.4 - Aggregate Handling And Storage Piles (USEPA, November 2006)/ equation 1 - emission factor for drop operation.

|                                      |          |                                 | TSP <= 30 um | PM <sub>10</sub> | PM <sub>2.5</sub> |
|--------------------------------------|----------|---------------------------------|--------------|------------------|-------------------|
|                                      |          |                                 |              |                  |                   |
| Particle size multiplier             | -        | K                               | 0.74         | 0.35             | 0.053             |
| Emission factor (uncontrolled)       | kg/tonne | L = K*E*((C/G)^F)/((D/I)^H)     | 5.95E-04     | 2.81E-04         | 4.26E-05          |
| Maximum emission rate (controlled)   | g/s      | M = B*L*(1-J/100)*1000/(A*3600) | 0.0036       | 0.0017           | 2.56E-04          |
| Maximum Emission rate (uncontrolled) | g/s      | N = B*L*1000/(A*3600)           | 0.0036       | 0.0017           | 2.56E-04          |
| Quality rating                       | •        |                                 | Α            | Α                | Α                 |

Source: (a) AP-42 / 13.2.4 - Aggregate Handling And Storage Piles (USEPA, November 2006)/ equation 1 - emission factor for drop operation.

| Equipment/Vehicle        | Model                                | Number of Equipment/Vehicle | Daily Use |
|--------------------------|--------------------------------------|-----------------------------|-----------|
| Wheeled Front End Loader | Caterpillar 992K/Komatsu WA 900-3    | 1                           | 20.4      |
| Excavator                | Caterpillar 365C L/Komatsu PC650LC-8 | 1                           | 20.4      |
|                          |                                      |                             |           |

| Daily emission rate tonne/day (refer to Road_Construction_combustion) 1.21E-0 | 0.073 | 0.020 | 0.0032 | 0.0033 | 0.0037 | 2.12E-05 | 14.47 |
|---|-------|-------|--------|--------|--------|----------|-------|

# IV.5- Compacting

# A - Fugitive Emissions

| Dust Control Technique            |       | No control |           |
|-----------------------------------|-------|------------|-----------|
|                                   |       |            |           |
| Number of equipment               | рс    | A          | 1 (a)     |
| Hours of operation per day - peak | h/day | В          | 6.0 (a)   |
| Material silt content             | (%)   | С          | 56 (b)    |
| Material moisture content         | (%)   | D          | 16.8 (c ) |
| Emission reduction efficiency     | (%)   | E          | 0         |

Source: (a) Information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx".

(b) Material silt content taken as average silt content of the till and glacio-lacustrine deposit from Golder FEED document.

(c) Moisture content taken as the maximum overburden moisture content from AP 42 chapter 11.9 Western surface Coal Mine/ Table 11.9-3 (Metric and English Units). Typical Values For Correction Factors Applicable to the Predictive Emission Factor Equations.

|                                      |       |                          | TSP <= 30 um | TSP <= 15 um | PM <sub>10</sub> | PM <sub>2.5</sub> |
|--------------------------------------|-------|--------------------------|--------------|--------------|------------------|-------------------|
| Constant (a)                         |       | F                        | 2.6          | 0.45         | -                | -                 |
| Constant (b)                         |       | G                        | 1.2          | 1.5          | -                | -                 |
| Constant (c)                         |       | Н                        | 1.3          | 1.4          | -                |                   |
| Scaling Factor                       |       | I                        | -            | -            | 0.75             | 0.105             |
| Emission rate (uncontrolled)         | g/hr  | J = F*(C^G)/(D^H)*A*1000 | 8,315.66     | 3,631.30     | 2,723.47         | 873.14            |
| Emission rate (controlled)           | g/hr  | K = J*(1-E/100)          | 8,315.66     | 3,631.30     | 2,723.47         | 873.14            |
| Daily emission rate (uncontrolled)   | g/day | L = J * B                | 49,893.98    | 21,787.77    | 16,340.83        | 5,238.87          |
| Daily emission rate (controlled)     | g/day | M= K*B                   | 49,893.98    | 21,787.77    | 16,340.83        | 5,238.87          |
| Maximum emission rate (uncontrolled) | g/s   | N = L/(B* 3600)          | 2.31         | 1.01         | 0.76             | 0.24              |
| Maximum emission rate (controlled)   | g/s   | O = M/(B*3600)           | 2.31         | 1.01         | 0.76             | 0.24              |
| Quality rating                       |       |                          | В            | С            | D                | D                 |

Source: (a) AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines (bulldozing overburden). According to recommendations in AP-42 / Section 13.2.3 - Heavy Construction Operations (USEPA, January 1995) / Table 13.2.3-1 - Recommended Emission Factors for Construction Operations (reference to dozer equation (overburden) in Section 11.9 / Table 11.9.2).

(b) Scaling factor to convert TSP <= 30 um to  $PM_{2.5}$  and TSP <= 15 um to  $PM_{10}$ .

(c) PM10 and PM2.5 calculated multiplying TSP emission rates by respective scaling factors.

| Equipment/ venicle        | Wiodel                                       | Number of Equipment/ Vehicle            | Daily Ose       |                 |        |                   |                  |          |          |                   |
|---------------------------|--|---|-----------------|-----------------|--------|-------------------|------------------|----------|----------|-------------------|
| Compactor, Sheep Foot     | Caterpillar 815F/Komatsu CP76; or equivalent | 1                                       | 20.4            |                 |        |                   |                  |          |          |                   |
|                           |  |   |                 |                 |        |                   |                  |          |          |                   |
|                           |  |   | SO <sub>2</sub> | NO <sub>x</sub> | СО     | PM <sub>2.5</sub> | PM <sub>10</sub> | voc      | PAH      | CO <sub>2</sub> e |
| Mandanian anti-time anti- | tanna/day                                    | (refer to Bood Construction combustion) | 2 225 05        | 0.012           | 0.0017 | E 63E 04          | E 70E 04         | C 00F 04 | 4.075.06 | 2.70              |

### IV.6 - Grading

# A - Fugitive Emissions

| Dust Control Technique           |         | No control |          |
|----------------------------------|---------|------------|----------|
|                                  |         |            | ·        |
| Hours of operation per day       | hr/day  | A          | 6.0 (a)  |
| Number of graders                | number  | В          | 1 (a)    |
| Mean vehicle speed               | km/hr   | С          | 11.4 (b) |
| Vehicle kilometer traveled (VKT) | VKT/day | D = A*B*C  | 68.4     |
| Emission reduction efficiency    | (%)     | E          | 0        |

Source: (a) Information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx".

(b) Calculated assuming an average speed of 11.4 km/h, taken from AP-42 chapter 11.9 Western Surface Coal Mining.

|                                      |        |                       | 15P <= 30 um | 15P <= 15 um | PIVI <sub>10</sub> | PIVI <sub>2.5</sub> | i       |
|--------------------------------------|--------|-----------------------|--------------|--------------|--------------------|---------------------|---------|
| Constant (a)                         |        | F                     | 0.0034       | 0.0056       | -                  | -                   | (a)     |
| Constant (b)                         | -      | G                     | 2.5          | 2            | -                  | -                   | (a)     |
| Scaling Factor                       |        | Н                     | -            | -            | 0.60               | 0.031               | (a) (b) |
| Emission factor (uncontrolled)       | kg/VKT | I = F*(C^G)           | 1.49         | 0.73         | 0.44               | 0.05                | (a) (c) |
| Daily emission rate (uncontrolled)   | g/day  | J = D* I*1000         | 102,046.27   | 49,779.88    | 29,867.93          | 3,163.43            | l       |
| Daily emission rate (controlled)     | g/day  | K= D*I*1000*(1-E/100) | 102,046.27   | 49,779.88    | 29,867.93          | 3,163.43            | j       |
| Maximum emission rate (uncontrolled) | g/s    | L = J/(A*3600)        | 4.72         | 2.30         | 1.38               | 0.15                | l       |
| Maximum emission rate (controlled)   | g/s    | M = K/(A*3600)        | 4.72         | 858.79       | 515.28             | 54.57               | j       |
| Quality rating                       | -      |                       | С            | С            | D                  | D                   | i       |

Source: (a) AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines (grading). According to recommendations in Section 13.2.3 Heavy Construction Operations (USEPA, January 1995) / Table 13.2.3-1 - Recommended Emission Factors for Construction Operations (reference to grading equation in Table 11.9.2).

(b) Scaling factor to convert TSP <= 30 um to PM  $_{2.5}$  and TSP <= 15 um to PM  $_{10}$ .

(c) PM10 and PM2.5 calculated multiplying TSP emission rates by respective scaling factors.

| Surface grader      | Caterpillar 14W/Komatsu GD675-3 | 1                                       | 20.4            |                 |        |                   |                  |        |          |                   |
|---------------------|---------------------------------|---|-----------------|-----------------|--------|-------------------|------------------|--------|----------|-------------------|
|                     |                                 |   |                 |                 |        |                   |                  |        |          |                   |
|                     |                                 |   | SO <sub>2</sub> | NO <sub>x</sub> | со     | PM <sub>2.5</sub> | PM <sub>10</sub> | voc    | PAH      | CO <sub>2</sub> e |
| Daily emission rate | tonne/day                       | (refer to Road_Construction_combustion) | 2.60E-05        | 0.017           | 0.0039 | 0.0011            | 0.0011           | 0.0011 | 4.55E-06 | 3.11              |

# IV.7- Loading of aggregate into trucks

# A - Fugitive Emissions

| bust control rechnique           |            | NO CONTrol |          |
|----------------------------------|------------|------------|----------|
|                                  |            |            | -        |
| Hours of operation per day       | h/day      | A          | 15.6 (a) |
| Amount of debris removed per day | tonnes/day | В          | 337 (b)  |
| Emission reduction efficiency    | (%)        | C          | 0        |

Source: (a) Numbers of work hours per day taken as the Loader and Excavator hours of operation.

(b) Estimated from 0.3 m depth of aggregate used on the road (7.5 m wide) and 31.58 km length. Assuming the average unit weight of the aggregate material of 17 kN/m <sup>3</sup>.

|                                      |          |                        | TSP      | PM <sub>10</sub> | PM <sub>2.5</sub> |             |
|--------------------------------------|----------|------------------------|----------|------------------|-------------------|-------------|
| Emission factor (uncontrolled)       | kg/tonne | D                      | 0.018    | 0.0094           | 0.0019            | (a) (b) (c) |
| Daily emission rate (controlled)     | g/day    | E = B*D*1000*(1-C/100) | 6,072.31 | 3,157.60         | 637.59            |             |
| Daily emission rate (uncontrolled)   | g/day    | F = B*D*1000           | 6,072.31 | 3,157.60         | 637.59            |             |
| Maximum emission rate (controlled)   | g/s      | G = E/(A*3600)         | 0.11     | 0.06             | 0.011             |             |
| Maximum emission rate (uncontrolled) | g/s      | H = F/(A*3600)         | 0.11     | 0.06             | 0.011             |             |
| Quality rating                       | -        |                        | E        | -                | -                 |             |

Source: (a) TSP emission factor extracted from AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9.4 - Uncontrolled Particulate Emission Factors for Open Dust Sources at Western Surface Coal Mine (truck loading by power shovel (batch drop) / overburden).

(b) Emission factor for PM<sub>10</sub> based on the ratio between TSP and PM<sub>10</sub> emission factors for blasting in AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines.

(c) Emission factor for PM 25 based on the ratio between TSP and PM 25 emission factors for bulldozing overburden in AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines.

| Wheeled Front End Loader Caterpillar 980H/Komatsu WA 500-6 1 20.4 |
|---|
|   |

|                     |           |   | SO <sub>2</sub> | NO <sub>X</sub> | CO     | PM <sub>2.5</sub> | PM <sub>10</sub> | voc      | PAH      | CO₂e |
|---------------------|-----------|---|-----------------|-----------------|--------|-------------------|------------------|----------|----------|------|
| Daily emission rate | tonne/day | (refer to Road_Construction_combustion) | 3.50E-05        | 0.020           | 0.0075 | 9.17E-04          | 9.45E-04         | 8.09E-04 | 6.12E-06 | 4.19 |

# **Calculation of Emissions During the Construction Phase**

# IV.8 Hauling aggregate material along the road

A - Fugitive Emissions

| Dust Control Technique   |           | Assume no control | (a)        |  |  |  |
|--|-----------|-------------------|------------|--|--|--|
| Source: (a) Information provided by Fortune in an email dated Feb. 15, 2011. |           |                   |            |  |  |  |
|  |           |                   |            |  |  |  |
| Hours of operation per day - peak  | h/day     | A                 | 20 (a)     |  |  |  |
| Surface material silt content  | (%)       | В                 | 1.6 (b)    |  |  |  |
| Mean vehicle weight  | tonnes    | С                 | 56.87 (c)  |  |  |  |
| Vehicle kilometer traveled (VKT)   | km/day    | D                 | 320.98 (c) |  |  |  |
| Number of working days   | days/year | E                 | 365        |  |  |  |
| Number of days with precipitation >= 0.2 mm                                  | days/year | F                 | 58 (d)     |  |  |  |
| Emission reduction efficiency  | (%)       | G                 | 0          |  |  |  |

Source: (a) Information provided by Fortune. Daily operating time assumed to the same as construction haulage times. Assumed continuous operations.

(b) Roads are assumed to be lined with aggregate and it is expected to have a similar silt content as limestone; data available in AP 42 chapter 13.2.4/table 13.2.4-1.

(c) See Mean Vehicle Weight table below.

(d) Value derived from Fortune 2004-2007 onsite meteorological station (Fortune\_2004\_2007\_MetData(Oct8 04 - Sep27 07)\_MD.xls).

|   |        |  | PM-30 (TSP) | PM <sub>10</sub> | PM <sub>2.5</sub> |
|---|--------|--|-------------|------------------|-------------------|
| Constant (k)  | -      | Н  | 4.9         | 1.5              | 0.15              |
| Constant (a)  | -      | I  | 0.7         | 0.9              | 0.9               |
| Constant (b)  | -      | J  | 0.45        | 0.45             | 0.45              |
| Emission factor (uncontrolled)                        | lb/VMT | $K = H*((B/12)^{1})*((C*1.1/3)^{J})*[(E-G)/E]$ | 3.95        | 0.81             | 0.081             |
| Emission factor (metric uncontrolled)                 | g/VKT  | L = K * 281.9                                  | 1,114.51    | 228.02           | 22.80             |
| Emission factor (controlled)                          | g/VKT  | M = L*281.9*(1-G/100)                          | 1,114.51    | 228.02           | 22.80             |
| Emission factor (metric uncontrolled, without precip) | g/VKT  | $N = H^*((B/12)^{1})^*((C^*1.1/3)^{1})^*281.9$ | 1,323.63    | 270.80           | 27.08             |
| Emission factor (controlled, without precip)          | g/VKT  | O = N * (1-G/100)                              | 1,323.63    | 270.80           | 27.08             |
| Daily emission rate (uncontrolled)                    | g/day  | P = L *D                                       | 357,729.23  | 73,187.57        | 7,318.76          |
| Daily emission rate (controlled)                      | g/day  | Q= M*D   | 357,729.23  | 73,187.57        | 7,318.76          |
| Daily emission rate (uncontrolled, without precip)    | g/day  | R = N*D  | 424,851.96  | 86,920.17        | 8,692.02          |
| Daily emission rate (controlled, without precip)      | g/day  | S = O*D  | 424,851.96  | 86,920.17        | 8,692.02          |
| Maximum emission rate (uncontrolled)                  | g/s    | T = P/(A*3600)                                 | 4.87        | 1.00             | 0.10              |
| Maximum emission rate (controlled)                    | g/s    | U = Q/(A*3600)                                 | 4.87        | 1.00             | 0.100             |
| Maximum emission rate (uncontrolled, without precip)  | g/s    | V = R/(A*3600)                                 | 5.79        | 1.18             | 0.12              |
| Maximum emission rate (controlled, without precip)    | g/s    | W = S/(A*3600)                                 | 5.79        | 1.18             | 0.118             |
| Quality rating  |        |  | В           | В                | В                 |

Source: (a) AP-42 / Section 13.2.2 - Unpaved Roads (USEPA, November 2006)/ Equation (1a) - unpaved surfaces at industrial sites and Table 13.2.2-2.
(b) 281.9 constant to convert lb/VMT (pounds per vehicle mile travelled) to g/VKT (grams per vehicle kilometer travelled).



# **Calculation of Emissions During the Construction Phase**

### Mean Vehicle Weight

| Equipment                        | -      | Articulated Truck | Haulage Unit | Total  | 1    |
|----------------------------------|--------|-------------------|--------------|--------|------|
| Weight - Empty                   | tonne  | 33.10             | 73.98        |        | (a)  |
| Weight - Loaded                  | tonne  | 61.20             | 163.29       |        | (b)  |
| Mean Weight                      | tonne  | 47.15             | 118.63       |        |      |
| Number of two way trips          | number | 8                 | 1            |        | ( c) |
| Distance of two way trip         | km/day | 34.65             | 34.65        |        | ( d) |
| Vehicle kilometer traveled (VKT) | km/day | 277.35            | 43.63        | 320.98 | 3    |
| Percentage of traffic            | %      | 86%               | 14%          |        |      |
| Mean vehicle weight              | tonne  | 40.74             | 16.13        | 56.87  | 7    |

Source: (a) Information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx".

- (b) Haul trucks the loaded weight was taken as the maximum specified load in CAT 777F specification sheet. Articulated truck haulage capacity detailed in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx".

  (c) Estimated from 0.3 m depth of aggregate used on the road (7.5 m wide) and 31.58 km length. Assuming the average unit weight of the aggregate material of 17 kN/m <sup>3</sup>.

  (d) Assume distance is from centre of CDF to 1/2 way down access road.

# B- Exhaust Emissions

| Model                             | Number of Equipment/Vehicle       | Daily Use                         |
|-----------------------------------|-----------------------------------|-----------------------------------|
| Caterpillar 777F/Komatsu HD 785-7 | 1                                 | 20.4                              |
| Caterpillar 740                   | 2                                 | 20.4                              |
|                                   | Caterpillar 777F/Komatsu HD 785-7 | Caterpillar 777F/Komatsu HD 785-7 |

|                     |           |   | SO <sub>2</sub> | NO <sub>x</sub> | со    | PM <sub>2.5</sub> | PM <sub>10</sub> | voc    | PAH      | CO₂e  | 4 |
|---------------------|-----------|---|-----------------|-----------------|-------|-------------------|------------------|--------|----------|-------|---|
| Daily emission rate | tonne/day | (refer to Road_Construction_combustion) | 1.66E-04        | 0.12            | 0.032 | 0.0051            | 0.0053           | 0.0058 | 2.90E-05 | 19.83 | 3 |

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# **Calculation of Emissions During the Construction Phase**

### IV.9 - Vehicular traffic

### A - Fugitive Emissions

| - Tugitive Lillissions |                   |
|------------------------|-------------------|
| Dust Control Technique | Assume no control |
| Source:                | 2011.             |

| Hours of operation per day                  | h/day     | A | 6 (a      |
|---|-----------|---|-----------|
| Surface material silt content               | (%)       | В | 1.6 (1    |
| Mean vehicle weight                         | (tons)    | С | 16.13 (0  |
| Vehicle kilometer traveled (VKT)            | km/day    | D | 460.80 (0 |
| Number of working days                      | days/year | E | 365       |
| Number of days with precipitation >= 0.2 mm | days/year | F | 58 (0     |
| Emission reduction efficiency               | (%)       | G | 0         |

Source: (a) Based on information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx" assumed the same operating time as the haul trucks.

(b) Roads are assumed to be lined with aggregate and it is expected to have a similar silt content as limestone; data available in AP 42 chapter 13.2.4/table 13.2.4-1.

(c) See Mean Vehicle Weight table below.

(d) Value derived from Fortune 2004-2007 onsite meteorological station (Fortune\_2004\_2007\_MetData(Oct8 04 - Sep27 07)\_MD.xls).

|   |        |                                      | PM-30 (TSP) | PM <sub>10</sub> | PM <sub>2.5</sub> |
|---|--------|--------------------------------------|-------------|------------------|-------------------|
| Constant (k)  |        | н                                    | 4.9         | 1.5              | 0.15 (a           |
| Constant (a)  |        | 1                                    | 0.7         | 0.9              | 0.9 (a            |
| Constant (b)  | -      | J                                    | 0.45        | 0.45             | 0.45 (a           |
| Emission factor (uncontrolled)                              | lb/VMT | K = H*((B/12)^I)*((C/3)^J)*[(E-G)/E] | 2.15        | 0.44             | 0.044 (b          |
| Emission factor (uncontrolled, metric)                      | g/VKT  | L = K * 281.9                        | 605.10      | 123.80           | 12.38 (b          |
| Emission factor (controlled)                                | g/VKT  | M = L*281.9*(1-G/100)                | 605.10      | 123.80           | 12.38 (b          |
| Emission factor (uncontrolled, without precipitation)       | g/VKT  | N=H*((B/12)^I)*((C/3)^J)*281.9       | 718.64      | 147.03           | 14.70             |
| Emission factor (controlled, without precipitation)         | g/VKT  | O = N*(1-G/100)                      | 718.64      | 147.03           | 14.70             |
| Daily emission rate (uncontrolled)                          | g/day  | P= L * D                             | 278,832.12  | 57,046.07        | 5,704.61          |
| Daily emission rate (controlled)                            | g/day  | Q = M*D                              | 278,832.12  | 57,046.07        | 5,704.61          |
| Daily emission rate (uncontrolled, without precipitation)   | g/day  | R = N * D                            | 331,150.95  | 67,749.94        | 6,774.99          |
| Daily emission rate (controlled, without precipitation)     | g/day  | S = O* D                             | 331,150.95  | 67,749.94        | 6,774.99          |
| Maximum emission rate (uncontrolled)                        | g/s    | T = P/(A*3600)                       | 12.87       | 2.63             | 0.26              |
| Maximum emission rate (controlled)                          | g/s    | U = Q/(A*3600)                       | 12.87       | 2.63             | 0.26              |
| Maximum emission rate (uncontrolled, without precipitation) | g/s    | V = R/(A*3600)                       | 15.29       | 3.13             | 0.31              |
| Maximum emission rate (controlled, without precipitation)   | g/s    | W = S/(A*3600)                       | 15.29       | 3.13             | 0.31              |
| Quality rating  | -      |                                      | В           | В                | В                 |

Source: (a) AP-42 / Section 13.2.2 - Unpaved Roads (USEPA, November 2006)/ Equation (1a) - unpaved surfaces at industrial sites and Table 13.2.2-2.

(b) 281.9 constant to convert lb/VMT (pounds per vehicle mile travelled) to g/VKT (grams per vehicle kilometer travelled).



# **Calculation of Emissions During the Construction Phase**

Mean Vehicle Weight

| Equipment                        | -      | Light I | Duty Truck | Heavy Duty<br>Truck | Road Tractor | Fuel and Lube Truck | Personal Carrier | Total  |         |
|----------------------------------|--------|---------|------------|---------------------|--------------|---------------------|------------------|--------|---------|
| Weight - Empty                   | tonne  |         | 4.26       | 6.59                | 28.12        | 28.12               | 4.13             |        | (a)     |
| Weight - Loaded                  | tonne  |         | 4.26       | 6.59                | 28.12        | 48.12               | 4.13             |        | (b) (c) |
| Mean Weight                      | tonne  |         | 4.26       | 6.59                | 28.12        | 38.12               | 4.13             | 81.22  |         |
| Number of Vehicles               | number |         | 2          | 2                   | 1            | 1                   | 1                |        | (d)     |
| Distance travelled per day       | km/day |         | 38.40      | 76.80               | 76.80        | 76.80               | 76.80            |        | (e)     |
| Vehicle kilometer traveled (VKT) | km/day |         | 76.80      | 153.60              | 76.80        | 76.80               | 76.80            | 460.80 |         |
| Percentage of traffic            | %      |         | 17%        | 33%                 | 17%          | 17%                 | 17%              | •      |         |
| Mean vehicle weight              | tonne  |         | 0.71       | 2.20                | 4.69         | 6.35                | 0.69             | 14.64  |         |

Source: (a) Information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx".

(b) Assumed loaded Fuel truck is 20,000 kg heavier than empty truck.

(c) Assumed loaded tractor is 20,000 kg heavier than empty tractor.
(d) Assumed all vehicles took one trip. For vehicles with 2 trips per day represents that Fortune indicated that there were two of that vehicle type.

(e) Distance travelled per day calculated from vehicle operational times multiplied by an assumed average speed of 20 km/hour.

| Equipment/Vehicle        | Model  | Number of Equipment/Vehicle | Daily Use |
|--------------------------|--|-----------------------------|-----------|
| Fuel & Lube Truck        | Western Star 4900 SA; or Equivalent            | 1                           | 3.8       |
| Road Tractor             | Western Star 4900 SA; or Equivalent            | 1                           | 3.8       |
| Light Duty Truck         | Ford F-250 Crewcab, or equivalent              | 2                           | 1.9       |
| Personnel Carrier        | Chevrolet Express 2500 Standard, or equivalent | 1                           | 3.8       |
| Heavy Duty Truck, Diesel | Ford F-450 Crew Cab Flat Deck; or equivalent   | 1                           | 3.8       |
| Heavy Duty Truck, Diesel | Ford F-450 Crew Cab Flat Deck; or equivalent   | 1                           | 3.8       |

|                     |           |   | SO <sub>2</sub> | NO <sub>x</sub> | co    | PM <sub>2.5</sub> | PM <sub>10</sub> | voc    | PAH      | CO <sub>2</sub> e |
|---------------------|-----------|---|-----------------|-----------------|-------|-------------------|------------------|--------|----------|-------------------|
| Daily emission rate | tonne/day | (refer to Road_Construction_combustion) | 4.44E-05        | 0.030           | 0.011 | 0.0015            | 0.0015           | 0.0013 | 7.77E-06 | 5.31              |



# **Calculation of Emissions During the Construction Phase**

### IV.10 - Jaw crusher

#### A - Fugitive Emission

| bust control reclinique              |            | 140 CONTROL |            |
|--------------------------------------|------------|-------------|------------|
|                                      |            |             | ·          |
| Hours of operation per day - maximum | h/day      | A           | 1.2 (a)(b) |
| Amount of material processed per day | tonnes/day | В           | 337 (b)    |
| Emission reduction efficiency        | (%)        | C           | 0 (c)      |

Source: (a) Information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx".

(b) Estimated from 0.3 m depth of aggregate used on the road (7.5 m wide) and 31.58 km length. Assuming the average unit weight of the aggregate material of 17 kN/m <sup>3</sup>.

(c ) Assume no Wet Suppression

|                                     |          |                        | TSP     | PM <sub>10</sub> | PM <sub>2.5</sub> | 1       |
|-------------------------------------|----------|------------------------|---------|------------------|-------------------|---------|
| Emission factor (uncontrolled)      | kg/tonne | D                      | 0.01    | 0.004            | 0.00007           | (a) (b) |
| Daily emission rate (controlled)    | g/day    | E = B*D*1000*(1-C/100) | 3373.51 | 1349.40          | 24.99             | i       |
| Maximum emission rate, controlled   | g/s      | F = E/(A*3600)         | 0.78    | 0.31             | 0.0058            | ı       |
| Maximum emission rate, uncontrolled | g/s      | F' = B*D*1000/(A*3600) | 0.78    | 0.31             | 0.0058            | i       |
| Quality rating                      | -        |                        | С       | С                | -                 | (a)     |

Source: (a) AP-42 / 11.24 - Metallic Minerals Processing (USEPA, August 1982)/ Table 11.24-1 (Metric Units). Emission factors for metallic minerals processing (value for high moisture ore / primary crushing; high moisture ore defined as >= 4% in weight).

(b) Emission factor for PM<sub>2.5</sub> based on the ratio between PM<sub>10</sub> and PM<sub>2.5</sub> emission factors for tertiary crushing (controlled) in AP-42 / 11.19.2 Crushed Stone Processing and Pulverized Mineral Processing (USEPA, August 2004)/ Table 11.19.2.1.

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# **Calculation of Emissions During the Construction Phase**

### IV.11 Material screening

#### A - Fugitive Emission

| Dust Control Technique               |            | NO CONTROL |           |
|--------------------------------------|------------|------------|-----------|
|                                      |            |            | •         |
| Hours of operation per day - maximum | h/day      | A          | 1.2 (a)   |
| Amount of material processed per day | tonnes/day | В          | 337.4 (b) |
| Emission reduction efficiency        | (%)        | С          | 0 (c      |

Source: (a) Assumed same operational hours as the Crusher.

(b) Estimated from 0.3 m depth of aggregate used on the road (7.5 m wide) and 31.58 km length. Assuming the average unit weight of the aggregate material of 17 kN/m <sup>3</sup>.

(c) No dust controls methods were assumed.

|                                      |          |                        | TSP      | PM <sub>10</sub> | PM <sub>2.5</sub> | 1       |
|--------------------------------------|----------|------------------------|----------|------------------|-------------------|---------|
| Emission factor (uncontrolled)       | kg/tonne | D                      | 0.0125   | 0.0043           | 0.00003           | (a) (b) |
| Daily emission rate (controlled)     | g/day    | E = B*D*1000*(1-C/100) | 4,216.88 | 1,450.61         | 8.43              | l       |
| Daily emission rate (uncontrolled)   | g/day    | F = B*D*1000           | 4,216.88 | 1,450.61         | 8.43              | i       |
| Maximum emission rate (controlled)   | g/s      | G = E/(A*3600)         | 0.98     | 0.34             | 0.0020            | i       |
| Maximum emission rate (uncontrolled) | g/s      | H = F/(A*3600)         | 0.98     | 0.34             | 0.0020            | i       |
| Quality rating                       | -        |                        | E        | С                | -                 | (a)     |

Source: (a) AP-42 / 11.19.2 Crushed Stone Processing and Pulverized Mineral Processing (USEPA, August 2004)/ Table 11.19.2-1 (Metric Units) - Emission factors for crushed stone processing operations (value for screening - uncontrolled). (b) Assumed PM<sub>25</sub> emission factor taken from Screening for wet suppression.



# Air Quality Assessment - NICO Project Calculation of Emissions During the Construction Phase

### IV.12 - Blasting

### A - Fugitive Emissions

| Dust Control Technique       |            | No control |         |  |
|------------------------------|------------|------------|---------|--|
|                              |            |            |         |  |
| Blasting from ANFO           | tonne/year | A          | 17 (a)  |  |
| Blasting from Emulsion blend | tonne/year | В          | 17 (a)  |  |
| Number of Blasts per day     | blasts/day | С          | 0.4 (a) |  |

Source: (a) Information provided by Fortune in "NICO estimated blasting quantities.xlsx".

|                       |           |                          | SO2      | NOx    | со     | CH4      | H2S      | CO2e     |
|-----------------------|-----------|--------------------------|----------|--------|--------|----------|----------|----------|
| ANFO Constant (a)     | kg/Mg     | D                        | 1        | 8      | 34     |          |          |          |
| Emulsion blend (b)    | kg/Mg     | E                        | 1        | 26     | 52     | 0.3      | 2        |          |
| Emission rate         | tonne/day | F = (A*D+B*E)/10^3/(365) | 9.45E-05 | 0.0016 | 0.0041 | 1.42E-05 | 9.45E-05 | 2.98E-04 |
| Maximum emission rate | g/s       | G' = F/(24*3600)*10^6    | 0.0011   | 0.019  | 0.047  | 1.64E-04 | 0.0011   | 0.0034   |

Source: (a) Emission factors taken from AP-42 Section 13.3.

(b) Assumed that Emulsion blend is Dynamite Gelatin within AP-42, chapter 13.

|                                     |           |                           | 1SP <= 30 um | PIVI <sub>10</sub> | PIVI <sub>2.5</sub> |       |
|-------------------------------------|-----------|---------------------------|--------------|--------------------|---------------------|-------|
| Constant (a)                        | •         | Н                         | 0.00022      | -                  | - (a)               |       |
| Constant (b)                        | •         |                           | 1.5          | -                  | - (a)               |       |
| Scaling factor                      |           | J                         | -            | 0.52               | 0.03 (a)            |       |
| Annual emission rate (uncontrolled) | kg/year   | K = H*(1250/50)^I*C*(365) | 4.37         | 2.27               | 0.13 (a) (b) (d     | c)(d) |
| Daily emission rate (uncontrolled)  | tonne/day | L= K/1000/(365)           | 1.20E-05     | 6.22E-06           | 3.59E-07            |       |
| Maximum emission rate (24 hour)     | g/s       | N = L/(24*3600)*10^6      | 1.39E-04     | 7.20E-05           | 4.16E-06            |       |

Source: (a) AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998)/ Table 11.9-2 - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines (blasting).

(b) Scaling factor to convert TSP <= 30 um to PM<sub>2.5</sub> and PM<sub>10</sub>.

(c) PM10 and PM2.5 calculated multiplying TSP emission rate by respective scaling factors.

(d) Fortune provided that for 50 blasts results in 1250 m<sup>2</sup> of disturbed area in an email dated November 29, 2010.

# Summary of Daily Maximum (Winter) Emissions During the Road Construction Phase

| Description                | Course   | T                      | Type Top DMG DMG DG NG NG NG NG NG NG NG NG NG NG NG NG NG |          |          |          |          |          |          |          |           |              |     |     |     |     |
|----------------------------|--|------------------------|--|----------|----------|----------|----------|----------|----------|----------|-----------|--------------|-----|-----|-----|-----|
| Description                | Source   | туре                   | TSP  | PM10     | PM2.5    | SO2      | NOx      | СО       | VOC      | PAH      | CO2e      | DIOXIN/FURAN | As  | Bi  | Со  | Cu  |
|                            | IV.1 - General land clearing                   | A - Fugitive Emissions | 7.65E+00   | 2.51E+00 | 8.04E-01 | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       | N/A          | N/A | N/A | N/A | N/A |
|                            | IV.1 - General land cleaning                   | B- Exhaust Emissions   | 2.20E-02   | 2.20E-02 | 2.14E-02 | 7.74E-04 | 3.92E-01 | 6.46E-02 | 2.55E-02 | 1.35E-04 | 9.26E+01  | N/A          | N/A | N/A | N/A | N/A |
|                            | IV.2 - Drilling                                | A - Fugitive Emissions | 3.04E-02   | 1.35E-02 | 2.50E-03 | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       | N/A          | N/A | N/A | N/A | N/A |
|                            | IV.2 - Dilling                                 | B- Exhaust Emissions   | 1.12E+00   | 1.12E+00 | 1.09E+00 | 4.52E-02 | 2.26E+01 | 3.25E+00 | 1.36E+00 | 7.91E-03 | 5.41E+03  | N/A          | N/A | N/A | N/A | N/A |
|                            | IV.3 - Bulldozing                              | A - Fugitive Emissions | 3.39E+02   | 1.11E+02 | 3.56E+01 | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       | N/A          | N/A | N/A | N/A | N/A |
|                            | IV.5 - Buildozing                              | B- Exhaust Emissions   | 3.81E+00   | 3.81E+00 | 3.69E+00 | 1.17E-01 | 8.04E+01 | 3.02E+01 | 3.25E+00 | 2.04E-02 | 1.39E+04  | N/A          | N/A | N/A | N/A | N/A |
|                            | IV.4 - Material handling                       | A - Fugitive Emissions | 2.01E-01   | 9.49E-02 | 1.44E-02 | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       | N/A          | N/A | N/A | N/A | N/A |
|                            | 1V.4 - Waterial Hariding                       | B- Exhaust Emissions   | 3.28E+00   | 3.28E+00 | 3.18E+00 | 1.21E-01 | 7.25E+01 | 1.97E+01 | 3.66E+00 | 2.12E-02 | 1.45E+04  | N/A          | N/A | N/A | N/A | N/A |
| - Access Poad Construction | IV.5- Compacting                               | A - Fugitive Emissions | 4.99E+01   | 1.63E+01 | 5.24E+00 | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       | N/A          | N/A | N/A | N/A | N/A |
|                            | TV.5- Compacting                               | B- Exhaust Emissions   | 5.79E-01   | 5.79E-01 | 5.62E-01 | 2.33E-02 | 1.16E+01 | 1.67E+00 | 6.99E-01 | 4.07E-03 | 2.78E+03  | N/A          | N/A | N/A | N/A | N/A |
|                            | IV.6 - Grading                                 | A - Fugitive Emissions | 1.02E+02   | 2.99E+01 | 3.16E+00 | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       | N/A          | N/A | N/A | N/A | N/A |
|                            | TV.0 - Grading                                 | B- Exhaust Emissions   | 1.13E+00   | 1.13E+00 | 1.10E+00 | 2.60E-02 | 1.66E+01 | 3.86E+00 | 1.10E+00 | 4.55E-03 | 3.11E+03  | N/A          | N/A | N/A | N/A | N/A |
|                            | IV.7- Loading of aggregate into trucks         | A - Fugitive Emissions | 6.07E+00   | 3.16E+00 | 6.38E-01 | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       | N/A          | N/A | N/A | N/A | N/A |
|                            | TV.7- Edding of aggregate into trucks          | B- Exhaust Emissions   | 9.45E-01   | 9.45E-01 | 9.17E-01 | 3.50E-02 | 2.00E+01 | 7.51E+00 | 8.09E-01 | 6.12E-03 | 4.19E+03  | N/A          | N/A | N/A | N/A | N/A |
|                            | IV.8 Hauling aggregate material along the road | A - Fugitive Emissions | 3.58E+02   | 7.32E+01 | 7.32E+00 | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       | N/A          | N/A | N/A | N/A | N/A |
|                            | TV.0 Hadiing aggregate material along the road | B- Exhaust Emissions   | 5.25E+00   | 5.25E+00 | 5.09E+00 | 1.66E-01 | 1.16E+02 | 3.20E+01 | 5.81E+00 | 2.90E-02 | 1.98E+04  | N/A          | N/A | N/A | N/A | N/A |
|                            | IV 9 - Vehicular traffic                       | A - Fugitive Emissions | 2.79E+02   | 5.70E+01 | 5.70E+00 | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       | N/A          | N/A | N/A | N/A | N/A |
|                            | IIV 9 - Venicular framic                       | B- Exhaust Emissions   | 1.50E+00   | 1.50E+00 | 1.46E+00 | 4.44E-02 | 3.04E+01 | 1.10E+01 | 1.31E+00 | 7.77E-03 | 5.31E+03  | N/A          | N/A | N/A | N/A | N/A |
|                            | IV.10 - Jaw crusher                            | A - Fugitive Emissions | 3.37E+00   | 1.35E+00 | 2.50E-02 | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       | N/A          | N/A | N/A | N/A | N/A |
|                            | IV.11 Material screening                       | A - Fugitive Emissions | 4.22E+00   | 1.45E+00 | 8.43E-03 | N/A      | N/A      | N/A      | N/A      | N/A      | N/A       | N/A          | N/A | N/A | N/A | N/A |
|                            | IV.12 - Blasting                               | A - Fugitive Emissions | 1.20E-02   | 6.22E-03 | 3.59E-04 | 9.45E-02 | 1.61E+00 | 4.06E+00 | N/A      | N/A      | 2.98E-01  | N/A          | N/A | N/A | N/A | N/A |
| Total                      |  |                        | 1,166.98   | 313.78   | 75.65    | 0.67     | 372.12   | 113.40   | 18.02    | 0.10     | 69,130.27 | N/A          | N/A | N/A | N/A | N/A |

N/A- No applicable emissions

| Description                   |          |          |          |          | Emis   | sion Rate (kg/ | day)     |          |           |              |     |     |     |     |
|-------------------------------|----------|----------|----------|----------|--------|----------------|----------|----------|-----------|--------------|-----|-----|-----|-----|
| Description                   | TSP      | PM10     | PM2.5    | SO2      | NOx    | СО             | VOC      | PAH      | CO2e      | DIOXIN/FURAN | As  | Bi  | Со  | Cu  |
| IV - Access Road Construction | 1.17E+03 | 3.14E+02 | 7.57E+01 | 6.73E-01 | 372.12 | 1.13E+02       | 1.80E+01 | 1.01E-01 | 6.91E+04  | N/A          | N/A | N/A | N/A | N/A |
| Total                         | 1,166.98 | 313.78   | 75.65    | 0.67     | 372.12 | 113.40         | 18.02    | 0.10     | 69,130.27 | N/A          | N/A | N/A | N/A | N/A |

N/A- No applicable emissions



### Summary of Daily Maximum (Winter) Emissions During the Operation Phase

| Description  | Source Type Emission R  |   |          |          | Emission Rate (kg/day) |          |          |          |          |          |            |              |          |          |          |        |
|--|---|---|----------|----------|------------------------|----------|----------|----------|----------|----------|------------|--------------|----------|----------|----------|--------|
| Description  | Source  | Туре                                    | TSP      | PM10     | PM2.5                  | SO2      | NOx      | co       | VOC      | PAH      | CO2e       | DIOXIN/FURAN | As       | Bi       | Co       | Cu     |
|  | I.1 - Drilling  | A - Fugitive Emissions (PM with Metals) | 2.98E+00 | 1.32E+00 | 2.45E-01               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | 8.63E-03 | 2.02E-03 | 1.04E-03 | 4.19E  |
|  | 3   | B- Exhaust Emissions                    | 1.12E+00 | 1.12E+00 | 1.08E+00               | 9.06E-02 | 3.46E+01 | 7.33E+00 | 1.47E+00 | 1.58E-02 | 1.08E+04   | N/A          | N/A      | N/A      | N/A      | N/A    |
| Open Pit Extraction                                      | 1.2 - Blasting  | A - Fugitive Emissions (PM with Metals) | 1.26E+00 | 6.54E-01 | 3.77E-02               | 9.92E+00 | 1.69E+02 | 4.26E+02 | N/A      | N/A      | 3.12E+01   | N/A          | 3.64E-03 | 8.53E-04 | 4.37E-04 |        |
|  | 1.3 - Ore transport (haul truck transport)  | A - Fugitive Emissions (PM)             | 7.74E+02 | 1.58E+02 | 1.58E+01               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | N/A      | N/A      | N/A      | N/     |
|  | i.s - Ole transport (natir truck transport)   | B- Exhaust Emissions                    | 3.88E+00 | 3.88E+00 | 3.77E+00               | 1.77E-01 | 8.25E+01 | 2.81E+01 | 3.98E+00 | 3.09E-02 | 2.11E+04   | N/A          | N/A      | N/A      | N/A      | N/     |
|  | II.1 -Transfer (dump) to Stockpile 1  | A - Fugitive Emissions (PM with Metals) | 5.81E+00 | 2.75E+00 | 4.16E-01               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | 4.69E-02 | 6.46E-03 | 5.51E-03 | 1.05   |
|  | II.2 - Transfer to Primary Crusher by Front End Loader/Maintenance, Stockpile 1                           | A - Fugitive Emissions (PM with Metals) | 4.66E+00 | 3.81E-01 | 4.90E-01               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | 3.76E-02 | 5.18E-03 | 4.42E-03 | 8.43   |
|  | II.2 - Transfer to Frimary Crosner by Front End Codder/Maintenance, Stockpile 1                           | B- Exhaust Emissions                    | 1.39E-01 | 1.39E-01 | 1.35E-01               | 6.91E-03 | 2.66E+00 | 1.01E+00 | 1.44E-01 | 1.21E-03 | 8.26E+02   | N/A          | N/A      | N/A      | N/A      | N      |
| Ore management   | II.3 Wind Erosion from Stockpile 1  | A - Fugitive Emissions (PM with Metals) | 1.10E+00 | 5.52E-01 | 8.29E-02               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | 8.92E-03 | 1.23E-03 | 1.05E-03 | 2.0    |
| Ore management   | II.4 - Transfer (dump) to Stockpile 2   | A - Fugitive Emissions (PM with Metals) | 5.81E+00 | 2.75E+00 | 4.16E-01               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | 4.69E-02 | 6.46E-03 | 5.51E-03 |        |
|  | II.5 - Transfer to Primary Crusher by Frond End Loader/Maintenance. Stockpile 2                           | A - Fugitive Emissions (PM with Metals) | 4.66E+00 | 3.81E-01 | 4.90E-01               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | 3.76E-02 |          | 4.42E-03 |        |
|  |   | B- Exhaust Emissions                    | 1.39E-01 | 1.39E-01 | 1.35E-01               | 6.91E-03 | 2.66E+00 | 1.01E+00 | 1.44E-01 | 1.21E-03 | 8.26E+02   | N/A          | N/A      | N/A      | N/A      |        |
|  | II.6 Wind Erosion from Stockpile 2  | A - Fugitive Emissions (PM with Metals) | 2.03E+00 | 1.02E+00 | 1.53E-01               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | 1.64E-02 | 2.26E-03 | 1.93E-03 |        |
|  | III.1 - Ore Drop into Primary Crusher   | A - Fugitive Emissions (PM with Metals) | 1.24E+01 | 5.85E+00 | 8.85E-01               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | 9.98E-02 | 1.37E-02 | 1.17E-02 | 2.2    |
|  | III.2 - Primary Crushing  | A - Fugitive Emissions (PM with Metals) | 5.50E+01 | 2.20E+01 | 4.07E-01               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | 4.44E-01 | 6.12E-02 | 5.22E-02 | 9.9    |
|  | III.3 - Conveyor Transport (1200-CV-003), exhaust to DC-003 (UTM 513463/7046445)                          | A - Fugitive Emissions (PM with Metals) | 3.62E-03 | 1.19E-03 | 3.36E-04               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | 2.92E-05 | 4.02E-06 | 1.99E-04 | 6.5    |
|  | III.4 - Ore Drop into Secondary Crusher, exhaust to DC-003 (UTM 513463/7046445)                           | A - Fugitive Emissions (PM with Metals) | 6.51E-04 | 3.08E-04 | 4.66E-05               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | 5.26E-06 | 7.24E-07 | 6.18E-07 |        |
|  | III.5 - Secondary Crushing, exhaust to DC-003 (UTM 513463/7046445)  | A - Fugitive Emissions (PM with Metals) | 8.25E-01 | 3.30E-01 | 6.11E-03               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | 6.66E-03 | 9.17E-04 | 7.83E-04 |        |
|  | III.6 - Conveyer Transport (2150-CV-005), exhaust to DC-003 (UTM 513463/7046445)                          | A - Fugitive Emissions (PM with Metals) | 3.62E-03 | 1.19E-03 | 3.36E-04               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | 2.92E-05 | 4.02E-06 | 3.43E-06 | 6.5    |
| Ore Processing   | III.7 - Ore Drop in Transfer Tower, exhaust to DC-004 (UTM 513370/7046442)                                | A - Fugitive Emissions (PM with Metals) | 6.51E-04 | 3.08E-04 | 4.66E-05               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | 5.26E-06 | 7.24E-07 | 6.18E-07 | 1.1    |
|  | III.8 - Conveyer transport (2150-CV-007), exhaust to DC-003 (UTM 513463/7046445)                          | A - Fugitive Emissions (PM with Metals) | 3.62E-03 | 1.19E-03 | 3.36E-04               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | 2.92E-05 | 4.02E-06 | 3.43E-06 | 6.5    |
|  | III.9 - Ore Drop into Material Screen, exhaust to DC-003 (UTM 513463/7046445)                             | A - Fugitive Emissions (PM with Metals) | 6.51E-04 | 3.08E-04 | 4.66E-05               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | 5.26E-06 | 7.24E-07 | 6.18E-07 | 1.1    |
|  | III.10 Material Screening, exhaust to DC-003 (UTM 513463/7046445)   | A - Fugitive Emissions (PM with Metals) | 5.68E-02 | 1.91E-02 | 1.29E-03               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | 4.59E-04 | 6.32E-05 | 5.39E-05 | 1.0    |
|  | III.11 - Tertiary Crushing, exhaust to DC-003 (UTM 513463/7046445)  | A - Fugitive Emissions (PM with Metals) | 8.25E-01 | 2.75E-01 | 5.09E-03               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | 6.66E-03 | 9.17E-04 | 7.83E-04 | 1.4    |
|  | III.12 Grinding   | N/A                                     | N/A      | N/A      | N/A                    | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | N/A      | N/A      | N/A      |        |
|  | III.13 Ore Concentration Using Flotation and Recovery   | N/A                                     | N/A      | N/A      | N/A                    | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | N/A      | N/A      | N/A      |        |
|  | III.14 Tailing Slurry Transfer to CDF   | N/A                                     | N/A      | N/A      | N/A                    | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | N/A      | N/A      | N/A      |        |
|  | IV.1- Waste rock dumping on waste rock pile   | A - Fugitive Emissions (PM with Metals) | 6.27E+01 | 2.97E+01 | 4.49E+00               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | 7.02E-02 | 3.32E-02 | 8.86E-03 | 7.9    |
|  | IV.2 - CDF Management   | A - Fugitive Emissions (PM with Metals) | 7.68E+02 | 2.49E+02 | 8.07E+01               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | 8.59E-01 | 4.07E-01 | 1.08E-01 | 9.7    |
| - Co-Disposal Facility (CDF)                             | TE OF Management  | B- Exhaust Emissions                    | 8.05E-01 | 8.05E-01 | 7.80E-01               | 3.67E-02 | 1.80E+01 | 6.14E+00 | 8.43E-01 | 6.42E-03 | 4.39E+03   | N/A          | N/A      | N/A      | N/A      |        |
|  | IV.3 - Transport of Rock to CDF   | A - Fugitive Emissions (PM)             | 1.82E+03 | 3.72E+02 | 3.72E+01               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | N/A      | N/A      | N/A      | 1      |
|  | 17.3 - Halisport of Rock to Cor-  | B- Exhaust Emissions                    | 5.77E+00 | 5.77E+00 | 5.60E+00               | 2.64E-01 | 1.22E+02 | 3.99E+01 | 6.04E+00 | 4.61E-02 | 3.15E+04   | N/A          | N/A      | N/A      | N/A      | 1      |
| Concentrate Storage                                      | V.1 - Dumping into fine ore bin assumed to be the same as bagging, exhaust to DC-005 (UTM 513427/7046460) | A - Fugitive Emissions (PM with Metals) | 8.31E-05 | 3.93E-05 | 5.95E-06               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | 6.71E-07 | 9.25E-08 | 7.89E-08 | 1.5    |
| Concentrate Storage                                      | V.2 Concentrate Storage   | N/A                                     | N/A      | N/A      | N/A                    | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | N/A      | N/A      | N/A      |        |
|  | VI.1 - B-Train concentrate. Access Road   | A - Fugitive Emissions (PM)             | 3.06E+02 | 6.27E+01 | 6.27E+00               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | N/A      | N/A      | N/A      |        |
| - Concentrate Transport                                  | VI.1 - B-11all Concellitate, Access Road  | B- Exhaust Emissions                    | 3.57E-02 | 3.57E-02 | 3.28E-02               | 2.96E-03 | 1.62E+00 | 7.45E-01 | 1.52E-01 | 1.13E-03 | 7.75E+02   | N/A          | N/A      | N/A      | N/A      |        |
| - Concentrate Transport                                  | VI.2 - B-Train concentrate. Tilcho Road   | A - Fugitive Emissions (PM)             | 1.84E+02 | 3.76E+01 | 3.76E+00               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | N/A      | N/A      | N/A      |        |
|  |   | B- Exhaust Emissions                    | 2.14E-02 | 2.14E-02 | 1.97E-02               | 1.78E-03 | 9.73E-01 | 4.47E-01 | 9.11E-02 | 4.53E-04 | 3.10E+02   | N/A          | N/A      | N/A      | N/A      |        |
|  | VII.1 - Air transport   | A - Fugitive Emissions (PM)             | 4.66E+01 | 2.33E+01 | 3.50E+00               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | N/A      | N/A      | N/A      |        |
|  | VII.2 - Offsite Transport, Access Road  | A - Fugitive Emissions (PM)             | 5.51E+02 | 1.13E+02 | 1.13E+01               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | N/A      | N/A      | N/A      |        |
| - Other Off-site Transport (people, equipment, supplies) | VII.2 - Olisite Halisport, Access Road  | B- Exhaust Emissions                    | 6.42E-02 | 6.42E-02 | 5.91E-02               | 5.33E-03 | 2.92E+00 | 1.34E+00 | 2.73E-01 | 2.04E-03 | 1.39E+03   | N/A          | N/A      | N/A      | N/A      |        |
|  | VII.3 - Offsite Transport, Tilcho road  | A - Fugitive Emissions (PM)             | 3.31E+02 | 6.76E+01 | 6.76E+00               | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | N/A      | N/A      | N/A      |        |
|  |   | B- Exhaust Emissions                    | 3.85E-02 | 3.85E-02 | 3.55E-02               | 3.20E-03 | 1.75E+00 | 8.04E-01 | 1.64E-01 | 8.16E-04 | 5.58E+02   | N/A          | N/A      | N/A      | N/A      |        |
|  | VIII.1 - Power Generation   | C - Combustion Emissions                | 6.66E+01 | 6.16E+01 | 6.16E+01               | 1.63E+00 | 3.44E+03 | 9.13E+02 | 4.46E+00 | 2.26E-01 | 1.86E+05   | N/A          | N/A      | N/A      | N/A      |        |
|  | VIII.2 - Incineration   | C - Combustion Emissions                | 7.04E-01 | 6.42E-01 | 6.19E-01               | 1.53E+00 | 2.07E+01 | 5.17E+00 | 1.02E-01 | 1.26E-03 | 3.61E+03   | 8.50E-10     | 3.99E-05 | N/A      | 6.45E-05 | 4.     |
| - Support Activities                                     | VIII.3 - Heating  | N/A                                     | N/A      | N/A      | N/A                    | N/A      | N/A      | N/A      | N/A      | N/A      | N/A        | N/A          | N/A      | N/A      | N/A      |        |
|  | VIII.4 - Other vehicles   | B- Exhaust Emissions                    | 2.92E+00 | 2.92E+00 | 2.83E+00               | 1.23E-01 | 5.88E+01 | 2.20E+01 | 3.14E+00 | 2.15E-02 | 1.47E+04   | N/A          | N/A      | N/A      | N/A      |        |
|  | VIII.5 - Fuel Storage   | N/A                                     |          |          |                        |          |          |          |          |          |            |              |          | . —      |          | $\Box$ |
|  |   |   |          |          |                        |          | 3.956.52 |          |          |          | 276.458.75 |              |          |          | 0.21     |        |

|  |          |          | Emiss    | ion Rate (kg/d | ay)      |        |      |        |            |              |          |         |           |            |
|--|----------|----------|----------|----------------|----------|--------|------|--------|------------|--------------|----------|---------|-----------|------------|
| Description  | TSP      | PM10     | PM2.5    | SO2            | NOx      | co     | VOC  | PAH    | CO2e       | DIOXIN/FURAN | As       | Bi      | Co        | Cu         |
| I - Open Pit Extraction                                      | 782.97   | 165.28   | 20.96    | 10.19          | 285.72   | 461.96 | 5.45 | 0.047  | 31,997.02  | N/A          | 0.012    | 0.002   | 0.0015    | 5.97E-04   |
| II - Ore management  | 24.35    | 8.10     | 2.32     | 0.014          | 5.31     | 2.02   | 0.29 | 0.0024 | 1,651.45   | WA.          | 0.19     | 0.02    | 0.023     | 0.0044     |
| III - Ore Processing   | 69.08    | 28.47    | 1.31     | N/A            | N/A      | N/A    | N/A  | N/A    | N/A        | WA.          | 0.56     | 0.07    | 0.066     | 0.012      |
| IV - Co-Disposal Facility (CDF)                              | 2,656.51 | 657.68   | 128.76   | 0.30           | 139.93   | 46.09  | 6.89 | 0.052  | 35,869.58  | WA.          | 0.93     | 0.4     | 0.12      | 0.11       |
| V - Concentrate Storage                                      | 8.31E-05 | 3.93E-05 | 5.95E-06 | N/A            | N/A      | N/A    | N/A  | N/A    | N/A        | WA.          | 6.71E-07 | 9.25E-I | 8 7.89E-0 | 8 1.50E-08 |
| VI - Concentrate Transport                                   | 490.01   | 100.30   | 10.08    | 0.0047         | 2.60     | 1.19   | 0.24 | 0.0016 | 1,084.40   | NA AW        | N/A      | N/A     | N/A       | N/A        |
| VII - Other Off-site Transport (people, equipment, supplies) | 928.64   | 203.84   | 21.63    | 0.0085         | 4.67     | 2.14   | 0.44 | 0.0029 | 1,951.92   | VA NV        | WA.      | N/A     | N/A       | N/A        |
| VIII - Support Activities                                    | 70.25    | 65.14    | 65.03    | 3.28           | 3,518.29 | 940.61 | 7.70 | 0.25   | 203,904.38 | 8.50E-10     | 3.99E-05 |         | 6.45E-0   | 0.0044     |
|  | 5.004.04 |          |          |                |          |        |      |        |            | 0.505.40     |          |         |           | 0.40       |

N/A- No applicable emission



| Annual | Emisison | Rate |
|--------|----------|------|

| Description  | Source   | Туре   | Emission<br>rate<br>(tonne/year)<br>CO2e | Perecent of total |
|--|--|--|--|-------------------|
|  |  | A - Fugitive Emissions (PM with Metals)                        | N/A                                      | N/A               |
|  | I.1 - Drilling   | R- Fyhaust Emissions   | 3 948 24                                 | 4%                |
| I - Open Pit Extraction                                  | I.2 - Blasting   | A - Fugitive Emissions (PM with Metals)                        | 11.40                                    | 0%                |
| 1 Open in Extraction                                     |  | A - Fugitive Emissions   | N/A                                      | N/A               |
|  | I.3 - Ore transport (haul truck transport)   | B- Exhaust Emissions   | 7.719.27                                 | 8%                |
|  | II.1 -Transfer (dump) to Stockpile 1   | A - Fugitive Emissions   | N/A                                      | N/A               |
|  |  | A - Fugitive PM Emissions                                      | N/A                                      | N/A               |
|  | II.2 - Transfer to Primary Crusher by Front End Loader/Maintenance, Stockpile 1  | B- Exhaust Emissions   | 301.39                                   | 0%                |
|  | II.3 Wind Erosion from Stockpile 1   | A - Funitive PM Emissions                                      | N/A                                      | N/A               |
| II - Ore management                                      | II.4 - Transfer (dump) to Stockpile 2  | A - Fugitive Emissions   | N/A                                      | N/A               |
|  |  | A - Fugitive PM Emissions - Stockpile Working (Dozer)          | N/A                                      | N/A               |
|  | II.5 - Transfer to Primary Crusher by Frond End Loader/Maintenance, Stockpile 2  | B- Exhaust Emissions   | 301.39                                   | 0%                |
|  | II.6 Wind Erosion from Stockpile 2   | A - Fugitive PM Emissions                                      | N/A                                      | N/A               |
|  | III.1 - Ore Drop into Primary Crusher  | A - Fugitive Emissions   | N/A                                      | N/A               |
|  | III.2 - Primary Crushing   | A - Fugitive Emissions   | N/A                                      | N/A               |
|  | III.3 - Conveyor Transport (1200-CV-003) , exhaust to DC-003 (UTM 513463/7046445)  | A - Fugitive Emissions to secondary crusher                    | N/A                                      | N/A               |
|  | III.4 - Ore Drop into Secondary Crusher, exhaust to DC-003 (UTM 513463/7046445)  | A - Fugitive Emissions   | N/A                                      | N/A               |
|  | III.5 - Secondary Crushing, exhaust to DC-003 (UTM 513463/7046445)   | A - Fugitive Emissions   | N/A                                      | N/A               |
|  | III.6 - Convever Transport (2150-CV-005), exhaust to DC-003 (UTM 513463/7046445)   | A - Fugitive Emissions to transfer tower                       | N/A                                      | N/A               |
|  | III.7 - Ore Drop in Transfer Tower, exhaust to DC-004 (UTM 513370/7046442)   | A - Fugitive Emissions   | N/A                                      | N/A               |
| III - Ore Processing                                     | III.8 - Convever transport (2150-CV-007), exhaust to DC-003 (UTM 513463/7046445)   | A - Fugitive Emissions from transfer tower to tertiary crusher | N/A                                      | N/A               |
|  | III.9 - Ore Drop into Material Screen, exhaust to DC-003 (UTM 513463/7046445)  | A - Fugitive Emissions   | N/A                                      | N/A               |
|  | III.10 Material Screening, exhaust to DC-003 (UTM 513463/7046445)  | A - Fugitive Emissions   | N/A                                      | N/A               |
|  | III.11 - Tertiary Crushing, exhaust to DC-003 (UTM 513463/7046445)   | A - Fugitive Emissions   | N/A                                      | N/A               |
|  | III.11 - Tenany Crasning, exhaust to DC-003 (01th 5134037/040445)  | N/A  | N/A                                      | N/A               |
|  | III.13 Ore Concentration Using Flotation and Recovery  | N/A  | N/A                                      | N/A               |
|  | III.13 Ole Concentiation Osing Floration and Recovery  | N/A  | N/A                                      | N/A               |
|  | IV.1- Waste rock dumping on waste rock pile  | A - Fugitive Emissions   | N/A                                      | N/A               |
|  | • •  | A - Fugitive PM Emissions - Dozer working in the CDF           | N/A                                      | N/A               |
| IV - Co-Disposal Facility (CDF)                          | IV.2 - CDF Management  | B- Exhaust Emissions   | 1.602.31                                 | 2%                |
| IV - Co-Disposal Facility (CDF)                          |  | A - Fugitive Emissions   | N/A                                      | N/A               |
|  | IV.3 - Transport of Rock to CDF  | R- Fyhaust Emissions   | 11 490 08                                | 11%               |
|  | V.1 - Dumping into fine ore bin assumed to be the same as bagging, exhaust to DC-005 (UTM 513427/7046460)                              | A - Fugitive Emissions   | N/A                                      | N/A               |
| V - Concentrate Storage                                  | V.1 - Dumping into line ore bit assumed to be the same as bagging, exhaust to bc-ood (or in a 1342/17040400).  V.2 Concentrate Storage | N/A  | N/A                                      | N/A               |
|  | v.2 Concentrate Storage  | A - Fugitive Emissions   | N/A<br>N/A                               | N/A<br>N/A        |
|  | VI.1 - B-Train concentrate, Access Road  | A - Fuguve Emissions B- Exhaust Emissions                      | 282.75                                   | 0%                |
| VI - Concentrate Transport                               |  | A - Fugitive Emissions   | N/A                                      | N/A               |
|  | VI.2 - B-Train concentrate, Tilcho Road  | A - Fugitive Emissions  B- Exhaust Emissions                   | 113.05                                   | 0%                |
|  | VII.1 - Air transport  | A - Fugitive Emissions   | N/A                                      | N/A               |
|  | VII.1 - Air transport  | A - Fugitive Emissions   | N/A                                      | N/A<br>N/A        |
| - Other Off-site Transport (people, equipment, supplies) | VII.2 - Offsite Transport, Access Road   | B- Exhaust Emissions   | 508.95                                   | 1%                |
| · Other Oil-site Transport (people, equipment, supplies) |  |  | N/A                                      | N/A               |
|  | VII.3 - Offsite Transport, Tilcho road   | A - Fugitive Emissions B- Exhaust Emissions                    | N/A<br>203.50                            |                   |
|  | VIII 1 - Power Generation  | B- Exhaust Emissions C - Combustion Emissions                  | 67.748.07                                | 0%<br>68%         |
|  |  | C - Combustion Emissions C - Combustion Emissions              | 658.91                                   | 1%                |
|  |  |  |  |                   |
| AND Comment Assessed                                     | VIII.2 - Incineration  |  |  | A1/A              |
| VIII - Support Activities                                | VIII.3 - Heating   | N/A  | N/A                                      | N/A               |
| VIII - Support Activities                                |  |  |  | N/A<br>5%<br>N/A  |



#### Calculation of Emissions During the Operation Phase

| Oust Control Technique               |             |                      | Wet Drilling | (a) |
|--------------------------------------|-------------|----------------------|--------------|-----|
|                                      | Source: (a) | Assume wet drilling. |              |     |
| lours of operation per day - maximum |             | h/day                | A            |     |
| Aaterial throughput (ore extracted)  |             | tonnes/day           | В            | 3:  |
|                                      |             |                      |              |     |

|   |                                    |                        | TSP      | PM <sub>10</sub> | PM <sub>2.5</sub> | As       | Bi       | Co       | Cu       | i .         |
|---|------------------------------------|------------------------|----------|------------------|-------------------|----------|----------|----------|----------|-------------|
| Emission factor (controlled - wet drilling)                   | kg/tonne                           | D                      | 0.00009  | 0.00004          | 7.41E-06          |          |          |          |          | (a) (b) (c) |
| Daily emission rate (controlled - wet drilling and retention) | g/day                              | E = B*D*1000*(1-C/100) | 2,977.74 | 1,323.44         | 245.08            |          |          |          |          | 1           |
| Maximum Emission rate   | g/s                                | F = E/(A*3600)         | 0.041    | 0.018            | 0.0033            |          |          |          |          | 1           |
| Elemental component (by mass)                                 | g (element)/g (ore and waste rock) | G                      |          |                  |                   | 0.0029   | 6.79E-04 | 3.48E-04 | 1.41E-04 |             |
| Maximum emission rate   | g/s                                | H = F(TSP)*G           |          |                  |                   | 1.17E-04 | 2.75E-05 | 1.41E-05 | 5.71E-06 | (e)         |
| Quality rating  |                                    |                        |          | E                | -                 |          |          |          |          | ı           |

Source (a) Emission factor for TSP estracted from in AP-42 / 11.19.2 - Crushed Stone Processing and Pulverrand Mineral Processing (USEPA, August 2003)/ Table 11.19.2.1 (value for West Orlings - Uniforgamented Stone).

(b) Emission factor for TSP based on the ratio between TSP and PMLD emission factors for terrainy crushing functoritied (i) A AP-22 / 11.19.2. Crushed Stone Processing and Pulverrand Mineral Processing (USEPA, August 2004)/ Table 11.19.2.1.

(c) Emission factor for PMLD Stased on the ratio between PMLD and PMLD emission factors for territary crushing functoritied (ii) AP-22 / 11.13.2. Crushed Stone Processing and Pulverrand Mineral Processing (USEPA, August 2004)/ Table 11.19.2.1.

(c) Emission factor for PMLD Stased on the natio between PMLD and PMLD emission for ferritary crushing (controlled) in AP-22 / 11.13.2. Crushed Stone Processing and Pulverrand Mineral Processing (USEPA, August 2004)/ Table 11.19.2.1.

(d) Martial speciation within not was provided by Further the "Appendix Vir exists." Based on the rock and one quantities outlined in "Nico Project. Tallings and Mine Bock Co Disposal Facility (EED study) (Golder 2010) it was assumed that all blasted rock is 26% blw one and 74% blw waste rock. (e) Assumed demental Factors with excilosated from TSP emissions.

| B- E | xhaust Emissions  |       |                             |           |
|------|-------------------|-------|-----------------------------|-----------|
|      | Equipment/Vehicle | Model | Number of Equipment/Vehicle | Daily Use |
|      |                   |       |                             |           |

| Daily emission rate     | tonne/day                                  | (refer to mine_fleet_operation) | 9.06E-05        | 0.035 | 0.0073 | 0.0011            | 0.0011           | 0.0015 | 1.58E-05 | 10.82             |
|-------------------------|--|---------------------------------|-----------------|-------|--------|-------------------|------------------|--------|----------|-------------------|
|                         |  |                                 | SO <sub>2</sub> | NOx   | со     | PM <sub>2.5</sub> | PM <sub>10</sub> | VOC    | PAH      | CO <sub>2</sub> e |
| Track Mounted ITH Drill | Sandvik D45KS; Atlas Copco DML; or similar | 1                               | 20.4            |       |        |                   |                  |        |          |                   |
| Mining Jumbo            | Sandvik D45KS; Atlas Copco DML; or similar |                                 | 20.4            |       |        |                   |                  |        |          |                   |



# Air Quality Assessment - NICO Project Calculation of Emissions During the Operation Phase

| Dust Control Technique       |            | No Control |           |
|------------------------------|------------|------------|-----------|
| •                            |            |            |           |
| Blasting from ANFO           | tonne/year | A          | 1,810 (a) |
| Blasting from Emulsion blend | tonne/year | В          | 1,810 (a) |
| Number of Blasts per day     | blasts/day | c          | 46 (b     |
|                              |            |            |           |

|                     |   |                        | SO2   | NOx  | со   | CH4    | H2S   | CO <sub>2</sub> e | l      |
|---------------------|---|------------------------|-------|------|------|--------|-------|-------------------|--------|
| ANFO Constant (a)   | kg/Mg   | D                      | 1     | 8    | 34   |        |       |                   | (a)    |
| Emulsion blend (b)  | kg/Mg   | E                      | 1     | 26   | 52   | 0.3    | 2     |                   | (a)(b) |
| Daily emission rate | tonne/day   | F = (A*D+B*E)/10^3/365 | 0.010 | 0.17 | 0.43 | 0.0015 | 0.010 | 0.031             | 1      |
| Source:             | (a) Emission factors taken from AP-42 Section 13.3. |                        |       |      |      |        |       |                   |        |

| ource. | (a) Ellission lactors taken from AP-42 Section 15.5.                        |
|--------|---|
|        | (b) Assumed that Emulsion bland is Dunamite Galatin within AR-A2 chapter 12 |

|                                     |   |                         | TSP <= 30 um | PM <sub>10</sub> | PM <sub>2.5</sub>              | As                   | Bi             | Co              | Cu          |
|-------------------------------------|---|-------------------------|--------------|------------------|--------------------------------|----------------------|----------------|-----------------|-------------|
| Constant (a)                        |   | G                       | 0.00022      |                  | -                              |                      |                |                 |             |
| Constant (b)                        |   | H                       | 1.5          |                  | -                              |                      |                |                 | (;          |
| Scaling Factor                      |   |                         |              | 0.52             | 0.03                           |                      |                |                 | (2          |
| Annual Emission rate (uncontrolled) | kg/year   | J = G*(1250/50)^H*C*365 | 458.78       | 238.57           | 13.76                          |                      |                |                 | (2          |
| Daily emission rate (uncontrolled)  | tonne/day   | K= J/1000/365           | 0.0013       | 6.54E-04         | 3.77E-05                       |                      |                |                 | (2          |
| Elemental component (by mass)       | g (element)/g (ore and waste rock)  | L                       |              |                  |                                | 0.0029               | 6.79E-04       | 3.48E-04        | 1.41E-04 (c |
| Daily emission rate (24 hour)       | tonne/day   | M = L*K                 |              |                  |                                | 3.64E-06             | 8.53E-07       | 4.37E-07        | 1.77E-07 (f |
|                                     | (a) AP-42 / Section 1.3 - Western Surface Coal Mining (USPA, October 1998) If the 1.1.9 2 - Emission Facts<br>(b) Scaling factor to convent TSP - 0.3 unit on MAZ. and MAZ. 3.<br>(c) PMLO and PMLZ - Galculated multiplying TSP emission nate by respective scaling factors.<br>(d) FMLO and PMLZ - Galculated multiplying TSP emission nate by respective scaling factors.<br>(d) FMLO and PMLZ - Galculated multiplying TSP emission nate by respective scaling factors.<br>(e) Metal speciation within rock was previded by fortune in "Appendix N" - result.xisc". Based on the rock of<br>(d) Assumed Americal Factors with the Calculated from TSP emission. | er 29, 2010.            |              |                  | er 2010) it was assumed that a | II blasted rock is 2 | 6% btw ore and | 74% btw waste r | rock.       |

#### Calculation of Emissions During the Operation Phase

A - Fugitive Emissions from vehicle transport (unpaved roads)

| Dust Control Technique                      | Watering more than twice a day |   |          |  |  |  |
|---|--------------------------------|---|----------|--|--|--|
|   |                                |   |          |  |  |  |
| Hours of operation per day - maximum        | h/day                          | A | 20.5 (a) |  |  |  |
| Surface material silt content               | (%)                            | В | 1.6 (b)  |  |  |  |
| Mean vehicle weight                         | tonnes                         | c | 28 (c)   |  |  |  |
| Vehicle kilometer traveled (VKT)            | km/day                         | D | 957 (c)  |  |  |  |
| Number of working days                      | days/year                      | E | 365 (d)  |  |  |  |
| Number of days with precipitation >= 0.2 mm | days/year                      | F | 58 (e)   |  |  |  |
| Emission reduction efficiency               | (%)                            | G | 70 (f)   |  |  |  |

Source 1.0 Information provided by Frotonsin "MICO Model ground flow", of white After fuel dais". Operating boars based on loaders and had fracts.

(1) See Mean-Vehicle Weight table below.

(2) See Mean-Vehicle Weight table below.

(3) See Mean-Vehicle Weight table below.

(4) Assumed continuous operation of mine.

(6) Vehicle derived from Fortuna 2004-2007 under meteorological station (Fortune, 2004-2007\_Methabl(CEE) 64 - Sep22 077\_MD.Mb.).

(7) Includes content efficiency of This form watering future a day extracted from Uniqued Industrial Read Door Educative (Information CEE) and website, accessed in December 2010.

|   |  |   | PM-30 (15P) | PM <sub>10</sub> | PIM <sub>2.5</sub> | ı   |
|---|--|---|-------------|------------------|--------------------|-----|
| Constant (k)  | lb/VMT   | Н                                       | 4.9         | 1.5              | 0.15               | (a) |
| Constant (a)  |  |   | 0.7         | 0.9              | 0.9                | (a) |
| Constant (b)  | +  | J                                       | 0.45        | 0.45             | 0.45               | (a) |
| Emission factor (uncontrolled)                          | lb/vMT   | K= H*((B/12)^I)*((C*1.1/3)^J)*[(E-F)/E] | 2.87        | 0.59             | 0.059              | (a) |
| Emission factor (controlled)                            | g/VKT  | L= K*281.9*(1-G/100)                    | 242.63      | 49.64            | 4.96               | Į(E |
| Emission factor (uncontrolled)                          | g/VKT  | M = K*281.9 <sup>(c)</sup>              | 808.77      | 165.47           | 16.55              | L   |
| Daily emission rate (controlled)                        | g/day  | N = L*D                                 | 232,121.51  | 47,489.58        | 4,748.96           | Ĺ   |
| Daily emission rate (uncontrolled)                      | g/day  | O = M*D                                 | 773,738.38  | 158,298.60       | 15,829.86          | Ĺ   |
| Maximum emission rate (controlled)                      | g/s  | P = N/(A*3600)                          | 3.15        | 0.64             | 0.064              | (c) |
| Maximum emission rate (uncontrolled)                    | g/s  | Q = O/(A*3600)                          | 10.51       | 2.15             | 0.21               | (c  |
| Maximum Emission rate (controlled, without adjustment)  | g/s  | R = P/[(E-F)/E]                         | 3.74        | 0.77             | 0.077              | Ĺ   |
| Maximum emission rate (uncontrolled without adjustment) | g/s  | S = Q/[(E-F)/E]                         | 12.48       | 2.55             | 0.26               | Ĺ   |
| Quality rating  |  |   | В           | В                | В                  | Ĺ   |
|   | (a) AP-42 / Section 13.2.2 - Unpaved Roads (USEPA, November 2006)/ Equation (1a) - unpaved surfaces at in    |   |             |                  |                    |     |
|   | (b) 281.9: constant to convert lb/VMT (pounds per vehicle mile travelled) to g/VKT (grams per vehicle kilome | ter travelled).                         |             |                  |                    |     |
|   | (c ) Daily hours is taken as the daily operating hours not 24h/day.  |   |             |                  |                    |     |
| Note:   | Maximum 1 hour and 24 hours emission rates are assumed to occur in periods without snow cover on roads       | and without precipitation > 0.254 mm.   |             |                  |                    |     |
|   |  |   |             |                  |                    |     |

| 6ean  | Vehic | le We | ight |  |
|-------|-------|-------|------|--|
| quipn | nent  |       |      |  |

| Equipment                           |                | Water Truck | Wheeled Front<br>End Loader | Surface rock haulage<br>trucks | Surface grader | Explosives Truck | Explosives Truck<br>Trailer | Heavy Duty<br>Truck, Diesel | Personnel Carrier | Light Duty<br>Truck, Diesel | Light Duty Truck | Total  | 1    |
|-------------------------------------|----------------|-------------|-----------------------------|--------------------------------|----------------|------------------|-----------------------------|-----------------------------|-------------------|-----------------------------|------------------|--------|------|
| Weight - Empty                      | tonnes         | 28.10       | 97.30                       | 73.98                          | 21.28          | 28.12            | 20.00                       | 6.58                        | 4.13              | 4.08                        | 4.26             |        | (a)  |
| Weight - Loaded                     | tonnes         | 28.10       | 97.30                       | 163.29                         | 21.28          | 28.12            | 40.00                       | 6.58                        | 4.13              | 4.08                        | 4.26             |        | (b)  |
| Mean Weight                         | tonnes         | 28.10       | 97.30                       | 118.63                         | 21.28          | 28.12            | 30.00                       | 6.58                        | 4.13              | 4.08                        | 4.26             |        | 1    |
| Number of return trips              | number         | 1           | 1                           | 65                             | 1              | . 1              | 1                           | 1                           | 1                 | 1                           | 1                |        | ( c) |
| Distance of return trip             | km/return trip | 50          | 2                           | 2                              | 200            | 2                | 2                           | 250                         | 100               | 100                         | 100              |        | (d)  |
| Distance of vehicle travelled (VKT) | km/day         | 50.00       | 2.30                        | 149.78                         | 200.00         | 2.30             | 2.30                        | 250.00                      | 100.00            | 100.00                      | 100.00           | 956.68 | 1    |
| Percentage of traffic               | %              | 5.23%       | 0.24%                       | 15.66%                         | 20.91%         | 0.24%            | 0.24%                       | 26.13%                      | 10.45%            | 10.45%                      | 10.45%           |        | 1    |
| Mean vehicle weight                 | Tonnes         | 1.47        | 0.23                        | 18.57                          | 4.45           | 0.07             | 0.07                        | 1.72                        | 0.43              | 0.43                        | 0.45             | 27.89  | 1    |
|                                     |                |             |                             |                                |                |                  |                             |                             |                   |                             |                  |        |      |

e: (a) Information provided by Fortune in "NICO Mobile Equipment, EXV\_without Aker fisel-six". The explosive truck trailer was assumed to be 20 tonnes empty.

(b) Ford mills, showels, doesns, grades, stands, personnel curriers and light daily wholes it has been assumed that the empty and loaded weight are the same. For hald trucks the loaded weight was taken as the maximum specified load in CAT 7777 specification sheet. The explosive trailer's loaded weight is assumed to be twice the empty trailer's weight.

(d) Data provided by client in HaulTruckKlömetres (2), loks in an email dated December 22, 2010.

| EXHAUST EIRISSIONS          |  |                             |                   |
|-----------------------------|--|-----------------------------|-------------------|
| Equipment/Vehicle           | Model  | Number of Equipment/Vehicle | Daily Use (hours) |
| Wheeled Front End Loader    | Caterpillar 992K/Komatsu WA 900-3            | 1                           | 20.4              |
| Surface rock haulage trucks | Caterpillar 777F/Komatsu HD 785-7            | 2                           | 2.9               |
| Surface rock haulage trucks | Caterpillar 777F/Komatsu HD 785-7            | 1                           | 2.9               |
| Surface grader              | Caterpillar 14M/Komatsu GD675-3              | 1                           | 3.8               |
| Explosives Truck            | Western Star 4900 SA; or Equivalent          | 1                           | 3.8               |
| Explosives Truck            | Customized Package                           | 1                           | 3.8               |
| Heavy Duty Truck, Diesel    | Ford F-450 Crew Cab Flat Deck; or equivalent | 1                           | 3.8               |
| Light Duty Truck, Diesel    | Ford F-250 Supercab, or equivalent           | 1                           | 1.9               |
|                             | Ford F-250 Crewcab, or equivalent            | 1                           | 3.8               |
|                             | Western Star 4900 SA; or Equivalent          | 1                           | 1.9               |
| Personnel Carrier           | Western Star 4900 SA Mixer                   | 1                           | 2.0               |

|                     |           |                                 | SO <sub>2</sub> | NOx   | co    | PM <sub>2.5</sub> | PM <sub>10</sub> | voc    | PAH      | CO <sub>2</sub> e |  |
|---------------------|-----------|---------------------------------|-----------------|-------|-------|-------------------|------------------|--------|----------|-------------------|--|
| Daily emission rate | tonne/day | (refer to mine fleet operation) | 1.77E-04        | 0.083 | 0.028 | 0.0038            | 0.0039           | 0.0040 | 3.09E-05 | 21.15             |  |



May 2011 Project No. 09-1373-1004

# Air Quality Assessment - NICO Project Calculation of Emissions During the Operation Phase

| Dust Control Technique                  |            | Wet Suppression  |        |
|---|------------|--|--------|
| *************************************** |            |  | _      |
| Hours of operation per day - maximum    | h/day      | A  | 20.5   |
| Amount of material handled per day      | tonnes/day | В  | 2,584  |
| Mean wind speed - maximum daily value   | m/s        | c  | 12.82  |
| Material moisture content               | %          | D  | 7      |
| Constant (a)                            | ·          | E  | 0.0016 |
| Constant (b)                            | -          | F  | 1.3    |
| Constant (c)                            |            | G  | 2.2    |
| Constant (d)                            | ·          | н  | 1.4    |
| Constant (e)                            | ·          | T. Control of the con | 2      |
| Emission reduction efficiency           | (%)        | J  | 70     |

e: (a) information provided by Fortune in "NEO Mobile Equipment, Berk", withbook After fist late." (Operating byour based on loaders and that trucks.

(b) Estimated as the "Reign daily willing erfs "specified in Tailing and the Rock Co Cologosia Tellor (FETED savi) (Girler, 2010).

(c) Value derived from Fortune 2004-2007 onthe meteorological station (Fortune 2004, 2007 Metabas(Cold 61-5ep27 07), MLx de).

(d) Mobilezer content for ossuppide by Fortune in a neural stated Newherber 22, 2010.

(e) APA-42, T.1.1.4.\* Aggregate Handling And Sorage Piles (USSIA, November 2006) (e) qualiton 1: emission factor for drop operation relation suppides or horizont in internal stations for the other states of the state of the

|                                      |                     |                                 | TSP <= 30 um | PM <sub>10</sub> | PM <sub>2.5</sub> | As       | Bi       | Co       | Cu       |     |
|--------------------------------------|---------------------|---------------------------------|--------------|------------------|-------------------|----------|----------|----------|----------|-----|
| Particle size multiplier             | ·                   | K                               | 0.74         | 0.35             | 0.053             |          |          |          |          | (a) |
| Emission factor (uncontrolled)       | kg/tonne            | L = K*E*((C/G)^F)/((D/I)^H)     | 0.0022       | 0.0011           | 1.61E-04          |          |          |          |          | (a) |
| Maximum emission rate (controlled)   | g/s                 | M = B*L*(1-J/100)*1000/(A*3600) | 0.024        | 0.011            | 0.0017            |          |          |          |          | Ī   |
| Maximum emission rate (uncontrolled) | g/s                 | M' = B*L*1000/(A*3600)          | 0.079        | 0.037            | 0.0056            |          |          |          |          | Ī   |
| Elemental component (by mass)        | g (element)/g (ore) | N                               |              |                  |                   | 0.0081   | 0.0011   | 9.49E-04 | 1.81E-04 | (b) |
| Maximum emission rate (controlled)   | g/s                 | O = M*N                         |              |                  |                   | 1.91E-04 | 2.63E-05 | 2.24E-05 | 4.28E-06 | (c) |
| Maximum emission rate (uncontrolled) | g/s                 | P = M**N                        |              |                  |                   | 6.36E-04 | 8.77E-05 | 7.48E-05 | 1.43E-05 | (c) |
| Quality rating                       |                     |                                 | A            | A                | A                 |          |          |          |          | I   |

Source (s) AP-42 / 11.24 - Aggregate Handling And Storage Piles (USEA, November 2006) equation 1 - emission factor for drop operation.

(b) Metal ispectation within factor dwar provided by Pinther in \* \*Agenetical V - emission.\*\* Based on the rock and ore quantities outlined in \*Not Project.\*\* Tailings and Milme Rock Co-Disposal Facility FEED study" (Golder 2010) it was assumed that all blasted rock is 26% between a 474% bit was a factor of the rock and ore quantities outlined in \*Not Project.\*\* Tailings and Milme Rock Co-Disposal Facility FEED study" (Golder 2010) it was assumed that all blasted rock is 26% between a 474% bit was a factor of the rock and ore quantities outlined in \*Not Project.\*\* Tailings and Milme Rock Co-Disposal Facility FEED study" (Golder 2010) it was assumed that all blasted rock is 26% bits ore and 74% bits waste rock.
(c) Assumed General facilities will be calculated from 15° emission.

#### Calculation of Emissions During the Operation Phase

A - Fugitive PM Emissions - Stockpile Working (Dozer)

| Dust Control Technique               |       | Wetting more than twice a day |          |
|--------------------------------------|-------|-------------------------------|----------|
|                                      |       |                               |          |
| Number of equipment                  | pc    | A                             | 3 (a)    |
| Hours of operation per day - maximum | h/day | В                             | 20.5 (a) |
| Material silt content                | (%)   | c                             | 0.4 (b)  |
| Material moisture content            | (%)   | D                             | 6.5 (c)  |
| Emission reduction efficiency        | (%)   | E                             | 70 (d)   |

Source: (a) Information provided by Fortune in "INCO Mobile Equipment, RevC, without Aker fuel skin". Number of equipment is for "Processing joint" and excludes passanger vehicles. Operating hours based on loaders and haul trucks. (b) AP 42 (7.13.24 - Aggregate branding And Storage Piles (USPA), November 2006) Table 13.2.4-1. Typical silt content of materials at various industries (value for limestrone). (c) Mobiles counter provided by Fortune in an email dated for homether 24, 2010.

(d) Assumed same emission reduction assigned to material handing for wetting more than twice a day as unpaved roads (Environment Canada website, accessed in December 2010).

|                                      |                     |                        | TSP <= 30 um | TSP <= 15 um | PM <sub>10</sub> | PM <sub>2.5</sub> | As       | Bi       | Co       | Cu      | ı.      |
|--------------------------------------|---------------------|------------------------|--------------|--------------|------------------|-------------------|----------|----------|----------|---------|---------|
| Constant (a)                         |                     | F                      | 2.6          | 0.45         |                  |                   |          |          |          |         | (a)     |
| Constant (b)                         |                     | G                      | 1.2          | 1.5          |                  |                   |          |          |          |         | (a)     |
| Constant (c)                         |                     | Н                      | 1.3          | 1.4          |                  |                   |          |          |          |         | (a)     |
| Scaling Factor                       |                     | _                      |              |              | 0.75             | 0.105             |          |          |          |         | (a) (b) |
| Emission rate (uncontrolled)         | kg/hr/pc            | J = F*(C^G)/(D^H)      | 0.076        | 0.008        | 0.0062           | 0.0080            |          |          |          |         | (a) (c) |
| Emission rate (controlled)           | g/hr                | K = A*J*1000*(1-E/100) | 68.38        | 7.46         | 5.59             | 7.18              |          |          |          |         | 1       |
| Maximum emission rate (uncontrolled) | g/s                 | L' = A*J*1000/3600     | 0.063        | 0.0069       | 0.0052           | 0.0066            |          |          |          |         | 1       |
| Maximum emission rate (controlled)   | g/s                 | L = K/3600             | 0.019        | 0.0021       | 0.0016           | 0.0020            |          |          |          |         | 1       |
| Elemental component (by mass)        | g (element)/g (ore) | M                      |              |              |                  |                   | 0.0081   | 0.0011   | 9.49E-04 | 1.81E-0 |         |
| Maximum emission rate (uncontrolled) | g/s                 | N = L'*M               |              |              |                  |                   | 5.11E-04 | 7.04E-05 | 6.01E-05 | 1.15E-0 |         |
| Maximum emission rate (controlled)   | g/s                 | 0 = L * M              |              |              |                  |                   | 1.53E-04 | 2.11E-05 | 1.80E-05 | 3.44E-0 | 6 (e)   |
| Quality rating                       |                     |                        | В            | c            | D                | D                 |          |          |          |         |         |

Source: (a) AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equation (USEPA

(a) M=42 y Section 1.15 whether has history (a) where the history

| Equipment/Vehicle        | Model                           | Number of Equipment/Vehicle | Daily Use (hours) |
|--------------------------|---------------------------------|-----------------------------|-------------------|
| Skid Steer-Loader        | Bobcat S150                     | 1                           | 1.9               |
| Skid Steer-Loader        | Bobcat S70                      | 1                           | 1.9               |
| Wheeled Front End Loader | Caterpillar 988H/Komatsu WA 600 | 1                           | 2.4               |

|                     |           |                                 | SO <sub>2</sub> | NOx    | co     | PM <sub>2.5</sub> | PM <sub>10</sub> | voc      | PAH      | CO <sub>2</sub> e |
|---------------------|-----------|---------------------------------|-----------------|--------|--------|-------------------|------------------|----------|----------|-------------------|
| Daily emission rate | tonne/day | (refer to mine_fleet_operation) | 6.91E-06        | 0.0027 | 0.0010 | 1.35E-04          | 1.39E-04         | 1.44E-04 | 1.21E-06 | 0.83              |

#### II.3 Wind Erosion from Stockpile 1

A - Fugitive PM Emission:

| Dust Control Technique                      |           | Material will come out wet and will manage dust with water<br>during water truck season and when required |      |
|---|-----------|---|------|
|   |           |   |      |
| Pile surface area                           | ha        | A   | 0.8  |
| Percentage of time WS >19.3 km/h            | %         | В   | 31 ( |
| Material silt content                       | %         | c   | 0.4  |
| Number of days with precipitation >= 0.2 mm | days/year | D   | 58   |
| Constant (a)                                |           | E   | 1.9  |
| Constant (b)                                |           | F   | 1.5  |
| Constant (c)                                |           | G   | 365  |
| Constant (d)                                |           | Н   | 235  |
| Constant (e)                                |           | I I   | 15   |
| Emission reduction efficiency               | (26)      | J   | 70   |

|   |                     |  | TSP <= 30 um | PM <sub>10</sub> | PM <sub>2.5</sub> | As       | Bi       | Co       | Cu       |         |
|---|---------------------|--|--------------|------------------|-------------------|----------|----------|----------|----------|---------|
| Scaling factors   |                     | K  |              | 0.5              | 0.075             |          |          |          |          | (a)     |
| Emission factor (uncontrolled)  | kg/d/ha             | L = E*(C/F)*((G-D)/H)*(B/I)                                      | 1.35         | 0.67             | 0.10              |          |          |          |          | (b) (c) |
| Maximum emission rate (controlled)                                    | g/s                 | M = L*A*1000*(1-J/100)/(24*3600)                                 | 0.0038       | 0.0019           | 2.88E-04          |          |          |          |          | ſ       |
| Maximum emission rate (uncontrolled)                                  | g/s                 | M'= L*A*1000/(24*3600)   | 0.013        | 0.0064           | 9.59E-04          |          |          |          |          | ſ       |
| Maximum emission rate (controlled, removing precipitation correction) | g/s                 | $M^*= E^*(C/F)^*((G-0)/H)^*(B/I)^*A^*1000^*(1-J/100)/(24^*3600)$ | 0.0046       | 0.0023           | 3.42E-04          |          |          |          |          | 1       |
| Maximum emission rate (uncontrolled, removing precip correction)      | g/s                 | M"= E*(C/F)*((G-0)/H)*(B/I)*A*1000/(24*3600)                     | 0.015        | 0.0076           | 0.0011            |          |          |          |          | 1       |
| Elemental component (by mass)   | g (element)/g (ore) | N  |              |                  |                   | 0.0081   | 0.0011   | 9.49E-04 | 1.81E-04 | (d)     |
| Maximum emission rate (controlled)                                    | g/s                 | O = M * N  |              | _                | ,                 | 3.10E-05 | 4.27E-06 | 3.64E-06 | 6.94E-07 | (e)     |
| Maximum emission rate (uncontrolled)                                  | g/s                 | P = M**N   |              |                  |                   | 1.03E-04 | 1.42E-05 | 1.21E-05 | 2.31E-06 | (e)     |

Server: (a) AP-42/Section 13.2.5 - Industrial Wind Erosion.
(b) TSP calculated according to Control of Open Fagility Dest Source (tidSPA), September 1988) / Equation (4-9).
(c) PMID and PMZS. Socialized millipling TSP emissions can be by respective scaling factors.
(d) MMID and PMZS. Socialized millipling TSP emissions can be by respective scaling factors.
(d) MMID and PMZS. Socialized millipling TSP emissions can be by respective scaling factors.
(d) MMID and emissions with min not was provided by Fortione in "Appendix U" results.kix". Based on the rock and ore quantities outlined in "Nico Project." Tailings and Mine Rock Co-Disposal Facility FEED study" (Golder 2010) It was assumed that all blasted rock is 20% blw ore and 74% blw waste rock.
(d) Assumed General Entation. We be calculated from TSP semisions.

#### II.4 - Transfer (dump) to Stockpile 2

| - Fugitive Emissions                  |  |  |           |
|---------------------------------------|--|--|-----------|
| Dust Control Technique                |  | Wet suppression                        |           |
| <u> </u>                              |  |  |           |
| Hours of operation per day - maximum  | h/day  | A                                      | 20.5 (a   |
| Amount of material handled per day    | tonnes/day   | 8                                      | 2,584 (b  |
| Mean wind speed - maximum daily value | m/s  | c                                      | 12.82 (c  |
| Material moisture content             | %  | D                                      | 7 (d      |
| Constant (a)                          |  | E                                      | 0.0016 (e |
| Constant (b)                          |  | F                                      | 1.3 (c    |
| Constant (c)                          |  | G                                      | 2.2 (e    |
| Constant (d)                          |  | Н                                      | 1.4 (e    |
| Constant (e)                          |  |  | 2 (e      |
| Emission reduction efficiency         | (%)  | J                                      | 70 (f)    |
| Source:                               | (a) Information provided by Fortune in "NICO Mobile Equipment RevC without Aker fuel.xlsx". Operating It | ours based on loaders and haul trucks. |           |

(c) Existing the second of the

|                                      |                     |                                 | TSP <= 30 um | PM <sub>10</sub> | PM <sub>2.5</sub> | As       | Bi       | Co       | Cu       |
|--------------------------------------|---------------------|---------------------------------|--------------|------------------|-------------------|----------|----------|----------|----------|
| Particle size multiplier             | ·                   | K                               | 0.74         | 0.35             | 0.053             |          |          |          |          |
| Emission factor (uncontrolled)       | kg/tonne            | L = K*E*((C/G)^F)/((D/I)^H)     | 0.0022       | 0.0011           | 1.61E-04          |          |          |          |          |
| Maximum emission rate (controlled)   | g/s                 | M = B*L*(1-J/100)*1000/(A*3600) | 0.024        | 0.011            | 0.0017            |          |          |          |          |
| Maximum emission rate (uncontrolled) | g/s                 | M' = B*L*1000/(A*3600)          | 0.079        | 0.037            | 0.0056            |          |          |          |          |
| Elemental component (by mass)        | g (element)/g (ore) | N                               |              |                  |                   | 0.0081   | 0.0011   | 9.49E-04 | 1.81E-04 |
| Maximum emission rate (controlled)   | g/s                 | O = M*N                         |              |                  |                   | 1.91E-04 | 2.63E-05 | 2.24E-05 |          |
| Maximum emission rate (uncontrolled) | g/s                 | P = M**N                        |              |                  |                   | 6.36E-04 | 8.77E-05 | 7.48E-05 | 1.43E-05 |
| Quality rating                       |                     |                                 | Α            | Δ                | •                 |          |          |          |          |

Source: (a) AP-42 / 1.3.2.4 - Aggregate Handling And Storage Piles (USEPA, November 2006)/ equation 1 - emission factor for drop operation.
(b) Metal speciation within nock was provided by Fortune in "Appendix N" - results.six". Based on the rock and ore quantities outlined in "Nico Project." Tailings and Mine Rock Co-Disposal Facility FEED study" (Golder 2010) it was assumed that all blasted rock is 26% bits ore and 74% bits waste rock.
(c) Assumed demental Faction. Wile becaused in accidated from The sensitions.

### Calculation of Emissions During the Operation Phase

#### II.5 - Transfer to Primary Crusher by Frond End Loader/Maintenance, Stockpile 2

| A - Fugitive PM Emissions - Stockpile Working (Dozer) |  |
|---|--|
| Dust Control Technique                                |  |
|   |  |

| Dust Control Technique               |       | Wetting more than twice a day |          |
|--------------------------------------|-------|-------------------------------|----------|
|                                      |       |                               |          |
| Number of equipment                  | pc    | A                             | 3 (a)    |
| Hours of operation per day - maximum | h/day | В                             | 20.5 (a) |
| Material silt content                | (%)   | c                             | 0.4 (b)  |
| Material moisture content            | (%)   | D                             | 6.5 (c)  |
| Emission reduction efficiency        | (%)   | E                             | 70 (d)   |

|                                      |                     |                        | TSP <= 30 um | TSP <= 15 um | PM <sub>10</sub> | PM <sub>2.5</sub> | As       | Bi       | Co       | Cu       | ĺ       |
|--------------------------------------|---------------------|------------------------|--------------|--------------|------------------|-------------------|----------|----------|----------|----------|---------|
| Constant (a)                         | *                   | F                      | 2.6          | 0.5          | -                |                   |          |          |          |          | (a)     |
| Constant (b)                         | *                   | G                      | 1.2          | 1.5          | -                |                   |          |          |          |          | (a)     |
| Constant (c)                         | *                   | Н                      | 1.3          | 1.4          | -                |                   |          |          |          |          | (a)     |
| Scaling Factor                       | *                   |                        |              |              | 0.75             | 0.105             |          |          |          |          | (a) (b) |
| Emission rate (uncontrolled)         | kg/hr/pc            | J = F*(C^G)/(D^H)      | 0.076        | 0.0083       | 0.0062           | 0.0080            |          |          |          |          | (a) (c) |
| Emission rate (controlled)           | g/hr                | K = A*J*1000*(1-E/100) | 68.38        | 7.46         | 5.59             | 7.18              |          |          |          |          | 1       |
| Maximum emission rate (controlled)   | g/s                 | L= K/(3600)            | 0.019        | 0.0021       | 0.0016           | 0.0020            |          |          |          |          | 1       |
| Maximum emission rate (uncontrolled) | g/s                 | L' = A*J*1000/3600     | 0.063        | 0.0069       | 0.0052           | 0.0066            |          |          |          |          | J       |
| Elemental component (by mass)        | g (element)/g (ore) | M                      |              |              |                  |                   | 0.0081   | 0.0011   |          | 1.81E-04 |         |
| Maximum emission rate (controlled)   | g/s                 | N = M*L                |              |              |                  |                   | 1.53E-04 | 2.11E-05 | 1.80E-05 | 3.44E-06 |         |
| Maximum emission rate (uncontrolled) | g/s                 | 0 = M*L'               |              |              |                  |                   | 5.11E-04 | 7.04E-05 | 6.01E-05 | 1.15E-05 | (e)     |
| Quality rating                       | •                   | ·                      | В            | c            | D                | D                 |          |          |          |          | 1       |

Source (a) AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines (buildooing overburden).
(b) Scaling factor to convert 15P = 30 un to PML2. Sand 15P <- 15 un to PML2.
(c) PML0 and PML2 Scalaziated multiplying 15P emission since they respective scaling factors.
(d) PML0 and PML2 Scalaziated multiplying 15P emission since they respective scaling factors.
(d) Metal speciation within not was provided by Further in "Appendix IV" results.tax", Based on the rock and ore quantities outlined in "Nico Project." Tailings and Mine Rock Co-Disposal Facility FEED study" (Golder 2010) it was assumed that all blasted rock is 20% blw ore and 74% bits waste rock.
(d) Assumed General Enrication with the remission.

| Equipment/Vehicle        | Model                           | Number of Equipment/Vehicle | Daily Use (hours) |
|--------------------------|---------------------------------|-----------------------------|-------------------|
| Skid Steer-Loader        | Bobcat S150                     | 1                           | 1.9               |
|                          | Bobcat S70                      | 1                           | 1.9               |
| Wheeled Front End Loader | Caterpillar 988H/Komatsu WA 600 | 1                           | 2.4               |

|                     |           |                                   | SO <sub>2</sub> | NOx    | co     | PM <sub>2.5</sub> | PM <sub>10</sub> | VOC      | PAH      | CO <sub>2</sub> e | 1 |
|---------------------|-----------|-----------------------------------|-----------------|--------|--------|-------------------|------------------|----------|----------|-------------------|---|
| Daily emission rate | toppe/day | (refer to mine, fleet, operation) | 6.91F-06        | 0.0027 | 0.0010 | 1.35F-04          | 1.39F-04         | 1 44F-04 | 1.21F-06 | 0.83              | 1 |

#### II.6 Wind Erosion from Stockpile 2

| A | Fugitive PM Emissions  |  |
|---|------------------------|--|
|   |                        | Material will come out wet and will manage dust with water |
|   | Cont Control Technique | dustrial material and and other resulted                   |

| Pile surface area                           | ha        | A | 1.5 (a)    |
|---|-----------|---|------------|
| Percentage of time WS >19.3 km/h            | %         | В | 31 (b)     |
| Material silt content                       | %         | c | 0.4 (c)    |
| Number of days with precipitation >= 0.2 mm | days/year | D | 58 (d)     |
| Constant (a)                                |           | E | 1.9 (e)(f) |
| Constant (b)                                |           | F | 1.5 (e)    |
| Constant (c)                                |           | G | 365 (e)    |
| Constant (d)                                |           | Н | 235 (e)    |
| Constant (e)                                |           |   | 15 (e)     |
|   |           |   |            |

|   |                     |  | TSP <= 30 um | PM <sub>10</sub> | PM <sub>2.5</sub> | As       | Bi       | Co       | Cu       |         |
|---|---------------------|--|--------------|------------------|-------------------|----------|----------|----------|----------|---------|
| Scaling factors   |                     | K  |              | 0.5              | 0.075             |          |          |          |          | (a)     |
| Emission factor (uncontrolled)  | kg/d/ha             | L = E*(C/F)*((G-D)/H)*(B/I)                            | 1.35         | 0.67             | 0.10              |          |          |          |          | (b) (c) |
| Maximum emission rate (controlled)                                    | g/s                 | M = L*A*1000*(1-J/100)/(24*3600)                       | 0.0071       | 0.0035           | 5.30E-04          |          |          |          |          | ſ       |
| Maximum emission rate (uncontrolled)                                  | g/s                 | M' = L*A*1000/(24*3600)                                | 0.024        | 0.012            | 0.0018            |          |          |          |          | ſ       |
| Maximum emission rate (controlled, removing precipitation correction) | g/s                 | M*= E*(C/F)*((G-0)/H)*(B/I)*A*1000*(1-J/100)/(24*3600) | 0.0084       | 0.0042           | 6.29E-04          |          |          |          |          | ſ       |
| Maximum emission rate (uncontrolled, removing precip correction)      | g/s                 | M"= E*(C/F)*((G-0)/H)*(B/I)*A*1000/(24*3600)           | 0.028        | 0.014            | 0.0021            |          |          |          |          | ſ       |
| Elemental component (by mass)   | g (element)/g (ore) | N  |              |                  |                   | 0.0081   | 0.0011   | 9.49E-04 | 1.81E-04 | (d)     |
| Maximum emission rate (controlled)                                    | g/s                 | 0 = M*N  |              |                  |                   | 5.70E-05 | 7.86E-06 | 6.70E-06 | 1.28E-06 | (e)     |
| Maximum emission rate (uncontrolled)                                  | g/s                 | P = M*N  |              |                  |                   | 1 90F-04 | 2 62F-05 | 2 23F-05 | 4.26F-06 | (e)     |

p/s

From in

Source: (a) AP-42/Section 13.25 - Industrial Wind Erosion.

(b) The Calculated according to Control of Open Fagility Post Source (b) (AP-42/Section 13.25 - Industrial Wind Erosion.

(c) PRIST and PRIST-S calculater militaging 125 emissions in rate by respective Stating (settless.)

(c) PRIST and PRIST-S calculater militaging 125 emissions in rate by respective Stating (settless.)

(c) PRIST and PRIST Scalacidater militaging 125 emissions in rate by respective Stating (settless.)

(d) Assumed elemental fraction will be calculated from TSP emissions.

(e) Assumed elemental fraction will be calculated from TSP emissions.



#### Calculation of Emissions During the Operation Phase

| Α- | Fug | itive | Em | issio |
|----|-----|-------|----|-------|
|    |     |       |    |       |

| Togethe Emission                      |            |                 |           |  |  |  |  |  |  |  |
|---------------------------------------|------------|-----------------|-----------|--|--|--|--|--|--|--|
| Dust Control Technique                |            | Wet suppression |           |  |  |  |  |  |  |  |
|                                       |            |                 |           |  |  |  |  |  |  |  |
| Hours of operation per day - maximum  | h/day      | A               | 10.0 (a)  |  |  |  |  |  |  |  |
| Amount of material removed per day    | tonnes/day | В               | 5,500 (a) |  |  |  |  |  |  |  |
| Mean wind speed - maximum daily value | m/s        | c               | 12.82 (b  |  |  |  |  |  |  |  |
| Material moisture content             | %          | D               | 7 (c)     |  |  |  |  |  |  |  |
| Constant (a)                          |            | E               | 0.0016 (d |  |  |  |  |  |  |  |
| Constant (b)                          |            | F               | 1.3 (d    |  |  |  |  |  |  |  |
| Constant (c)                          |            | G               | 2.2 (d    |  |  |  |  |  |  |  |
| Constant (d)                          |            | Н               | 1.4 (d    |  |  |  |  |  |  |  |
| Constant (e)                          |            | I               | 2 (d      |  |  |  |  |  |  |  |
| Emission reduction efficiency         | (%)        | J               | 70 (e)    |  |  |  |  |  |  |  |

Source. (a) Information provided by Fortune in an email dated November 24, 2010. Amount of material based on plants design capacity.

(b) Value derived from Fortune 2004-2007 ontine intererological station (Fortune, 2004, 2007, Methada (CHS 401-5-56) 2707, Mib.sh).

(c) Mediator center of ore supplied by Fortune in an email added November 23, 2000).

(d) RP 4-27 (13.24 - Aggregate handling And Sourage Pfiles (LISPA, November 2006) equation 1 - emission factor for drop operation.

(e) Assumed ame emission reduction assigned on insertal reducings as for writting more than twice add ay as unpreved roads (Environment Canada website, accessed in December 2010).

|                                      |                     |                                 | TSP <= 30 um | PM <sub>10</sub> | PM <sub>2.5</sub> | As       | Bi       | Co       | Cu       |
|--------------------------------------|---------------------|---------------------------------|--------------|------------------|-------------------|----------|----------|----------|----------|
| Particle size multiplier             | ·                   | K                               | 0.74         | 0.35             | 0.053             |          |          |          |          |
| Emission factor (uncontrolled)       | kg/tonne            | L = K*E*((C/G)^F)/((D/I)^H)     | 0.0022       | 0.0011           | 1.61E-04          |          |          |          |          |
| Maximum emission rate (controlled)   | g/s                 | M = B*L*(1-J/100)*1000/(A*3600) | 0.10         | 0.049            | 0.0074            |          |          |          |          |
| Maximum emission rate (uncontrolled) | g/s                 | M' = B*L*1000/(A*3600)          | 0.34         | 0.16             | 0.025             |          |          |          |          |
| Elemental component (by mass)        | g (element)/g (ore) | N                               |              |                  |                   | 0.0081   | 0.0011   | 9.49E-04 | 1.81E-04 |
| Maximum emission rate (controlled)   | g/s                 | O = M*N                         |              |                  |                   | 8.31E-04 | 1.15E-04 | 9.77E-05 | 1.86E-05 |
| Maximum emission rate (uncontrolled) | g/s                 | P = M*N                         |              |                  |                   | 0.0028   | 3.82E-04 | 3.26E-04 | 6.21E-05 |
| Quality rating                       |                     |                                 | Α            | Δ                | •                 |          |          |          |          |

Source: (a) AP-42 / 13.2.4 - Aggregate Handling And Storage Piles (USFA, November 2006) equation 1 - emission factor for drop operation.
(b) Martal speciation within neck was provided by Fortune in "Appendix to" - results.Ax". Based on the rock and ore quantities outlined in "Nico Project." Tallings and Mine Rock Co-Disposal Facility FEED study" (Golder 2010) it was assumed that all blasted rock is 26% blow ore and 74% bits waste rock. (c) Assumed General Enterior. Whis Co-Localization from Tise Investions.

#### III.2 - Primary Crushing

### A - Fugitive Emissions

| Dust Control Technique               |            | Wet suppression |           |
|--------------------------------------|------------|-----------------|-----------|
|                                      |            |                 |           |
| Hours of operation per day - maximum | h/day      | A               | 10.0 (a)  |
| Amount of material processed per day | tonnes/day | В               | 5,500 (a) |
|                                      |            |                 |           |

(N) C 50(pt)

Source: (a) Information provided by Fortune in an email dated Rovember 23, 2010 as the design capacity of the plant.
(b) Emission reduction efficiency calculated from a control factor provided in Environment Canada, Pils and Quarries Guidance, Last Accessed December 23, 2010. Factors for wet material and water spray.

|                                      |                     |                        | TSP       | PM <sub>10</sub> | PM <sub>2.5</sub> | As     | Bi       | Co       | Cu       | ı       |
|--------------------------------------|---------------------|------------------------|-----------|------------------|-------------------|--------|----------|----------|----------|---------|
| Emission factor (uncontrolled)       | kg/tonne            | D                      | 0.01      | 0.004            | 0.00007           |        |          |          |          | (a) (b) |
| Daily emission rate (controlled)     | g/day               | E = B*D*1000*(1-C/100) | 27,500.00 | 11,000.00        | 203.70            |        |          |          |          | i       |
| Maximum emission rate controlled     | g/s                 | F = E/(A*3600)         | 0.76      | 0.31             | 0.0057            |        |          |          |          | i       |
| Maximum emission rate uncontrolled   | g/s                 | F' = B*D*1000/(A*3600) | 1.53      | 0.61             | 0.011             |        |          |          |          | i       |
| Elemental component (by mass)        | g (element)/g (ore) | G                      |           |                  |                   | 0.0081 | 0.0011   | 9.49E-04 | 1.81E-04 | (c)     |
| Maximum emission rate (controlled)   | g/s                 | H = G *F               |           |                  |                   | 0.0062 | 8.50E-04 | 7.25E-04 | 1.38E-04 | (d)     |
| Maximum emission rate (uncontrolled) | g/s                 | I = G* F'              |           |                  |                   | 0.012  | 0.0017   | 0.0014   | 2.76E-04 | (d)     |
| Quality rating                       |                     |                        | C         | c                |                   |        |          |          |          | I(a)    |

Source: (a) 84-92 / 11.24 - Metallic Minerals Processing (USEPA, August 1982)/ Table 11.24-1 (Metric United, Emission factors for metallic minerals processing (value for high moisture or or defined as >= 45; in weight).

(b) Emission factor for PAE2 based on the ratio between PAE10 and PAE2.5 emission factors for tertainy crushing (controlled) in AP-82 / 11.19.2 Coulsed Stone Processing and Pulerinted Winteral Processing (USEPA, August 2004) Fable 11.19.2.1.

(c) Metal speciation within not was provided by Fortume in "Appendix 14" emissions." Shared on the rock and one quantities outlined in "Nico Project." Tailings and Mine Rock Co Disposal Facility FEED study (Golder 2010) it was assumed that all blasted rock is 26% blw one and 74% bits waste rock.

#### Calculation of Emissions During the Operation Phase

#### III.3 - Conveyor Transport (1200-CV-003) , exhaust to DC-003 (UTM 513463/7046445)

| A - Fugitive Emissions to secondary crusher |            |                     |            |
|---|------------|---------------------|------------|
| Dust Control Technique                      |            | (i) Wet Suppression |            |
|   |            | (ii) Bag house      |            |
| •   |            |                     |            |
| Hours of operation per day - maximum        | h/day      | A                   | 10.0 (a)   |
| Amount of material transferred              | tonnes/day | В                   | 5167.0 (a) |
| Emission reduction efficiency               | (%)        | c                   | 99 (b)     |
|   |            |                     |            |

Source: (a) Assumed same mass of ore going to secondary crusher. Information provided by Fortune in an em (b) Bag filter efficiency based on AP-42 / 11.24 - Metallic Minerals Processing (USEPA, August 1982).

|                                    |                     | TSP                    | PM <sub>10</sub> | PM <sub>2.5</sub> | As        | Bi       | Co       | Cu       |          |         |
|------------------------------------|---------------------|------------------------|------------------|-------------------|-----------|----------|----------|----------|----------|---------|
| Emission factor (controlled)       | kg/tonne            | D                      | 0.00007          | 0.000023          | 0.0000065 |          |          |          |          | (a) (b) |
| Daily emission rate (controlled)   | g/day               | E = B*D*1000*(1-C/100) | 3.6              | 1.2               | 0.3       |          |          |          |          | ľ       |
| Maximum emission rate (controlled) | g/s                 | F = E/(A*3600)         | 1.00E-04         | 3.30E-05          | 9.33E-06  |          |          |          |          | I       |
| Elemental component (by mass)      | g (element)/g (ore) | G                      |                  |                   |           | 0.0081   | 0.0011   | 0.055    | 1.81E-04 | (c)     |
| Daily emission rate                | g/s                 | H = G*F                |                  |                   |           | 8.11E-07 | 1.12E-07 | 5.54E-06 | 1.82E-08 | (d)     |
| Quality rating                     | _                   |                        |                  | D                 |           |          |          |          |          | ſ       |

Source: (a) AP-42/11.19.2 Crushed Stone Processing and Pulverized Mineral Processing (USEPA, August 2004) Table 11.19.2-1 (Metric Units) - Emission factors for crushed stone processing operations (value for conveyor transfer point - controlled). TSP emission has conservatively been taken as PAD-100ag.
(b) Emission factors for conveyer transport is for west suppression.
(c) Metal speciation within took was provided by Ferture as IP Agreement N - results.xia\*. Based on the rock and ore quantities outlined in "Nico Project." Tailings and Mine Rock Co-Disposal Facility EED study\* (Golder 2010) it was assumed that all bistant orck is 20% bitw ore and 74% bitw waste rock.
(d) Assumed excellental Rocks with 95 emissions.

#### III.4 - Ore Drop into Secondary Crusher, exhaust to DC-003 (UTM 513463/7046445)

| Fugitive Emissions                   |   |                                       |          |            |
|--------------------------------------|---|---------------------------------------|----------|------------|
| Dust Control Technique               |   | (i) Wet suppression<br>(ii) Bag house |          |            |
| <u> </u>                             |   |                                       | _        |            |
| Hours of operation per day - maximum | h/day   | A                                     | 10.0 (a  | a)         |
| Amount of material removed per day   | tonnes/day  | В                                     | 5,167 (a | a)         |
| Mean wind speed                      | m/s   | c                                     | 0.6 (8   | b)         |
| Material moisture content            | %   | D                                     | 7 (0     | :)         |
| Constant (a)                         |   | E                                     | 0.0016 ( | d)         |
| Constant (b)                         |   | F                                     | 1.3 (0   | d)         |
| Constant (c)                         |   | G                                     | 2.2 (0   | d)         |
| Constant (d)                         |   | H                                     | 1.4 (0   | d)         |
| Constant (e)                         |   | 1                                     | 2 (0     | d)         |
| Emission reduction efficiency        | (%)   | 1                                     | 70       | 99 (d) (e) |
| Source:                              | (a) Assumed same mass of ore going to secondary crusher. Information provided by Fortune in an email date | ed November 23, 2010.                 | *        |            |
|                                      |   |                                       |          |            |

(a) Assumed sidem thats of other good to excludely crosses in international products of a vicinal shall are state in the products of a vicinal shall be a vicinal sha

| ī                                  |                     | TSP <= 30 um                    | PM <sub>10</sub> | PM <sub>2.5</sub> | As       | Bi       | Co       | Cu       |          |     |
|------------------------------------|---------------------|---------------------------------|------------------|-------------------|----------|----------|----------|----------|----------|-----|
| Particle size multiplier           |                     | K                               | 0.74             | 0.35              | 0.053    |          |          |          |          | (a) |
| Emission factor (uncontrolled)     | kg/tonne            | L = K*E*((C/G)^F)/((D/I)^H)     | 4.20E-05         | 1.99E-05          | 3.01E-06 |          |          |          |          | (a) |
| Maximum emission rate (controlled) | g/s                 | M = B*L*(1-J/100)*1000/(A*3600) | 1.81E-05         | 8.55E-06          | 1.29E-06 |          |          |          |          |     |
| Elemental component (by mass)      | g (element)/g (ore) | N                               |                  |                   |          | 0.0081   | 0.0011   | 9.49E-04 | 1.81E-04 | (b) |
| Maximum emission rate              | g/s                 | 0 = N*M                         |                  |                   |          | 1.46E-07 | 2.01E-08 | 1.72E-08 | 3.27E-09 | (c) |
| Quality rating                     |                     |                                 | A                | A                 | A        |          |          |          |          |     |

Source: (a) AP-42 / 13.2.4 - Aggregate Handling And Storage Piles (USEPA, November 2006)/ equation 1 - emission factor for drop operation.

(b) Metal speciation within not war provided by Fortune in "Aggregate Handling And Storage Piles", (DSEPA, November 2006)/ equation 1 - emission factor for drop operation.

(c) Assumed foreign factor of the provided by Fortune in "Aggregate Handling And Storage Piles", (DSEPA, November 2006)/ equation 1 - emission factor for drop operation.

(c) Assumed foreign factor of the provided by Fortune in "Aggregate Handling And Storage Piles", (DSEPA, November 2006)/ equation 1 - emission factor for drop operation.

(c) Assumed femerical factors with the missions.

### Calculation of Emissions During the Operation Phase

#### III.5 - Secondary Crushing, exhaust to DC-003 (UTM 513463/7046445)

|  | Dust Control Technique               |            | (i) Wet suppression<br>(ii) Bag house |       |        |        |  |  |
|--|--------------------------------------|------------|---------------------------------------|-------|--------|--------|--|--|
|  | Hours of operation per day - maximum | h/day      | A                                     | 10.0  | (a)    |        |  |  |
|  | Amount of material processed per day | tonnes/day | В                                     | 5,500 | (a)(b) |        |  |  |
|  | Emission reduction efficiency        | (%)        | c                                     | 50    |        | 99 (c) |  |  |
| Source: (a) Information provided by Fortune in an email dated November 23, 2010. |                                      |            |                                       |       |        |        |  |  |

(a) Information provided by Fortune in an email dated howeverber 23, 2010. (b) Institution provided by Fortune in an email dated howeverber 23, 2010. (b) Institution factor for excoordary carabler is indication of mass of ore to the primary crusher, that is why the primary crusher mass is entered (AP 42/11.24).
(c) Tage (The reflicincy based on AP 42/11.24). At Mediti. Miterial Processing (USEPA, August 1380.).
(c) Tage (The reflicincy based on AP 42/11.24). At Mediti. Miterial Processing (USEPA, August 1380.).
(d) Formation reduction in Efficiency circulated from a control factor provided in Information Cauda, PS and Quarries Guidance, Last Accessed December 23, 2010. Factors for wet material and water spray, or a control factor provided in Information Cauda, PS and Quarries Guidance, Last Accessed December 23, 2010. Factors for wet material and water spray, or a control factor provided in Information Cauda, PS and Quarries Guidance, Last Accessed December 23, 2010. Factors for wet material and water spray, or a control factor provided in Information Cauda, PS and Quarries Guidance, Last Accessed December 23, 2010. Factors for wet material and water spray, or a control factor provided in Information Cauda, PS and Quarries Guidance, Last Accessed December 23, 2010. Factors for wet material and water spray, or a control factor provided in PS and

|                                    |                     | TSP                    | PM <sub>10</sub> | PM <sub>2.5</sub> | As       | Bi       | Co       | Cu       |          |         |
|------------------------------------|---------------------|------------------------|------------------|-------------------|----------|----------|----------|----------|----------|---------|
| Emission factor (uncontrolled)     | kg/tonne            | D                      | 0.03             | 0.012             | 0.00022  |          |          |          |          | (a) (b) |
| Daily emission rate (controlled)   | g/day               | E = B*D*1000*(1-C/100) | 825.00           | 330.00            | 6.11     |          |          |          |          | Ī       |
| Maximum emission rate (controlled) | g/s                 | F = E/(A*3600)         | 0.023            | 0.0092            | 1.70E-04 |          |          |          |          | Ī       |
| Elemental component (by mass)      | g (element)/g (ore) | G                      |                  |                   |          | 0.0081   | 0.0011   | 9.49E-04 | 1.81E-04 | (c)     |
| Maximum emission rate (controlled) | g/s                 | H = G*F                |                  |                   |          | 1.85E-04 | 2.55E-05 | 2.17E-05 | 4.15E-06 | (d)     |
| Overline entire                    |                     |                        | ,                |                   |          |          |          |          |          | T       |

Source: (a) 49-42/11.24 - Metallic Minerals Processing (UEPs, August 1993) Table 11.24-1 (Metall: United Entors for metallic minerals processing fusion for high moisture or or Jacondary crusthings high moisture or sedender as > 4% in neighbl, (b) Emission factors for PM2.5 based on the ratio between PM10 and PM2.5 emission factors for territary crusthing (controlled) in AP-42 / 11.32-1 crusted Stone Processing and Puberated Mineral Processing (UEPs, August 2004) Table 11.32.1.
(c) Metal speciation within row say provided by Critical in Superated Vision and Superated Vis

#### III.6 - Conveyer Transport (2150-CV-005), exhaust to DC-003 (UTM 513463/7046445)

| - Fugitive Emissions to transfer tower |  |                                 |       |  |  |  |  |  |  |
|--|--|---------------------------------|-------|--|--|--|--|--|--|
| Dust Control Technique                 |  | (i) Wet Suppression             |       |  |  |  |  |  |  |
|  |  | (ii) Bag house                  |       |  |  |  |  |  |  |
|  |  |                                 |       |  |  |  |  |  |  |
| Hours of operation per day - maximum   | h/day  | A                               | 10.0  |  |  |  |  |  |  |
| Amount of material transferred         | tonnes/day   | В                               | 5,167 |  |  |  |  |  |  |
| Emission reduction efficiency          | (%)  | c                               | 99    |  |  |  |  |  |  |
| f                                      | (a) Assessed the common of the common by the common of the | mail detect Newscarbor 22, 2010 |       |  |  |  |  |  |  |

(c) Bag filter efficiency based on AP-42 / 11.24 - Metallic Minerals Processing (USEPA, August 1982).

|                                    |                     | TSP                    | PM <sub>10</sub> | PM <sub>2.5</sub> | As       | Bi       | Co       | Cu       | 4        |         |
|------------------------------------|---------------------|------------------------|------------------|-------------------|----------|----------|----------|----------|----------|---------|
| Emission factor (controlled)       | kg/tonne            | D                      | 0.00007          | 2.30E-05          | 6.50E-06 |          |          |          |          | (a) (b) |
| Daily emission rate (controlled)   | g/day               | E = B*D*1000*(1-C/100) | 3.6              | 1.2               | 0.3      |          |          |          |          | Ī       |
| Maximum emission rate (controlled) | g/s                 | F = E/(A*3600)         | 1.00E-04         | 3.30E-05          | 9.33E-06 |          |          |          |          | Ī       |
| Elemental component (by mass)      | g (element)/g (ore) | G                      |                  |                   |          | 0.0081   | 0.0011   | 9.49E-04 | 1.81E-04 | (c)     |
| Maximum emission rate (controlled) | g/s                 | H = G*F                |                  |                   |          | 8.11E-07 | 1.12E-07 | 9.53E-08 | 1.82E-08 | s (d)   |
| Quality rating                     |                     |                        | E                | D                 |          |          |          |          |          | I       |

Source: (a) AP-42 / 11.19.2 Crushed Stone Processing and Pulverized Mineral Processing (USEPA, August 2004)/Table 11.19.2 (Metric Units) - Emission factors for crushed stone processing operations (value for conveyor transfer point - controlled). TSP emission has conservatively been taken as PM-100 ug.

(b) Emission factors for conveyer transport is for wet suppression.
(c) Mental expectation within rock was provided by Fottrue in "Appendix N" - results.siox". Based on the rock and ore quantities outlined in "Nico Project." Tailings and Mine Rock Co Disposal Facility FEED study" (Golder 2010) it was assumed that all blasted rock is 26% blw ore and 74% blw waste rock.
(d) Assumed Remember Infanction will be calculated from TSP emissions.

#### III.7 - Ore Drop in Transfer Tower, exhaust to DC-004 (UTM 513370/7046442)

| - Fugitive Emissions                  |            |                     |            |
|---------------------------------------|------------|---------------------|------------|
|                                       |            | (i) Wet suppression |            |
| Dust Control Technique                |            | (ii) Bag house      |            |
|                                       |            |                     |            |
| Hours of operation per day - maximum  | h/day      | A                   | 10.0 (a)   |
| Amount of material removed per day    | tonnes/day | В                   | 5,167 (a)  |
| Mean wind speed - maximum daily value | m/s        | c                   | 0.6 (b)    |
| Material moisture content             | %          | D                   | 7 (c)      |
| Constant (a)                          | ·          | E                   | 0.0016 (d) |
| Constant (b)                          | ·          | F                   | 1.3 (d)    |
| Constant (c)                          | ·          | G                   | 2.2 (d)    |
| Constant (d)                          | ·          | Н                   | 1.4 (d)    |
| Constant (e)                          | -          | I                   | 2 (d)      |

Source: (a) Assumed the same mass of one processed by secondary crusher, information provided by Fortune in an email dated November 23, 2010.
(b) Assumed calment conditions as allowed by the equation to represent dumping of aggregate material.
(c) Mostune content of or supplied by Fortune in a meral dated November 23, 2010.
(d) APA-21, 131-24. Aggregate handley doed Stanger Piles (CIAFA, November 2006), (e) equation 3 - emission factor for drop operation.
(e) Ray filter efficiency based on APA-27, 112.4\* Assemble Morentz Processing (CIAFA, August 1995).
(f) Assumed some emission relaction singled on handle of processing as for writing more than before 24 by as supposed cruded (Invironment Carada website, accessed in December 2010).

|                                    |                     |                                 | TSP <= 30 um | PM <sub>10</sub> | PM <sub>2.5</sub> | As       | Bi       | 0        | Cu       |
|------------------------------------|---------------------|---------------------------------|--------------|------------------|-------------------|----------|----------|----------|----------|
| Particle size multiplier           |                     | K                               | 0.74         | 0.35             | 0.053             |          |          |          |          |
| Emission factor (uncontrolled)     | kg/tonne            | L = K*E*((C/G)^F)/((D/I)^H)     | 4.20E-05     | 1.99E-05         | 3.01E-06          |          |          |          |          |
| Maximum emission rate (controlled) | g/s                 | M = B*L*(1-J/100)*1000/(A*3600) | 1.81E-05     | 8.55E-06         | 1.29E-06          |          |          |          |          |
| Elemental component (by mass)      | g (element)/g (ore) | N                               |              |                  |                   | 0.0081   | 0.0011   | 9.49E-04 | 1.81E-04 |
| Maximum emission rate (controlled) | g/s                 | O = M*N                         |              |                  |                   | 1.46E-07 | 2.01E-08 | 1.72E-08 | 3.27E-09 |
| Quality rating                     |                     |                                 | A            | A                | A                 |          |          |          |          |

Source (s) RP-42 / 13.2 4 - Aggregate Handling And Storage Piles (USFA, November 2006) equation 1 - emission factor for drop operation.
(b) Mithal speciation within nock was provided by Fortune in "Appendix IV - results.kar", Based on the rock and ore quantities outlined in "Nico Project." Tallings and Mine Rock Co-Disposal Facility FEED study" (Golder 2010) it was assumed that all blasted rock is 20% between and 74% bits worse and 74% bits worse rock.
(c) Assumed demential Factors will be calculated from TSP emissions.



### Calculation of Emissions During the Operation Phase

#### III.8 - Conveyer transport (2150-CV-007), exhaust to DC-003 (UTM 513463/7046445)

| - Fugitive Emissions from transfer tower to tertiary crusher  |            |                                       |       |  |  |  |  |  |  |  |
|---|------------|---------------------------------------|-------|--|--|--|--|--|--|--|
| Dust Control Technique  |            | (i) Wet suppression<br>(ii) Bag house |       |  |  |  |  |  |  |  |
|   |            |                                       | •     |  |  |  |  |  |  |  |
| Hours of operation per day - maximum  | h/day      | A                                     | 10.0  |  |  |  |  |  |  |  |
| Amount of material transferred  | tonnes/day | В                                     | 5,167 |  |  |  |  |  |  |  |
| Emission reduction efficiency   | (%)        | c                                     | 99    |  |  |  |  |  |  |  |
| Source: (a) Assumed the same mass of ore processed by secondary crusher. Information provided by Fortune in an email dated November 23, 2010. |            |                                       |       |  |  |  |  |  |  |  |

(c) Bag filter efficiency based on AP-42 / 11.24 - Metallic Minerals Processing (USEPA, August 1982).

|                                    |                     | TSP                    | PM <sub>10</sub> | PM <sub>2.5</sub> | As        | Bi       | Co       | Cu       |          |         |
|------------------------------------|---------------------|------------------------|------------------|-------------------|-----------|----------|----------|----------|----------|---------|
| Emission factor (controlled)       | kg/tonne            | D                      | 0.00007          | 0.000023          | 0.0000065 |          |          |          |          | (a) (b) |
| Daily emission rate (controlled)   | g/day               | E = B*D*1000*(1-C/100) | 3.6              | 1.2               | 0.3       |          |          |          |          |         |
| Maximum emission rate (controlled) | g/s                 | F = E/(A*3600)         | 1.00E-04         | 3.30E-05          | 9.33E-06  |          |          |          |          |         |
| Elemental component (by mass)      | g (element)/g (ore) | G                      |                  |                   |           | 0.0081   | 0.0011   | 9.49E-04 | 1.81E-04 | (c)     |
| Maximum emission rate (controlled) | g/s                 | H = G*F                |                  |                   |           | 8.11E-07 | 1.12E-07 | 9.53E-08 | 1.82E-08 | (d)     |
| Overline antique                   |                     |                        | ,                | 2                 |           |          |          |          |          |         |

Source 3, 07-42/11.19.2 Crushed Stove Processing and University Moved International Stove (USEN) (See No. 11.19.2 Crushed Stove Processing operations (using August 2004) Table 11.19.2 (Metric United) - Emission factors for crushed stove processing operations (using August 2004) Table 11.19.2 (Metric United) - Emission factors for crushed stove processing operations (using August 2004) Table 11.19.2 (Metric United) - Emission factors for crushed stove processing operations (using August 2004) Table 11.19.2 (Metric United) - Emission factors for crushed stove processing operations (using August 2004) Table 11.19.2 (Metric United) - Emission factors for crushed stove processing operations (using August 2004) Table 11.19.2 (Metric United) - Emission factors for crushed stove processing operations (using August 2004) Table 11.19.2 (Metric United) - Emission factors for crushed stove processing operations (using August 2004) Table 11.19.2 (Metric United) - Emission factors for crushed stove processing operations (using August 2004) Table 11.19.2 (Metric United) - Emission factors for crushed stove processing operations (using August 2004) Table 11.19.2 (Metric United) - Emission factors for crushed stove processing operations (using August 2004) Table 11.19.2 (Metric United) - Emission factors for crushed stove processing operations (using August 2004) Table 11.19.2 (Metric United) - Emission factors for crushed stove processing operations (using August 2004) Table 11.19.2 (Metric United) - Emission factors for crushed stove processing operations (using August 2004) Table 11.19.2 (Metric United) - Emission factors for crushed stove processing operations (using August 2004) Table 11.19.2 (Metric United) - Emission factors for crushed stove processing operations (using August 2004) Table 11.19.2 (Metric United) - Emission factors for crushed stove processing operations (using August 2004) Table 11.19.2 (Metric United) - Emission factors for crushed stove processing operations (using August 2004) Table 11.19.2 (Metric U

#### III.9 - Ore Drop into Material Screen, exhaust to DC-003 (UTM 513463/7046445)

| Fugitive Emissions                    |  |   |              |                  |                   |        |        |          |         |     |
|---------------------------------------|--|---|--------------|------------------|-------------------|--------|--------|----------|---------|-----|
| Dust Control Technique                |  | Bag house   | 7            |                  |                   |        |        |          |         |     |
|                                       | •  | •   | -            |                  |                   |        |        |          |         |     |
| Hours of operation per day - maximum  | h/day  | A   | 10.0         |                  |                   |        |        |          |         |     |
| Amount of material removed per day    | tonnes/day   | В   | 5,167        | (a)              |                   |        |        |          |         |     |
| Mean wind speed - maximum daily value | m/s  | Ċ   | 0.6          | (b)              |                   |        |        |          |         |     |
| Material moisture content             | %  | D   | 7            | (c)              |                   |        |        |          |         |     |
| Constant (a)                          |  | E   | 0.0016       | (d)              |                   |        |        |          |         |     |
| Constant (b)                          |  | F   | 1.3          | (d)              |                   |        |        |          |         |     |
| Constant (c)                          |  | G   | 2.2          | (d)              |                   |        |        |          |         |     |
| Constant (d)                          |  | H   | 1.4          | (d)              |                   |        |        |          |         |     |
| Constant (e)                          |  | I   | 2            | (d)              |                   |        |        |          |         |     |
| Emission reduction efficiency         | (%)  | J.  | 70           | 99               | e) (f)            |        |        |          |         |     |
| Source:                               | (a) Assumed the same mass of ore processed by secondary crusher. Information provided by Fortune in an e   | mail dated November 23, 2010.                               |              |                  |                   |        |        |          |         |     |
|                                       | (b) Assumed calmest conditions as allowed by the equation to represent dumping of aggregate material.      |   |              |                  |                   |        |        |          |         |     |
|                                       | (c) Moisture content of ore supplied by Fortune in an email dated November 26, 2010.                       |   |              |                  |                   |        |        |          |         |     |
|                                       | (d) AP-42 / 13.2.4 - Aggregate Handling And Storage Piles (USEPA, November 2006)/ equation 1 - emission fa | ctor for drop operation.                                    |              |                  |                   |        |        |          |         |     |
|                                       | (e) Bag filter efficiency based on AP-42 / 11.24 - Metallic Minerals Processing (USEPA, August 1982).      |   |              |                  |                   |        |        |          |         |     |
|                                       | (f) Assumed same emission reduction assigned to material dropping as for wetting more than twice a day as  | unpaved roads (Environment Canada website, accessed in Deco | ember 2010). |                  |                   |        |        |          |         |     |
|                                       |  |   |              |                  |                   |        |        |          |         |     |
|                                       |  |   | TSP <= 30 um | PM <sub>10</sub> | PM <sub>2.5</sub> | As     | Bi     | Co       | Cu      | I   |
| Particle size multiplier              |  | K   | 0.74         |                  |                   |        |        |          |         | (a) |
| Emission factor (uncontrolled)        | kg/tonne   | L = K*E*((C/G)^F)/((D/I)^H)                                 | 4.20E-05     |                  |                   |        |        |          |         | Ι   |
| Maximum emission rate (controlled)    | g/s  | M = B*L*(1-J/100)*1000/(A*3600)                             | 1.81E-05     | 8.55E-06         | 1.29E-06          |        |        | 1        | 1       | 1   |
| Elemental component (by marr)         | a (element)/a (ore)  | N   |              |                  |                   | 0.0091 | 0.0011 | 0.405.04 | 1 915.0 | Тпы |

| Particle size multiplier           |                     | K                               | 0.74     | 0.35     | 0.053    |          |          |          |          | (a) |
|------------------------------------|---------------------|---------------------------------|----------|----------|----------|----------|----------|----------|----------|-----|
| Emission factor (uncontrolled)     | kg/tonne            | L = K*E*((C/G)^F)/((D/I)^H)     | 4.20E-05 | 1.99E-05 | 3.01E-06 |          |          |          |          | ſ   |
| Maximum emission rate (controlled) | g/s                 | M = B*L*(1-J/100)*1000/(A*3600) | 1.81E-05 | 8.55E-06 | 1.29E-06 |          |          |          |          | ſ   |
| Elemental component (by mass)      | g (element)/g (ore) | N                               |          |          |          | 0.0081   | 0.0011   | 9.49E-04 | 1.81E-04 | (b) |
| Maximum emission rate (controlled) | g/s                 | 0 = N*M                         |          |          |          | 1.46E-07 | 2.01E-08 | 1.72E-08 | 3.27E-09 | (c) |
| Quality rating                     |                     |                                 | A        | A        | A        |          |          |          |          | ſ   |
|                                    |                     |                                 |          |          |          |          |          |          |          |     |

Source: (a) AP-42 / 13.2.4 - Aggregate Handling And Storage Piles (USEPA, November 2006)/ equation 1 - emission factor for drop operation.
(b) Metal speciation within not was provided by Forthure in "Agenedia" in "emission." Based on the rock and ore quantities outlined in "Nico Project." Tailings and Mine Rock Co-Disposal Facility FEED study" (Golder 2010) it was assumed that all blasted rock is 26% blw ore and 74% blw waste rock.
(c) Assumed femental fraction with breactional transforms with emissions.

#### Calculation of Emissions During the Operation Phase

#### III.10 Material Screening, exhaust to DC-003 (UTM 513463/7046445)

| Dust Control Technique               |  | (i) Wet suppression           | 1     |     |            |
|--------------------------------------|--|-------------------------------|-------|-----|------------|
|                                      |  | (ii) Bag house                |       |     |            |
|                                      |  |                               |       |     |            |
| Hours of operation per day - maximum | h/day  | A                             | 10    | (a) |            |
| Amount of material processed per day | tonnes/day   | В                             | 5,167 | (a) |            |
| Emission reduction efficiency        | (%)  | c                             | 0     |     | 99 (b) (c) |
| Source                               | (a) Assumed the same mass of ore processed by secondary crusher. Information provided by Fortune in an e | mail dated November 23, 2010. |       |     |            |

a) assumed the same mass or ore processed by secondary crusters information provided by Fortune in an email dated violentially of the blad filter efficiency based on AP-42 / 11.24 - Metallic Minerals Processing (USEPA, August 1924).
 (c) Emission reduction for wet suppression is 0 since the reduction efficiency from wet suppression is incorporated into the emission factor.

|                                    |                     |                        | TSP    | PM <sub>10</sub> | PM <sub>2.5</sub> | As       | Bi       | Co       | Cu       |         |
|------------------------------------|---------------------|------------------------|--------|------------------|-------------------|----------|----------|----------|----------|---------|
| Emission factor (controlled)       | kg/tonne            | D                      | 0.0011 | 0.00037          | 0.00003           |          |          |          |          | (a) (b) |
| Daily emission rate (controlled)   | g/day               | E = B*D*1000*(1-C/100) | 56.8   | 19.1             | 1.3               |          |          |          |          |         |
| Maximum emission rate (controlled) | g/s                 | F = E/(A*3600)         | 0.0016 | 5.31E-04         | 3.59E-05          |          |          |          |          |         |
| Elemental component (by mass)      | g (element)/g (ore) | G                      |        |                  |                   | 0.0081   | 0.0011   | 9.49E-04 | 1.81E-04 | (c)     |
| Maximum emission rate (controlled) | g/s                 | H = G*F                |        |                  |                   | 1.27E-05 | 1.76E-06 | 1.50E-06 | 2.86E-07 | (d)     |
| Quality rating                     |                     |                        | E      | c                |                   |          |          |          |          |         |

Source (a) AP-42 / 11.19.2 Counhed Stone Processing and Autorised Mineral Processing (USEPA, August 2004) Table 11.19.3-1 (Metric Units) - Emission factors for crushed stone processing operations (value for screening - uncontrolled).
(b) Emission factors for west suppression.
(c) Metal speciation within rock was provided by Fortune in "Appendix IV - results.xia". Based on the rock and ore quantities outlined in "Nico Project. Tailings and Mine Rock Co. Disposal Facility EEED study" (Golder 2010) It was assumed that all blasted rock is 26% bits ore and 74% bits waste rock.
(d) Assumed elemental fraction with the calculated from TSP emissions.

#### III.11 - Tertiary Crushing, exhaust to DC-003 (UTM 513463/7046445)

| Dust Control Technique               |   | (i) Wet suppression | 1     |         |        |       |
|--------------------------------------|---|---------------------|-------|---------|--------|-------|
|                                      |   | (ii) Bag house      |       |         |        |       |
|                                      |   |                     |       |         |        |       |
| Hours of operation per day - maximum | h/day   | A                   | 10.0  | (a)     |        |       |
| Amount of material processed per day | tonnes/day  | В                   | 5,500 | (a) (b) |        |       |
| Emission reduction efficiency        | (%)   | c                   | 50    |         | 99 (c) | ) (d) |
| Source:                              | (a) Information provided by Fortune for crushing train in an email dated November 23, 2010. |                     |       |         |        |       |

(c) Information produces of proteine continues that an enhance active exceeding 2.4, 2010. It is why the primary crusher mass is entered (AP 42/11.24).
(b) Emission factor for textrany crusher is a function of mass of one to the primary crusher. All this why the primary crusher mass is entered (AP 42/11.24).
(c) Tage (filter informs) based on the "AP 47/11.24" Metallic Ministra's Processing (1987A, August 1983A).
(c) Tage (filter informs) based on the "AP 47/11.24" Metallic Ministra's Processing (1987A, August 1983A).
(d) Emission reduction efficiency based on the "AP 47/11.24" Metallic Ministra's Processing (1987A, August 1983A).
(e) Emission reduction efficiency based on the "AP 47/11.24" Metallic Ministra's Processing (1987A, August 1983A).
(f) Emission reduction efficiency based on the "AP 47/11.24" Metallic Ministra's Processing (1987A, August 1983A).
(f) Emission reduction efficiency based on the "AP 47/11.24" Metallic Ministra's Processing (1987A, August 1983A).
(f) Emission reduction efficiency based on the "AP 47/11.24" Metallic Ministra's Processing (1987A, August 1983A).
(f) Emission reduction efficiency based on the "AP 47/11.24" Metallic Ministra's Processing (1987A, August 1983A).
(f) Emission reduction efficiency based on the "AP 47/11.24" Metallic Ministra's Processing (1987A, August 1983A).
(f) Emission reduction efficiency based on the "AP 47/11.24" Metallic Ministra's Processing (1987A, August 1983A).
(f) Emission reduction efficiency based on the "AP 47/11.24" Metallic Ministra's Processing (1987A, August 1983A).
(f) Emission reduction efficiency based on the "AP 47/11.24" Metallic Ministra's Processing (1987A, August 1987A).
(f) Emission reduction efficiency based on the "AP 47/11.24" Metallic Ministra's Processing (1987A, August 1987A).
(f) Emission reduction efficiency based on the "AP 47/11.24" Metallic Ministra's Processing (1987A, August 1987A).
(f) Emission reduction efficiency based on the "AP 47/11.24" Metallic Ministra's Processing (1987A, August 1987A).
(f) Emission reduction effi

|                                    |                     |                        | TSP    | PM <sub>10</sub> | PM <sub>2.5</sub> | As       | Bi       | Co       | Cu       |         |
|------------------------------------|---------------------|------------------------|--------|------------------|-------------------|----------|----------|----------|----------|---------|
| Emission factor (uncontrolled)     | kg/tonne            | D                      | 0.03   | 0.01             | 0.00019           |          |          |          |          | (a) (b) |
| Daily emission rate (controlled)   | g/day               | E = B*D*1000*(1-C/100) | 825.00 | 275.00           | 5.09              |          |          |          |          |         |
| Maximum emission rate (controlled) | g/s                 | F = E/(A*3600)         | 0.023  | 0.0076           | 0.00014           |          |          |          |          |         |
| Elemental component (by mass)      | g (element)/g (ore) | G                      |        |                  |                   | 0.0081   | 0.0011   | 9.49E-04 | 1.81E-04 |         |
| Maximum emission rate (controlled) | g/s                 | H = G*F                |        |                  |                   | 1.85E-04 | 2.55E-05 | 2.17E-05 | 4.15E-06 | (d)     |
| Quality rating                     |                     |                        | E      | E                |                   |          |          |          |          |         |

Searce (a) 44-2 (1) 23. Mortal Mortan Procuring (1025), August 1952/ Table 13.4-1 (better Units), Entition Institute for meditic misers's procuring (plane for high mortan or n / Setting reading spin and spin an

III.14 Tailing Slurry Transfer to CDF Fugitive particulate matter emissions: no significant.

# Air Quality Assessment - NICO Project Calculation of Emissions During the Operation Phase

| Fugitive Emissions                    |            |            |        |
|---------------------------------------|------------|------------|--------|
| Dust Control Technique                |            | No control |        |
|                                       |            |            |        |
| Hours of operation per day - maximum  | h/day      | A          | 20.4   |
| Amount of material handled per day    | tonnes/day | В          | 27,919 |
| Mean wind speed - maximum daily value | m/s        | c          | 12.82  |
| Material moisture content             | %          | D          | 7 (    |
| Constant (a)                          | +          | E          | 0.0016 |
| Constant (b)                          | +          | F          | 1.3    |
| Constant (c)                          |            | G          | 2.2    |
| Constant (d)                          | -          | Н          | 1.4    |
| Constant (e)                          | +          | I I        | 2      |
| Emission reduction efficiency         | (%)        | J          | 0      |

Source: (a) Based on information provided by Fortune n° NECO Mobile Equipment, IEVC\_without Aker fuel.sise\* assumed the same operating time as the haul trucks.

(b) Maximum daily mine not disposal as provided by Fortune n° Nast/Trucksionentres (1).sist.\*

(c) Value dender for norfurue 2002/2007 mine neteosological statine (Fortune 2004/2007/Medibal(0:16 04 - 5ep27 07), Mtd.As).

(d) Assumed same mostune content as one. One mostune content provided by Fortune in November 27, 2010.

(e) Al-Val 21/24. Aggregate Nearling Med Solorage Piles (USAP), November 2006/19 (agatents 1 - emission factor for drop operation.

|                                      |                            |                                 | TSP <= 30 um | PM <sub>10</sub> | PM <sub>2.5</sub> | As       | Bi       | Co       | Cu       | ı   |
|--------------------------------------|----------------------------|---------------------------------|--------------|------------------|-------------------|----------|----------|----------|----------|-----|
| Particle size multiplier             |                            | K                               | 0.74         | 0.35             | 0.053             |          |          |          |          | (a) |
| Emission factor (uncontrolled)       | kg/tonne                   | L = K*E*((C/G)^F)/((D/I)^H)     | 0.0022       | 0.0011           | 1.61E-04          |          |          |          |          | (a) |
| Maximum emission rate (controlled)   | g/s                        | M = B*L*(1-J/100)*1000/(A*3600) | 0.85         | 0.40             | 0.061             |          |          |          |          | ı   |
| Maximum emission rate (uncontrolled) | g/s                        | N = B*L*1000/(A*3600)           | 0.85         | 0.40             | 0.061             |          |          |          |          | ı   |
| Elemental component (by mass)        | g (element)/g (waste rock) | 0                               |              |                  |                   | 0.0011   | 5.30E-04 | 1.41E-04 | 1.27E-04 | (c) |
| Maximum emission rate (controlled)   | g/s                        | P = O * M                       |              |                  |                   | 9.55E-04 | 4.53E-04 | 1.21E-04 | 1.09E-04 | (d) |
| Maximum emission rate (uncontrolled) | g/s                        | Q = 0*N                         |              |                  |                   | 9.55E-04 | 4.53E-04 | 1.21E-04 | 1.09E-04 | (d) |
|                                      |                            |                                 |              |                  |                   |          |          |          |          |     |

Source: (a) AP-42 / 112.4 - Aggregate Handling And Storage Piles (USFA, November 2006) equation 1 - emission factor for drop operation.
(b) Metal speciation within nor kwas provided by Fortune in "Appendix in "- results.kax". Based on the rock and ore quantities outlined in "Nico Project." Tallings and Mine Rock Co-Disposal Facility FEED study" (Golder 2010) it was assumed that all blasted rock in 26% blw ore and 74% blw waste rock. (c) Assumed demental Factors will be accidated from Tile Penassons.



#### Calculation of Emissions During the Operation Phase

A - Fugitive PM Emissions - Dozer working in the CDF

| Dust Control Technique               |       | No control |         |
|--------------------------------------|-------|------------|---------|
|                                      |       |            |         |
| Number of equipment                  | pc    | A          | 2 (a    |
| Hours of operation per day - maximum | h/day | В          | 20.4 (t |
| Material silt content                | (%)   | c          | 40 (c   |
| Material moisture content            | (%)   | D          | 6.5 (c  |
| Emission reduction efficiency        | (%)   | E          | 0       |

Secure (a) 2 Dozens specified for one in the Yester Rock disposal exists. SCF DID and Sile. "NEOD blooks included INCK, without Alex factulars," (c) PAM-22 (11.24 A-Rgargester) in the Internal and build recks as colled

|                                      |                            |                        | TSP <= 30 um | TSP <= 15 um | PM <sub>10</sub> | PM <sub>2.5</sub> | As     | Bi       | Co       | Cu       | ı       |
|--------------------------------------|----------------------------|------------------------|--------------|--------------|------------------|-------------------|--------|----------|----------|----------|---------|
| Constant (a)                         | r ·                        | F                      | 2.6          | 0.45         |                  | -                 |        |          |          |          | (a)     |
| Constant (b)                         |                            | G                      | 1.2          | 1.5          | -                |                   |        |          |          |          | (a)     |
| Constant (c)                         |                            | Н                      | 1.3          | 1.4          | -                |                   |        |          |          |          | (a)     |
| Scaling Factor                       |                            | 1                      |              |              | 0.75             | 0.105             |        |          |          |          | (a) (b) |
| Emission rate (uncontrolled)         | kg/hr/pc                   | J = F*(C^G)/(D^H)      | 18.83        | 8.15         | 6.11             | 1.98              |        |          |          |          | (a) (c) |
| Emission rate (controlled)           | g/hr                       | K = A*J*1000*(1-E/100) | 37665.62     | 16295.79     | 12221.84         | 3954.89           |        |          |          |          |         |
| Maximum emission rate (controlled)   | g/s                        | L = K/(3600)           | 10.46        | 4.53         | 3.39             | 1.10              |        |          |          |          |         |
| Maximum emission rate (uncontrolled) | g/s                        | M = A*J*1000/3600      | 10.46        | 4.53         | 3.39             | 1.10              |        |          |          |          |         |
| Elemental component (by mass)        | g (element)/g (waste rock) | N                      |              |              |                  |                   | 0.0011 | 5.30E-04 | 1.41E-04 | 1.27E-04 | (d)     |
| Maximum emission rate (controlled)   | g/s                        | O = N*L                |              |              |                  |                   | 0.012  | 0.0055   | 0.0015   | 0.0013   | (e)     |
| Maximum emission rate (uncontrolled) | g/s                        | P = N*M                |              |              |                  |                   | 0.012  | 0.0055   | 0.0015   | 0.0013   | (e)     |
| Overlity antique                     |                            |                        | 2            | ,            | 2                | 2                 |        |          |          |          |         |

Source: (a) AP-42 / Section 1.13 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9.2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mining (Usiding overburden).
(b) Scaling factor to convert 159 <- 3.0 un to PM2.5 and 159 <- 5.5 un to PM2.5.
(c) FMIOL and FACE Scalicular factoring (Fig. 59 emissions reads by respective Scaling factors.
(c) FMIOL and FACE Scalicular factoring (Fig. 59 emissions reads by respective Scaling factors.
(d) Metal speciation within not was provided by Fertime in "Appendix IV" results.six". Based on the rock and one quantities outlined in "Noo Project." Tailings and Mine Rock Co-Disposal Facility, FEED study" (Golder 2010) it was assumed that all blasted rock is 26% bytw or and 74% bits waste rock.
(e) Assumed demonstrations when the includated from 159 emissions.

| Equipment/Vehicle               | Model                            | Number of Equipment/Vehicle | Daily Use (hours) |
|---------------------------------|----------------------------------|-----------------------------|-------------------|
| Track-dozer                     | Caterpillar D8T/Komatsu D15SAX-6 | 1                           | 3.8               |
| Tracked-Type tractor, buildozer | Caterpillar D10T/Komatsu 375A-6  | 1                           | 10.8              |
| •                               |                                  |                             |                   |

|                     |           |                                 | SO <sub>2</sub> | NOx   | со     | PM <sub>2.5</sub> | PM <sub>10</sub> | VOC      | PAH      | CO <sub>2</sub> e |   |
|---------------------|-----------|---------------------------------|-----------------|-------|--------|-------------------|------------------|----------|----------|-------------------|---|
| Daily emission rate | tonne/day | (refer to mine fleet operation) | 3.67E-05        | 0.018 | 0.0061 | 7.80E-04          | 8.05E-04         | 8.43E-04 | 6.42E-06 | 4.39              | 1 |

#### IV.3 - Transport of Rock to CDF

| Dust Control Technique                      |           | Watering more than twice a day |            |
|---|-----------|--------------------------------|------------|
|   |           |                                |            |
| Hours of operation per day - maximum        | h/day     | A                              | 20.4 (a)   |
| Surface material silt content               | (%)       | В                              | 1.6 (b)    |
| Mean vehicle weight                         | tons      | c                              | 130.77 (c) |
| Vehicle kilometer traveled (VKT)            | km/day    | D                              | 1,172 (c)  |
| Number of working days                      | days/year | E                              | 365 (d)    |
| Number of days with precipitation >= 0.2 mm | days/year | F                              | 58 (e)     |
| Facinities and order officians.             | (ar)      | 6                              | 70 (-)     |

|   |        |                                     | PM-30 (TSP)  | PM <sub>10</sub> | PM <sub>2.5</sub> |
|---|--------|-------------------------------------|--------------|------------------|-------------------|
| Constant (k)  |        | Н                                   | 4.9          | 1.5              | 0.15              |
| Constant (a)  |        | I                                   | 0.7          | 0.9              | 0.9               |
| Constant (b)  |        | I I                                 | 0.45         | 0.45             | 0.45              |
| Emission factor (uncontrolled)                                  | lb/vMT | K= H*((B/12)^I)*((C/3)^J)*[(E-F)/E] | 5.50         | 1.13             | 0.11              |
| Emission factor (uncontrolled)                                  | g/VKT  | L= K*281.9                          | 1551.64      | 317.45           | 31.74             |
| Emission factor (controlled)                                    | g/VKT  | M = K*281.9*(1 - G/100)             | 465.49       | 95.23            | 9.52              |
| Daily emission rate (uncontrolled)                              | g/day  | N = L*D                             | 1,818,820.65 | 372,111.25       | 37,211.13         |
| Daily emission rate (controlled)                                | g/day  | 0 = M*D                             | 545,646.20   | 111,633.38       | 11,163.34         |
| Maximum emission rate (uncontrolled)                            | g/s    | P = N/(A*3600)                      | 24.77        | 5.07             | 0.51              |
| Maximum emission rate (controlled)                              | g/s    | Q = O/(A*3600)                      | 7.43         | 1.52             | 0.15              |
| Maximum emission rate (uncontrolled removing precip correction) | g/s    | R = P/[(E-F)/E]                     | 29.41        | 6.02             | 0.60              |
| Maximum emission rate (controlled, removing precip correction)  | g/s    | S = Q/[(E-F)/E]                     | 8.82         | 1.81             | 0.18              |
| Quality rating  |        |                                     | В            | В                | В                 |

Source: (a) AP-42 / Section 13.2.2 - Uispaved Roads (USEPA, November 2006)/ Equation (1a) - unpaved surfaces at industrial sites and Table 13.2.2-2.
(b) 28.13: constant to convert bij/WMT (pounds per whole mile travelled) to p/WT (grams per whicle kilometer travelled).
(c) Daily hover of operation as lavelary incorporated in the VMT value.

| Mean Vehicle Weight              |        |                  |            |         |       |
|----------------------------------|--------|------------------|------------|---------|-------|
| Equipment                        | -      |                  | Haul Truck | Total   | 7     |
| Weight - Empty                   | tonne  | P                | 73.98      |         | (a)   |
| Weight - Loaded                  | tonne  | Q                | 163.29     |         | (b    |
| Mean Weight                      | tonne  | R=(P+Q)/2        | 119        |         | ٦.    |
| Number of two way trips          | number | S = 13,267/(Q-P) | 390.73     |         | (c    |
| Distance of two way trip         | km/day | T                | 3          |         | (d    |
| Vehicle kilometer traveled (VKT) | km/day | U = S*T          | 1,172.19   | 1,172.1 | 19    |
| Percentage of traffic            | %      |                  | 100%       |         | ٦.    |
| Mean vehicle weight              | tonne  |                  | 118.63     | 118.6   | 53 (0 |

Source. (a) Assumed on of the Open P8 haul trucks will be used to take waste rock to CDF, provided by Fortune in "NGC Mobile Equipment\_REVC\_without Aler fuel.ukis".

(b) Haul trucks the loaded weight was taken as the maximum specified load in CAT 77F specification in heat.

(c) Number of two way trips it defermed by Joiding the sold, where not disposal using logical load for 2010, FEED) by haul truck loaded weight.

(d) Distance of two way trup determined from value provided in Haul fruckKlometers (2) alox.

(e) Values weighted accounting to VXI.

Air Quality Assessment - NICO Project Calculation of Emissions During the Operation Phase

| Equipment/Vehicle           | Model                             | Number of Equipment/Vehicle | Daily Use (hours) |
|-----------------------------|-----------------------------------|-----------------------------|-------------------|
| Surface rock haulage trucks | Caterpillar 777F/Komatsu HD 785-7 | 1                           | 17.5              |
| Surface rock haulage trucks | Caterpillar 777F/Komatsu HD 785-7 | 2                           | 17.5              |
| •                           | *                                 |                             |                   |
|                             |                                   |                             |                   |

|                     |           |                                 | SO <sub>2</sub> | NOx  | co    | PM <sub>2.5</sub> | PM <sub>10</sub> | VOC    | PAH      | CO₂e  |
|---------------------|-----------|---------------------------------|-----------------|------|-------|-------------------|------------------|--------|----------|-------|
| Daily emission rate | tonne/day | (refer to mine_fleet_operation) | 2.64E-04        | 0.12 | 0.040 | 0.0056            | 0.0058           | 0.0060 | 4.61E-05 | 31.48 |



#### Calculation of Emissions During the Operation Phase

### V.1 - Dumping into fine ore bin assumed to be the same as bagging, exhaust to DC-005 (UTM 513427/7046460)

| A - Fugitive Emissi |
|---------------------|
|---------------------|

| Dust Control Technique                |   | Bag house |           |
|---------------------------------------|---|-----------|-----------|
|                                       |   |           |           |
| Hours of operation per day - maximum  | h/day   | A         | 24 (a     |
| Amount of material handled per day    | tonnes/day  | В         | 198.00 (b |
| Mean wind speed - maximum daily value | m/s   | c         | 0.60 (c   |
| Material moisture content             | %   | D         | 7 (c      |
| Constant (a)                          |   | E         | 0.0016 (d |
| Constant (b)                          |   | F         | 1.3 (d    |
| Constant (c)                          |   | G         | 2.2 (d    |
| Constant (d)                          |   | H         | 1.4 (d    |
| Constant (e)                          |   | 1         | 2 (d      |
| Emission reduction efficiency         | (%)   | J.        | 99 (f)    |
| Source:                               | (a) Operating time of processing plant define by Fortune in an email dated December 23, 2010. |           |           |

- e: (a) Operating time of processing glant define by Fortune in an email dated December 23, 2010.

  (b) Dry concentrate asswall be approximately 3.66 of morning one as detailed in Goodber (2010) FEED analysis page 3.

  (c) Assumed calment conditions as allowed by the equation to represent dumping of aggregate material.

  (d) Mosture contents or one supplied by Fortune in an email dated becoming 2, 0.00) (e) quality of the content of the cont

|   |  |                                 | 13F <= 30 um | PWI <sub>10</sub> | rivi <sub>2.5</sub> | As       | BI       | Lo       | Cu       |            |
|---|--|---------------------------------|--------------|-------------------|---------------------|----------|----------|----------|----------|------------|
| Particle size multiplier  | ·  | K                               | 0.74         | 0.35              | 0.053               |          |          |          |          | a)         |
| Emission factor (uncontrolled)  | kg/tonne   | L = K*E*((C/G)^F)/((D/I)^H)     | 4.20E-05     | 1.99E-05          | 3.01E-06            |          |          |          |          |            |
| Maximum emission rate (controlled)  | g/s  | M = B*L*(1-J/100)*1000/(A*3600) | 9.62E-07     | 4.55E-07          | 6.89E-08            |          |          |          |          |            |
| Elemental component (by mass)   | g (element)/g (ore)  | N                               |              |                   |                     | 0.0081   | 0.0011   | 9.49E-04 | 1.81E-04 | b)         |
| Maximum emission rate (controlled)  | g/s  | O = N*M                         |              |                   |                     | 7.77E-09 | 1.07E-09 | 9.13E-10 | 1.74E-10 | <b>=</b> ) |
| Quality rating  | ·  |                                 | A            | A                 | A                   |          |          |          |          |            |
|   | Source: (a) AP-42 / 13.2.4 - Aggregate Handling And Storage Piles (USEPA, November 2006)/ equation 1 - emission factor for drop operation. |                                 |              |                   |                     |          |          |          |          |            |
| (b) Metal speciation within rock was provided by Fortune in "Appendix IV - results.xixx". Based on the rock and ore quantities outlined in "Nico Project: Tailings and Mine Rock Co-Disposal Facility FEED study" (Golder 2010) it was assumed that all blasted rock is 26% btw ore and 74% btw waste rock. |  |                                 |              |                   |                     |          |          |          |          |            |
|   | (c) Assumed elemental fraction will be calculated from TSP emissions.  |                                 |              |                   |                     |          |          |          |          |            |

#### V.2 Concentrate Storage

#### VI - Concentrate Transport

| A - Fue | itive Fr | nissions |  |
|---------|----------|----------|--|

| Dust Control Technique                        |           | Assume No Control |           |
|---|-----------|-------------------|-----------|
|   |           |                   |           |
| Surface material silt content                 | (%)       | A                 | 1.6 (a)   |
| Mean vehicle weight                           | tonnes    | В                 | 41.75 (b) |
| Access Road, Vehicle kilometer traveled (VKT) | km/day    | c                 | 316 (b)   |
| Number of working days                        | days/year | D                 | 365       |
| Number of days with precipitation >= 0.2 mm   | days/year | E                 | 58 (c)    |
| Emission reduction, Access Road               | (%)       | F                 | 0         |
|   |           |                   |           |

(N)
Source: (a) AP-42 / 13.2.4 - Aggregate Handling And Storage Pies (USEPA, November 2006) Table 13.2.4-1. Typical sitz content of overburden for Western surface coal mine.
(b) Befor to mean whiche weight table below.
(c) Value devere form Formus 2004-2007 consider meteorological station (Fortune, 2004-2007, MetData)(Ox8 04-5ep27 07), MD.46).

|                                       |        |  | PM-30 (TSP) | PM <sub>10</sub> | PM <sub>2.5</sub> |
|---------------------------------------|--------|--|-------------|------------------|-------------------|
| Constant (k)                          |        | G  | 4.9         | 1.5              | 0.15 (a           |
| Constant (a)                          |        | Н  | 0.7         | 0.9              | 0.9 (a            |
| Constant (b)                          | -      | 1  | 0.45        | 0.45             | 0.45 (a           |
| Emission factor (uncontrolled)        | lb/vMT | J = G*((A/12)^H)*((B*1.1/3)^I)*((D-E)/D) | 3.44        | 0.70             | 0.070 (a          |
| Emission factor (metric uncontrolled) | g/VKT  | K = J * 281.9                            | 969.82      | 198.42           | 19.84 (b          |
| Daily emisison rate (uncontrolled)    | g/day  | L = K*C                                  | 306,270.32  | 62,659.63        | 6,265.96          |
| Quality rating                        |        |  | В           | В                | B (a              |

Source: (a) AP-42 / Section 13.2.2 · Unpawed Roads (USEPA. November 2006)/ Equation (1a) · unpawed surfaces at industrial sites and Table 13.2.2.2.
(b) 28.9.5 constant to convert Ib/NAT (pounds per whole mile travelled) to g/NAT (grams per vehicle kilometer travelled).
(c) Assumed waverage speed of Situah)r, continuous operation.

| Mean Vehicle Weight                           |           |         |        |     |
|---|-----------|---------|--------|-----|
| Equipment                                     |           | B-train | Total  |     |
| Weight - Empty                                | tonne     | 63.5    |        | (a) |
| Weight - Loaded                               | tonne     | 20.0    |        | (b) |
| Mean Weight                                   | tonne     | 41.8    |        |     |
| Number of loads per day                       | loads/day | 5       |        | (c) |
| Access Road vehicle kilometer travelled (VKT) | km/day    | 315.80  | 315.80 | (d) |
| Access Road Percentage of traffic             | %         | 100%    |        |     |
| Mean vehicle weight                           | tonne     | 41.75   | 41.75  |     |

Source: (a) Assumed 8-trains will transport material. B-train weight taken as maximum allowable weight from NWT motor vehicles act Section 36 (f)(ii).

(b) Assume empty weight of 8 train is 20 brones.
(c) Information provided by Fortune in an email dated Nov. 26, 2010.
(d) Length of access road basen from EBA report, NCO Mine Access Route Evaluation.

| Number of loads                               | loads/day  | A | 5 (a)   |
|---|------------|---|---------|
| Vehicle kilometer traveled, Access road (VKT) | km/day     | В | 316 (b) |
| Daily fuel consumption                        | L fuel/day | c | 258 (c) |

Source: (a) Data provided by Fortune in an email dated November 28, 2010.
(b) Refer to mean welste weight table above.
(c) Assumed 8-brath horspower at 75 hp and speed of 20 km/h. Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling- Compression-Ignition (EPA, April 2004).

|   |   |               | SO <sub>2</sub> | NOx     | co     | voc    | PM <sub>2.5</sub> | PM <sub>10</sub> |
|---|---|---------------|-----------------|---------|--------|--------|-------------------|------------------|
| Emission Factor for HDDV8b (modelled in MOBILE) | g/VMT   | D             | 0.0151          | 8.270   | 3.796  | 0.774  | 0.1674            | 0.1818 (         |
| Emission Factor for HDDV8b (modelled in MOBILE) | g/VKT   | E= D/1.609344 | 0.0094          | 5.14    | 2.36   | 0.48   | 0.10              | 0.11             |
| Access Road Daily Emission Rate                 | g/day   | F = E*B       | 2.96            | 1622.81 | 744.89 | 151.88 | 32.85             | 35.67            |
| Source  | c (a) Emission rates based on MOBILE simulation saved to "Winter_Road_Traffic_Emissions.xls". |               |                 |         |        |        |                   |                  |

|                     |           |       | PAH      | CO2    | CH4      | N20      | CO2e     |         |
|---------------------|-----------|-------|----------|--------|----------|----------|----------|---------|
| Emission Factor     | tonne/L   | Н     | 4.40E-09 | 0.0027 | 1.50E-07 | 1.10E-06 |          | (a) (b) |
| Daily amiraina anta | towns/day | 1-446 | 1 135 00 | 0.00   | 2 867 07 | 3 837 04 | 7.755.01 |         |

Source: (a) Technical reference (Golder Associates and Conor Pacific), Table 3-51, p. 94.
(b) Environment Canada, National Inventory Report (1990-2008).

### Calculation of Emissions During the Operation Phase

### VI.2 - B-Train concentrate, Tilcho Road

| Dust Control Technique                        | Assume No Control |   |       |  |  |  |  |
|---|-------------------|---|-------|--|--|--|--|
| <u> </u>                                      |                   |   | -     |  |  |  |  |
| Surface material silt content                 | (%)               | A | 1.6   |  |  |  |  |
| Mean vehicle weight                           | tonnes            | В | 41.75 |  |  |  |  |
| Tilcho Road, Vehicle kilometer traveled (VKT) | km/day            | c | 189   |  |  |  |  |
| Number of working days                        | days/year         | D | 365   |  |  |  |  |
| Number of days with precipitation >= 0.2 mm   | days/year         | E | 58    |  |  |  |  |
| Emission reduction, Tilcho Road               | (%)               | F | 0     |  |  |  |  |
|   |                   |   |       |  |  |  |  |

Source: (a) AP-42 / 13.2.4 - Aggregate Handling And Storage Pics (USEPA, November 2006)/ Table 13.2.4-1. Typical sit content of overburden for Weste (b) Refer to mean vehicle weight table below.
(c) Value devined from Fortune 2004-2007 outsite referencingical station (Fortune 2004, 2007 \_MetData(Oct8 04 - Sep27 07]\_MD.xls).

|                                       |        |   | PM-30 (TSP) | PM <sub>10</sub> | PM <sub>2.5</sub> |     |
|---------------------------------------|--------|---|-------------|------------------|-------------------|-----|
| Constant (k)                          |        | G                                       | 4.9         | 1.5              | 0.15              | (a) |
| Constant (a)                          |        | H                                       | 0.7         | 0.9              | 0.9               | (a) |
| Constant (b)                          |        | 1                                       | 0.45        | 0.45             | 0.45              | (a) |
| Emission factor (uncontrolled)        | lb/vMT | J =G*((A/12)^H)*((B*1.1/3)^I)*((D-E)/D) | 3.44        | 0.70             | 0.07              | (a) |
| Emission factor (metric uncontrolled) | g/VKT  | K = J * 281.9                           | 969.82      | 198.42           |                   | (b) |
| Daily emission rate                   | g/day  | L = K*C                                 | 183,684.61  | 37,579.91        | 3,757.99          |     |
| Quality rating                        |        |   | В           | R                | B                 | (a) |

| Mean Vehicle Weight   |           |         |        |     |
|---|-----------|---------|--------|-----|
| Equipment   |           | B-train | Total  | Ĺ   |
| Weight - Empty  | tonne     | 63.5    |        | (a) |
| Weight - Loaded   | tonne     | 20.0    |        | (b) |
| Mean Weight   | tonne     | 41.8    |        | i . |
| Number of loads per day   | loads/day | 5       |        | (c) |
| All weather road vehicle kilometer travelled (VKT)  | km/day    | 189.40  | 189.40 | (d) |
| Access Road Percentage of traffic   | %         | 100%    |        | Ĺ   |
| Management of the contract of |           | 41.75   | 41.75  | 1   |

Source (a) Assumed 8 trains will transport material. 8 train weight taken as maximum allowable weight from NWT motor vehicles act Section 36 (f)(ii).
(b) Assume empty weight of 8 train is 20 tones.
(c) Information provided by fortune in a mean dathed Nov. 26, 2010.
(d) Length of all weather road taken from #BA report, NCO Mine Access Route Evaluation.

| В- | Exhaust Emissions                             |   |   |        |
|----|---|---|---|--------|
|    | Number of loads                               | loads/day   | A | 5      |
|    | Vehicle kilometer traveled, Tilcho road (VKT) | km/day  | В | 189    |
|    | Daily fuel consumption                        | L fuel/day  | c | 103.00 |
|    | Source:                                       | (a) Data provided by Fortune in an email dated November 26, 2010. |   |        |

|   |   |               | SO <sub>2</sub> | NO <sub>x</sub> | co     | VOC   | PM <sub>2.5</sub> | PM <sub>10</sub> |
|---|---|---------------|-----------------|-----------------|--------|-------|-------------------|------------------|
| Emission Factor for HDDV8b (modelled in MOBILE) | g/VMT   | D             | 0.0151          | 8.270           | 3.796  | 0.774 | 0.1674            | 0.1818 (a)       |
| Emission Factor for HDDV8b (modelled in MOBILE) | g/VKT   | E= D/1.609344 | 0.0094          | 5.14            | 2.36   | 0.48  | 0.10              | 0.11             |
| Tilcho road Daily Emission rate                 | g/day   | F = E*B       | 1.78            | 973.28          | 446.74 | 91.09 | 19.70             | 21.40            |
| Source:   | (a) Emission rates based on MOBILE simulation saved to "Winter_Road_Traffic_Emissions.xls". |               |                 |                 |        |       |                   |                  |

|                     |           |         | PAH      | CO2      | CH4      | N20      | CO2e     |         |
|---------------------|-----------|---------|----------|----------|----------|----------|----------|---------|
| Emission Factor     | tonne/L   | Н       | 4.40E-09 | 0.0027   | 1.50E-07 | 1.10E-06 |          | (a) (b) |
| Daily emission rate | tonne/day | I=H * C | 4.53E-07 | 2.74E-01 | 1.54E-05 | 1.13E-04 | 3.10E-01 |         |

#### Calculation of Emissions During the Operation Phase

#### VII - Other Off-site Transport (people, equipment, supplies)

| - Fugitive Emissions                        |  |                             |         |
|---|--|-----------------------------|---------|
| Dust Control Technique                      |  | Chemical suppressant (EK35) |         |
| •   |  |                             |         |
| Pile surface area                           | ha   | A                           | 8.6 (a) |
| Percentage of time WS >19.3 km/h            | %  | В                           | 31 (b)  |
| Material silt content                       | %  | c                           | 1.6 (c) |
| Number of days with precipitation >= 0.2 mm | days/year  | D                           | 58 (d)  |
| Constant (a)                                |  | E                           | 1.9 (e) |
| Constant (b)                                |  | F                           | 1.5 (e) |
| Constant (c)                                |  | G                           | 365 (e) |
| Constant (d)                                |  | Н                           | 235 (e) |
| Constant (e)                                |  |                             | 15 (e)  |
| Emission reduction efficiency               | (%)  | j                           | 80 (f)  |
| Source:                                     | (a) Surface area estimated from Golder (2010) Proposed site layout. Assumed runway is elevated 2 m off the | e ground.                   |         |

Source (a) Surface area estimated from Golder (2010) Proposed side layout. Assumed runway is elevated 2 in off the ground.
(b) Value dender from Fortune 2004 2007 ontel meteorological station (Fortune 2004) 2007 Metabas(1004.66 5-sp2777)\_MD.ab.).
(c) The pile is assumed to be lined with limestone. Range of limestone sit content available in AP 4.2 chapter 13.2 Aplabel 13.2 A-1. Limestone will not actually be used but rather crushed rock.
(d) Value dender from Fortune 2004 2007 ontel meteorological station (Fortune 2002) 2007 Metabas(1004.66 5-sp2777)\_MD.ab.).
(e) Control of Open Sugines Deut Source (IGSFA, September 1988) / Foquation (4-9).
(f) Emission exclude and SMS from themal superseases (ISSG) avanced from Universel industrial Road Dust Calculator (Environment Canada website, accessed in December 2010).
(g) Constant of 1.1 Reyear device control of the SMS of the

|  |  |   | TSP <= 30 um | PM <sub>10</sub> | PM <sub>2.5</sub> |       |
|--|--|---|--------------|------------------|-------------------|-------|
|  |  |   |              |                  |                   |       |
| Scaling factors  |  | K   |              | 0.5              | 0.075             | (a)   |
| Emission factor (uncontrolled)                                   | kg/d/ha  | L = E*(C/F)*((G-D)/H)*(B/I)                                     | 5.39         | 2.69             | 0.40              | (b) ( |
| Maximum emission rate (controlled)                               | g/s  | M = L*A*1000*(1-J/100)/(24*3600)                                | 0.11         | 0.054            | 0.0081            |       |
| Maximum emission rate (controlled, removing precip correction)   | g/s  | $N = E^*(C/F)^*((G-0)/H)^*(B/I)^*A^*1000^*(1-J/100)/(24^*3600)$ | 0.13         | 0.064            | 0.0096            |       |
| Maximum emission rate (uncontrolled)                             | g/s  | O = L*A*1000/(24*3600)  | 0.54         | 0.27             | 0.040             |       |
| Maximum emission rate (uncontrolled, removing precip correction) | g/s  | P = E*(C/F)*((G-0)/H)*(B/I)*A*1000/(24*3600)                    | 0.64         | 0.32             | 0.048             | (c)   |
| Source:  | (a) AP-42/Section 13.2.5 - Industrial Wind Erosion.  |   |              |                  |                   |       |
|  |  |   |              |                  |                   |       |
|  | (c) PM10 and PM2.5 calculated multiplying TSP emission rate by respective scaling factors. |   |              |                  |                   |       |
|  |  |   |              |                  |                   |       |

| Dust Control Technique                        |           | Assume no control |      |  |  |
|---|-----------|-------------------|------|--|--|
|   |           |                   |      |  |  |
| Surface material silt content                 | (%)       | A                 | 1.6  |  |  |
| Mean vehicle weight                           | tonnes    | В                 | 41.8 |  |  |
| Access Road, Vehicle kilometer traveled (VKT) | km/day    | c                 | 568  |  |  |
| Number of working days                        | days/year | D                 | 365  |  |  |
| Number of days with precipitation >= 0.2 mm   | days/year | E                 | 58   |  |  |
| Emission reduction, Access Road               | (26)      | F                 | 0    |  |  |

Source: (a) AP-42 / 13.2.4 - Aggregate Handling And Storage Piles (USEPA, November 2006)/ Table 13.2.4-1. Typical silt content of overburden for Western surface coal (b) Refer to mean vehicle weight table below.

(c) Value evented from Fortura 2004-2007 content meteorological station (Fortune\_2004\_2007\_MetData)(Cxt8 04 - Sep27 07)\_MD.xis).

|                                       |        |   | PM-30 (TSP) | PM <sub>10</sub> | PM <sub>2.5</sub> | ı    |
|---------------------------------------|--------|---|-------------|------------------|-------------------|------|
| Constant (k)                          | +      | G                                       | 4.9         | 1.5              | 0.15              | (a)  |
| Constant (a)                          | +      | н                                       | 0.7         | 0.9              | 0.9               | (a)  |
| Constant (b)                          | +      |   | 0.45        | 0.45             | 0.45              | (a)  |
| Emission factor (uncontrolled)        | lb/vMT | J =G*((A/12)^H)*((B*1.1/3)^I)*((D-E)/D) | 3.44        | 0.70             | 0.070             | (a)  |
| Emission factor (metric uncontrolled) | g/VKT  | K = J * 281.9                           | 969.82      | 198.42           | 19.84             | (b)  |
| Daily Emission rate (uncontrolled)    | g/day  | L = K*C                                 | 551,286.58  | 112,787.34       | 11,278.73         | Ĺ    |
| Quality rating                        |        |   | B           | В                | B                 | l(a) |

Source: (a) AP-42 / Section 13.2.2 - Unpaved Roads (USEPA, November 2006)/ Equation (1a) - unpaved surfaces at industrial sites and Table 13.2.2.2.
(b) 281.9 constant to convert Ib/VMT (pounds per vehicle mile travelled) to g/VMT (grams per vehicle kilometer travelled).

#### Calculation of Emissions During the Operation Phase

| Mean Vehicle Weight                           |           |         |        |
|---|-----------|---------|--------|
| Equipment                                     |           | B-train | Total  |
| Weight - Empty                                | tonne     | 63.50   | (      |
| Weight - Loaded                               | tonne     | 20.00   | (      |
| Mean Weight                                   | tonne     | 41.75   |        |
| Number of loads per day                       | loads/day | 9       |        |
| Access Road vehicle kilometer travelled (VKT) | km/day    | 568.44  | 568.44 |
| Access Road Percentage of traffic             | %         | 100%    |        |
| Mean vehicle weight                           | tonne     | 41.75   | 41.75  |

Source (a) Assumed 8 trains will transport material. B train weight taken as maximum allowable weight from NWT motor vehicles act Section 36 (f)(ii).
(b) Assume empty weight of 8 train is 20 tones.
(c) Information provided by Fortion a nemal dated Nov. 26, 2010.
(d) Length of access road and all weather road taken from EBA report, NCO Mine Access Route Evaluation.

B- Exhaust Emissions

| Number of loads                               | loads/year | A | 9 (a      |
|---|------------|---|-----------|
| Vehicle kilometer traveled, Access road (VKT) | km/day     | В | 568 (b    |
| B-Train, average fuel consumption             | L fuel/day | c | 463.69 (c |
|   |            |   |           |

Source: (a) Distar provided by Fortone in an email dated November 26, 2010.
(b) Rifer to many which weight in section. A provided of the provi

|   |       |               | SO <sub>2</sub> | NO <sub>x</sub> | co       | voc    | PM <sub>2.5</sub> | PM <sub>10</sub> |
|---|-------|---------------|-----------------|-----------------|----------|--------|-------------------|------------------|
| Emission Factor for HDDV8b (modelled in MOBILE) | g/VMT | D             | 0.0151          | 8.270           | 3.796    | 0.774  | 0.1674            | 0.1818 (a)       |
| Emission Factor for HDDV8b (modelled in MOBILE) | g/VKT | E= D/1.609344 | 0.0094          | 5.14            | 2.36     | 0.48   | 0.10              | 0.11             |
| Access Road Daily Emission Rate                 | g/day | F = E*B       | 5.33            | 2,921.07        | 1,340.79 | 273.39 | 59.13             | 64.21            |

Source: (a) Emission rates based on MOBILE simulation saved to "Winter\_Road\_Traffic\_Emissions.xls".

|                     |           |       | PAH      | CO2    | CH4      | N20      | CO2e     |         |
|---------------------|-----------|-------|----------|--------|----------|----------|----------|---------|
| Emission Factor     | tonne/L   | Н     | 4.40E-09 | 0.0027 | 1.50E-07 | 1.10E-06 |          | (a) (b) |
| Daily emission rate | tonne/day | I=H*C | 2.04E-06 | 1.23   | 6.96E-05 | 5.10E-04 | 1.39E+00 |         |

Assume no control

| Surface material silt content                 | (%)       | A | 1.6 (a)  |
|---|-----------|---|----------|
| Mean vehicle weight                           | tonnes    | В | 41.8 (b) |
| Tilcho Road, Vehicle kilometer traveled (VKT) | km/day    | c | 341 (b)  |
| Number of working days                        | days/year | D | 365      |
| Number of days with precipitation >= 0.2 mm   | days/year | E | 58 (c)   |
|   |           |   |          |

Source: (a) AP-42 / 13.2.4 - Aggregate Handling And Storage Piles (USEPA, November 2006)/ Table 13.2.4-1. Typical sit content of overhourden for Western surface coal mine. (b) Refer to mean vehicle weight table below. (c) Value devined from Fortune 2004-2007 mate meteorological station (Fortune 2004\_2007\_MetData(Octil 64 - Sep27 07)\_MO. Job).

|                                       |        |   | PM-30 (TSP) | PM <sub>10</sub> | PM <sub>2.5</sub> |     |
|---------------------------------------|--------|---|-------------|------------------|-------------------|-----|
| Constant (k)                          |        | G                                       | 4.9         | 1.5              | 0.15              | (a) |
| Constant (a)                          |        | H                                       | 0.7         | 0.9              | 0.9               | (a) |
| Constant (b)                          |        | 1                                       | 0.45        | 0.45             | 0.45              | (a) |
| Emission factor (uncontrolled)        | lb/vMT | J =G*((A/12)^H)*((B*1.1/3)^I)*((D-E)/D) | 3.44        | 0.70             | 0.07              | (a) |
| Emission factor (metric uncontrolled) | g/VKT  | K = J * 281.9                           | 969.82      | 198.42           | 19.84             | (b) |
| Daily emission rate                   | g/day  | L = K * C                               | 330,632.29  | 67,643.83        | 6,764.38          |     |
| Quality rating                        |        |   | В           | В                | В                 | (a) |

Source: (a) AP-42 / Section 13.2.2 - Unpaved Roads (USEPA, November 2006)/ Equation (1a) - unpaved surfaces at industrial sites and Table 13.2.2-2.
(b) 28.12 constant to convert lb/VMT (pounds per vehicle mile travelled) to g/VKT (grams per vehicle kilometer travelled).

| Mean Vehicle Weight                                |           |         |        |     |
|--|-----------|---------|--------|-----|
| Equipment  |           | B-train | Total  |     |
| Weight - Empty                                     | tonne     | 63.50   |        | (a) |
| Weight - Loaded                                    | tonne     | 20.00   |        | (b) |
| Mean Weight  | tonne     | 41.75   |        |     |
| Number of loads per day                            | loads/day | 9       |        | (c) |
| All weather road vehicle kilometer travelled (VKT) | km/day    | 340.92  | 340.92 | (d) |
| Access Road Percentage of traffic                  | %         | 100%    |        |     |
|  |           |         |        |     |

Source (a) Assumed 8-trains will transport material. B-train weight taken as maximum allowable weight from NWT motor vehicles act Section 36 (§(i)).

(b) Assume empty weight of 8 train is 20 tones.
(c) Information provided by Fortune in an email dated Nov. 26, 2010.
(c) Length of access road and all weighter most laten from Elfa report, NCO Mine Access Route Evaluation.

| Number of loads                               | loads/year | A | 9 (;     | a) |
|---|------------|---|----------|----|
| Vehicle kilometer traveled, Tilcho road (VKT) | km/day     | В | 341 (1   | b) |
| B-Train, average fuel consumption             | L fuel/day | C | 185.40 ( | c) |

Source: (a) Data provided by Fortune in an email date November 28, 2010.
(b) Refer to mean which weight in section A.
(c) Assumed B-brain horspower 57 Sbp, and speed of 30 km/h. Exhaust and Crankase Emission Factors for Nonroad Engine Modeling - Compression-Ignition (EPA, April 2004).

|   |   |               | 802    | NU <sub>X</sub> | CO     | VUC    | PM <sub>2.5</sub> | PW <sub>10</sub> |
|---|---|---------------|--------|-----------------|--------|--------|-------------------|------------------|
| Emission Factor for HDDV8b (modelled in MOBILE) | g/vMT   | D             | 0.0151 | 8.270           | 3.796  | 0.774  | 0.1674            | 0.1818           |
| Emission Factor for HDDV8b (modelled in MOBILE) | g/VKT   | E= D/1.609344 | 0.0094 | 5.14            | 2.36   | 0.48   | 0.10              | 0.11             |
| Tilcho road Daily Emission rate                 | g/day   | F = E*B       | 3.20   | 1,751.90        | 804.14 | 163.96 | 35.46             | 38.51            |
| Source:   | Source: (a) Emission rates based on MOBILE simulation saved to "Winter Road Traffic Emissions.xls". |               |        |                 |        |        |                   |                  |

|                     |           |       | DAU      | CO2      | CHA      | N2O      | CO2e     | 1       |
|---------------------|-----------|-------|----------|----------|----------|----------|----------|---------|
|                     |           |       | PAR      |          | CH4      |          | COZE     | 3       |
| Emission Factor     | tonne/L   | H     | 4.40E-09 | 0.0027   | 1.50E-07 | 1.10E-06 |          | (a) (b) |
| Daily emission rate | tonne/day | I=H*C | 8.16E-07 | 4.94E-01 | 2.78E-05 | 2.04E-04 | 5.58E-01 | ĺ       |

tonne/day

Source: (a) Technical reference (Golder Associates and Conor Pacific), Table 3-51, p. 94. (b) Environment Canada, National Inventory Report (1990-2008).

# Air Quality Assessment - NICO Project Calculation of Emissions During the Operation Phase

| Control Technique           |         | No Control              |       |
|-----------------------------|---------|-------------------------|-------|
|                             |         |                         | _     |
| Hours of operation per day  | h/day   | A                       |       |
| Sulphur content in the fuel | %       | В                       | 0.00  |
| Number of power generators  |         | c                       |       |
| Maximum fuel consumption    | g/bkW-h | D                       |       |
| Generator power Rating      | kW      | E                       | 1,    |
| Maximum power output        | KW      | F= C*E                  | 11,   |
| Diesel heating value        | Btu/lb  | G                       | 19,3  |
| Maximum fuel consumption    | g/h     | H=F*D                   | 2.32E |
| Power within fuel           | GW      | I=H/453.5924*G*2.93e-10 | 0.    |

Searce (3) Assumed continuous operation.
(i)Blasted on Grand's Sulphur in Diesel Fuel Regulations for off-road diesel Fuel effective from October 1, 2010 (Environmental Canada website last updated December 2, 2010, accessed in December, 2010).
(c) Information provided Proture in "Fortune Minerian HICD Project Alar Solutions Specification 1812-04-193 Fineing Mindular Power Station".
(d) PAP 427 54 - Luga Stationsy Desert And Stationsy Develor Solution (s) Assistance (

|                                      |            |                        | TSP (a)   | PM10      | PM2.5 (c) | NOx (d)      | co           |          |                | VOC      | PAH          |
|--------------------------------------|------------|------------------------|-----------|-----------|-----------|--------------|--------------|----------|----------------|----------|--------------|
| Emission factor (uncontrolled)       | b/MMBTU    | 1                      | 0.062     | 0.0573    | 5.73E-02  | 3.2          | 0.85         | 0.001515 | 165            | 0.0042   | 2.11E-04 (b) |
| Emission factor (uncontrolled)       | g/GW-h     | K= J*453.59/0.00029307 | 95,958.72 | 88,684.43 | 88,684.43 | 4,952,708.34 | 1,315,563.15 | 2,344.80 | 255,374,023.57 | 6,426.11 | 326.01       |
| Maximum Emission rate (uncontrolled) | g/s        | L=K*I/3600             | 0.77      | 0.71      | 0.71      | 39.80        | 10.57        | 0.019    | 2052.23        | 0.052    | 0.0026       |
| Maximum Emission rate per boiler     | g/s/boiler | M=L/C                  | 0.096     | 0.089     | 0.089     | 4.98         | 1.32         | 0.0024   | 256.53         | 0.0065   | 3.27E-04     |

Source: (a) TSP in for filterable particulates.
(b) AP-42 / 3 A - trage Stationary Diseal And All Stationary Dual-fuel Engines: (USEPA, October 2006)/ Table 3.4-1. Table 3.4-4.
(c) Emission factor for NDA corresponds to uncontrolled exaginates (Lise And All Stationary Diseal An

|   |            |                           | NZU   | CH4   | CO <sub>2</sub> e |     |
|---|------------|---------------------------|-------|-------|-------------------|-----|
| GHG Emission factor for fuel combustion | g/L        | N                         | 0.4   | 0.133 |                   | (a) |
| Maximum GHG emissions                   | g/s        | O=H/(7.1*453/3.78)*N/3600 | 0.30  | 0.10  | 2148.28           | (b) |
| GHG emissions                           | g/s/boiler | P=0/C                     | 0.038 | 0.013 | 268.53            | 1   |

Source: (a) Emission factors for N2O and CH4 taken from Environment Canada, National Inventory Report 1990-2008, Part 2 (2010), Table A8-4.
(b) Diesel fuel density used was 7.1 lb/gallon as specified in AP-42 Chapter 3, table 3.4-1.



Air Quality Assessment - NICO Project Calculation of Emissions During the Operation Phase



#### Calculation of Emissions During the Operation Phase

| Control Technique           |           | No Scrubber |            |
|-----------------------------|-----------|-------------|------------|
| •                           |           |             |            |
| Waste Generation, Operation | kg/day    | A           | 470 (a)    |
| Operation hours             | hour/day  | В           | 8 (a)      |
| Waste Oil Burning           | L/hour    | c           | 10 (a)     |
| Sulphur Content of Oil      | %         | D           | 1 (b)      |
| Diesel Burning              | L/hour    | E           | 45 (a)     |
| Sulphur Content of diesel   | %         | F           | 0.0015 (c) |
| Diesel heating value        | Btu/lb    | G           | 19,300 (d) |
| Diesel density              | lb/gallon | Н           | 7.1 (d)    |

Source (a) Information provided by Fortrue in an email dated November 23, 2010, burns 8 hours every 2 days.
(b) Assumed that the sulphur content was the 1.5 sergulated in Orbanio.
(c) Based on August 2014 (a) Sergulated in Orbanio.
(c) Based on August 2014 (a) Sergulated in Orbanio.
(d) RAP-42 / 3.4 - Large Stationary Disest And All Stationary Dual-fost Engines (USEPA, October 2006).

|  |  |                   | NOx  | co | 502  | PM    |      | PM10 | PM2.5 | VOC  |        | PAH      | DIOXIN/FURAN P | S      | ie       | v      | Zn     | CO2     | N20   | CH4                  |
|--|--|-------------------|------|----|------|-------|------|------|-------|------|--------|----------|----------------|--------|----------|--------|--------|---------|-------|----------------------|
| AP-42 Emission factors for pollutants not included in stack test   | g/L  | I                 | 6.5  | 59 | 0.60 | 18.81 | 1.49 | 1.0  | 5     | 0.77 | 0.0040 | 1.43E-04 | 3.71E-10       | 0.0011 | 8.18E-05 | 0.0038 | 0.0035 | 3124.00 | 0.064 | 0.12 (a) through (g) |
| Maximum emission rate  | mg/s   | J = I*C/3600*1000 | 18.3 | 31 | 1.66 | 52.26 | 4.13 | 2.9  | 3     | 2.13 | 0.011  | 3.96E-04 | 1.03E-09       | 0.0031 | 2.27E-04 | 0.011  | 0.0097 | 8677.78 | 0.18  | 0.33                 |
| skimum emission rate mg/s J = 1*C/3600*1000  Source: (a) NOx, CO, SO2, and PM emissions are assumed to be for bellers-(100 Million BTU/hour burning Fuel Oil 6.  (b) PM10 and PM2.5 are assumed to be fur utility be loter firing residual oil for fuel oil 6. |  |                   |      |    |      |       |      |      |       |      |        |          |                |        |          |        |        |         |       |                      |
|  |  |                   |      |    |      |       |      |      |       |      |        |          |                |        |          |        |        |         |       |                      |
|  | e and o-xylene from AP-42 chapter 1.3/Table 1.3.9. |                   |      |    |      |       |      |      |       |      |        |          |                |        |          |        |        |         |       |                      |

(c) For Fuel Oll Combusion VVC (included are for Bearmer, Eithylberance, Formaldehyle, 1,1,1-follocerbane and oxylene from AP-42 chapter 1,3/fable 1.3.9.
(d) For Fuel Oll Renia Moudaded are Naphithese, Cereapsthere, Ambracea, Bearough, 1,1,1-follocerbane, Bearough, 1,1,1-foll

|  |      |                  | Sb       | As       | Ba       | Be       | Cd       | Cr       | Cr 6     | Co       | Cu       | Pb       | Mn       | Hg       | Mo       | Ni    |
|--|------|------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-------|
| AP-42 Emission factors for pollutants not included in stack test | g/L  | K                | 6.29E-04 | 1.58E-04 | 3.08E-04 | 3.33E-06 | 4.77E-05 | 1.01E-04 | 2.97E-05 | 7.21E-04 | 2.11E-04 | 1.81E-04 | 3.59E-04 | 1.35E-05 | 9.43E-05 | 0.010 |
| Maximum emission rate  | mg/s | L= D*C/3600*1000 | 0.0017   | 4.39E-04 | 8.55E-04 | 9.25E-06 | 1.32E-04 | 2.81E-04 | 8.25E-05 | 0.0020   | 5.86E-04 | 5.03E-04 | 9.99E-04 | 3.76E-05 | 2.62E-04 | 0.028 |
|  |      |                  |          |          |          |          |          |          |          |          |          |          |          |          |          |       |

|                                       |                       |                                     | TSP (a) | PM10  | PM2.5 (c ) | NOx (d) | co     | SOx (e) | CO2      | PAH      | voc        |
|---------------------------------------|-----------------------|-------------------------------------|---------|-------|------------|---------|--------|---------|----------|----------|------------|
| AP-42 Emission factors for Pollutants | ib/MMBtu (fuel input) | M                                   | 0.062   | 0.057 | 0.057      | 3.20    | 0.85   | 0.0015  | 165.00   | 2.11E-04 | 0.0042 (b) |
| Maximum emission Rate                 | mg/s                  | N=E*H/3,785*G/10*6*M*453,592,4/3600 | 12.73   | 11.76 | 11.76      | 656.79  | 174.46 | 0.31    | 3.39E+04 | 0.043    | 0.85       |

| Maximum emission Rate                     | mg/s  | N=E*H/3.785*G/10^6*M*453,592.4/3600                               | 12.73               | 11.76                  | 11.                     |
|---|---|---|---------------------|------------------------|-------------------------|
| Source:                                   | (a) TSP is for filterable particulates.   |   |                     |                        |                         |
|   | (b) AP-42 / 3.4 - Large Stationary Diesel And All Stationary Dual-fuel Engines (USEPA, October 2006)/ Table 3 | .4-1 -Table 3.4-4.  |                     |                        |                         |
|   | (c) Emission factors for PM10 and PM2.5 are assumed to be the same.   |   |                     |                        |                         |
|   | (d ) Emission factor for NOx corresponds to uncontrolled equipment (i.e., without ignition timing retard).    |   |                     |                        |                         |
|   | (e) Emission factor for SO2 calculated based on the equation EF_SO2 = 1.01*S, where S is the fuel sulphur co  | ntent, according to AP-42 / 3.4 - Large Stationary Diesel And All | Stationary Dual-fue | l Engines (USEPA, Octo | ber 2006)/ Table 3.4-1. |
|   |   |   |                     |                        |                         |
|   |   |   | N2O                 | CH4                    |                         |
| GHG Emission factor for diesel combustion | g/L   | 0   | 0.4                 | 0.133                  | (a)                     |
| Maximum GHG emissions                     | mg/s  | P=E*O/3600*1000   | 5.00                | 1.66                   |                         |
| Source:                                   | (a) Emission factors for N2O and CH4 taken from Environment Canada, National Inventory Report 1990-2008       | 3, Part 2 (2010), Table A8-4.                                     |                     |                        |                         |
|   |   |   |                     |                        |                         |

|   |  |  | SVOC1               | SVOC 2               | SVDC 3                         | Part/M-1         | Part/M-2 | Part/M-3  |
|---|--|--|---------------------|----------------------|--------------------------------|------------------|----------|-----------|
| Flow Rate, at stack O2 content, dry, 25°C and 101.325 kPa | m3/min   | Q  | 71.64               | 65.73                | 67.74                          | 66.79            | 66.72    | 67.04 (a) |
| Oxygen Content  | % volume of O2   | R  | 13.90               | 13.90                | 14.80                          | 15.20            | 14.70    | 14.30 (a) |
| Source  | (a) Cianciarelli, D. & C. Houre, 2002. Characterization of Emissions From the Eco Warte Solutions Thermal W. | arte Ovidizer Burlington, Ontario, Report ERMD 2002-02, Prepar | ad for Emirrions Re | rearch and Measureme | ent Division a department of E | invironment Cana | da       |           |

|                                      |           |                         | SO <sub>2</sub> | NO <sub>x</sub> | со       | PM       | voc      | HCI    | HF       | PCDD/PCDF   | PAH      | CO2        |         |
|--------------------------------------|-----------|-------------------------|-----------------|-----------------|----------|----------|----------|--------|----------|-------------|----------|------------|---------|
| SVOC1, stack test concentration      | mg/m3     | S                       | 0.00            | 33.88           | 0.00     |          | 4.03     |        |          | 7.04949E-09 | 3.86E-05 | 5 80,953.5 | .51 (a' |
| SVOC 2, stack test concentration     | mg/m3     | T                       | 3.70            | 38.68           | 2.43     |          | 1.97     |        |          | 2.52707E-08 | 3.49E-05 | 5 80,953.5 | .51 (a' |
| SVOC 3, stack test concentration     | mg/m3     | U                       | 0.00            | 33.71           | 2.82     |          | 0.95     |        |          | 4.3729E-08  | 1.47E-05 | 5 66,561.7 | .77 (a' |
| Part/M-1, stack test concentration   | mg/m3     | V                       | 0.00            | 39.64           | 5.93     | 3.45     |          | 55.85  |          |             |          | - 57,566.9 |         |
| Part/M-2, stack test concentration   | mg/m3     | W                       | 0.00            | 39.64           | 4.30     | 1.82     |          | 70.77  | 2.51     |             |          | - 64,762.8 | .80 (a) |
| Part/M-3, stack test concentration   | mg/m3     | X                       | 0.00            | 41.81           | 3.05     | 15.13    |          | 174.67 | 1.13     |             |          | - 80,953.5 |         |
| SVOC1, stack test flow rate          | mg/s.     | Y= Q*S/60               | 0.00            | 40.45           | 0        |          | 4.81     |        |          | 8.4171E-09  | 4.6E-05  |            | .49     |
| SVOC 2, stack test flow rate         | mg/s.     | Z = Q*T/60              | 4.06            | 42.37           | 2.66     |          | 2.15     | -      |          | 2.76841E-08 | 3.8E-05  | 5 88,684.5 | .57     |
| SVOC 3, stack test flow rate         | mg/s.     | A' = Q*U/60             | 0.00            | 38.05           | 3.19     |          | 1.07     |        |          | 4.937E-08   | 1.7E-05  | 5 75,148.2 | .24     |
| Part/M-1, stack test flow rate       | mg/s.     | B' = Q*V/60             | 0.00            | 44.13           | 6.60     | 3.85     |          | 62.17  | 2.12     |             |          | - 64,081.6 | .60     |
| Part/M-2, stack test flow rate       | mg/s.     | C' = Q*W/60             | 0.00            | 44.07           | 4.78     | 2.02     |          | 78.69  | 2.79     |             |          | - 72,016.2 | .24     |
| Part/M-3, stack test flow rate       | mg/s.     | D' = Q*X/60             | 0.00            | 46.72           | 3.41     | 16.91    |          | 195.16 | 1.27     |             |          | 90,452.0   | .05     |
| Number of Samples for each pollutant | number    | E'                      | 6               | 9               | 6        | 3        | 3        | 3      |          | 3           |          | 4          | 6       |
| Average flow rate                    | mg/s      | F'=(Y+Z+A'+B'+C'+D')/E' | 0.68            | 42.63           | 3.44     | 7.59     | 2.68     | 112.01 |          |             |          |            | .53     |
| Daily flow rate                      | tonne/day | G' = E'/10^9*3600*B     | 1.95E-05        | 0.0012          | 9.91E-05 | 2.19E-04 | 7.71E-05 | 0.0032 | 5.92E-05 | 8.21E-13    | 9.69E-10 | 2.7        | .34     |

Source () Classicardil, D. & C. House, 2003. Characterization of Emissions From the Eco Waste Solutions Thermal Waste Oxidizer Burlington, Ontario. Report ERMO 2002-03. Prepared for Emissions Research and Measurement Division a department of Environment Canada. (c) Concentrations have been converted to day, 25°C, 103.25 kPs and sample O2 content.

|                                      |           |                     | Hg       | Sb       | As       | Ba       | Be Ci  | 1      | Cr       | Co       | Cu       | Pb       | Mn       | Ni       | Se       | Ag       | TI   | Zn           |
|--------------------------------------|-----------|---------------------|----------|----------|----------|----------|--------|--------|----------|----------|----------|----------|----------|----------|----------|----------|------|--------------|
| Part/M-1, stack test concentration   | mg/m3     | V                   | 0.0064   | 0.019    | 5.18E-04 | 1.15E-04 | 0.00   | 0.012  | 0.033    | 1.73E-04 | 0.079    | 0.036    | 0.0067   | 0.0017   | 0.0012   | 0.0019   | 0.00 | 0.033 (a)(b) |
| Part/M-2, stack test concentration   | mg/m3     | W                   | 0.045    | 0.058    | 5.64E-04 | 0.0020   | 0.00   | 0.022  | 0.031    | 1.25E-04 | 0.10     | 0.10     | 0.0065   | 0.0017   | 0.0017   | 0.0022   | 0.00 | 0.055 (a)(b) |
| Part/M-3, stack test concentration   | mg/m3     | X                   | 0.0031   | 0.061    | 0.0015   | 0.0035   | 0.00   | 0.20   | 0.036    | 3.33E-04 | 0.23     | 0.34     | 0.014    | 0.0068   | 0.0024   | 0.0029   | 0.00 | 0.18 (a)(b)  |
| Part/M-1, stack test flow rate       | mg/s.     | B' = Q*V/60         | 0.0072   | 0.021    | 5.77E-04 | 1.28E-04 | 0.00   | 0.014  | 0.036    | 1.92E-04 | 0.088    | 0.040    | 0.0074   | 0.0019   | 0.0013   | 0.0021   | 0.00 | 0.037 (a)(b) |
| Part/M-2, stack test flow rate       | mg/s.     | C' = Q*W/60         | 0.050    | 0.064    | 6.27E-04 | 0.0022   | 0.00   | 0.025  | 0.034    | 1.39E-04 | 0.11     | 0.11     | 0.0072   | 0.0019   | 0.0019   | 0.0024   | 0.00 | 0.061        |
| Part/M-3, stack test flow rate       | mg/s.     | D' = Q*X/60         | 0.0035   | 0.068    | 0.0016   | 0.0039   | 0.00   | 0.23   | 0.040    | 3.72E-04 | 0.26     | 0.38     | 0.016    | 0.0076   | 0.0027   | 0.0032   | 0.00 | 0.20         |
| Number of Samples for each pollutant | number    | E'                  | 3        | 3        | 3        | 3        | 3      | 3      | 3        | 3        | 3        | 3        | 3        | 3        | 3        | 3        | 3    | 3            |
| Average flow rate                    | mg/s.     | F'=(B'+C'+D')/E'    | 0.020    | 0.051    | 9.47E-04 | 0.0021   | 0.00   | 0.088  | 0.037    | 2.35E-04 | 0.15     | 0.18     | 0.010    | 0.0038   | 0.0020   | 0.0026   | 0.00 | 0.10         |
| Daily flow rate                      | toone/day | G' = F'/10^9*3600*B | 5.85F-07 | 1 47F-06 | 2 73F-08 | 6.05F-08 | 0.00 2 | 54F-06 | 1.06F-06 | 6.76F-09 | 4 38F-06 | 5 13F-06 | 2 91F-07 | 1.09F-07 | 5.67F-08 | 7.45F-08 | 0.00 | 2 90F-06     |

Source: (3) Cancelardill, D. & C. House. 2003. Characterization of Emissions Prom the Eco Waste Solidons: Thermal Waste Oxidizer Burlington, Ontario, Report ERMD 2002 03. Prepared for Emissions Research and Measurement Division a department of Environment Canada.
(b) Concentrations have been corrected to day, 25, C) 03. 325 HPs and sample O2 content.



# Air Quality Assessment - NICO Project Calculation of Emissions During the Operation Phase

|                        |           |                     | SO <sub>2</sub> | NO <sub>x</sub>   | со       | PM      | PM2.5      | PM10     | voc      | HCI      | HF       | PCDD/PCDF | PAH      | CO2        | N20      | CH4      | P        |          |          |
|------------------------|-----------|---------------------|-----------------|-------------------|----------|---------|------------|----------|----------|----------|----------|-----------|----------|------------|----------|----------|----------|----------|----------|
| Average flow rate mg/s | mg/s      | H'=F'+P+N+L+J       | 53.24           | 717.73            | 179.57   | 24.4    | 5 21.4     | 3 22.28  | 3.54     | 112.01   | 2.06     | 2.95E-08  | 0.044    | 123,717.18 | 5.18     | 2.00     | 0.0031   |          |          |
| Daily flow rate        | tonne/day | l' = H'/10^9*3600*B | 0.0015          | 0.021             | 0.0052   | 7.04E-0 | 6.19E-04   | 6.42E-04 | 1.02E-04 | 0.0032   | 5.92E-05 | 8.50E-13  | 1.26E-06 | 3.56       | 1.49E-04 | 5.75E-05 | 9.07E-08 |          |          |
|                        |           |                     |                 |                   |          |         |            |          |          |          |          |           |          |            |          |          |          |          |          |
|                        |           |                     | Hg              | Sb                | As       | Ba      | Be         | Cd       | Cr       | Co       | Cu       | Pb        | Mn       | Ni         | Se       | Ag       | TI       | Zn       | v        |
| Average flow rate mg/s | mg/s      | H'=F'+P+N+L+J       | 0.020           | 0.053             | 0.0014   |         |            |          | 0.037    | 0.0022   | 0.15     | 0.18      | 0.011    | 0.032      | 0.0022   |          | 0.00     | 0.11     | 0.011    |
| Daily flow rate        | tonne/day | I' = H'/10^9*3600*B | 5.86E-07        | 1.52E-06          | 3.99E-08 | 8.52E-0 | 8 2.66E-10 | 2.54E-06 | 1.07E-06 | 6.45E-08 | 4.40E-06 | 5.15E-06  | 3.20E-07 | 9.19E-07   | 6.33E-08 | 7.45E-08 | 0.00     | 3.18E-06 | 3.05E-07 |
|                        |           |                     |                 |                   |          |         |            |          |          |          |          |           |          |            |          |          |          |          |          |
|                        |           |                     | Mo              | CO <sub>2</sub> e |          |         |            |          |          |          |          |           |          |            |          |          |          |          |          |
| Average flow rate mg/s | mg/s      | H'=F'+P+N+L+J       | 2.62E-04        | 125,364.20        |          |         |            |          |          |          |          |           |          |            |          |          |          |          |          |
|                        |           |                     |                 |                   |          |         |            |          |          |          |          |           |          |            |          |          |          |          |          |

| Equipment/Vehicle                     | Model  | Number of Equipment/Vehicle | Daily Use (hours |
|---------------------------------------|--|-----------------------------|------------------|
| Portable Light Stands                 | Boss Hawg BMHP104MH-40FT, Perkins Genset       | 2                           | 12.0             |
| Personnel Carrier                     | Chevrolet Express 2500 Standard, or equivalent | 1                           | 1.9              |
| Light Duty Truck                      | Ford F-250, or equivalent                      | 1                           | 3.8              |
| Light Duty Truck                      | Ford F-250, or equivalent                      | 1                           | 3.8              |
| Light Duty Truck                      | Ford F-250, or equivalent                      | 1                           | 3.8              |
| Portable Light Stands                 | Boss Hawg BMHP104MH-40FT, Perkins Genset       | 1                           | 12.0             |
| Rough Terrain Crane; 36.2 tonnes      | Manitowoc (Grove) RTS40E type; or Equivalent   | 1                           | 1.2              |
| Integrated Tool Carrier               | Caterpillar IT24F                              | 1                           | 3.8              |
| Fuel & Lube Truck                     | Western Star 4900 SA; or Equivalent            | 1                           | 3.8              |
| Boom Truck (Alternative "Hiab Truck") | Western Star 4900 SA; or Equivalent            | 1                           | 1.9              |
| Welding Truck                         | Ford F-450 Crew Cab Flat Deck; or equivalent   | 1                           | 3.8              |
| Light Duty Truck                      | Ford F-250 Crewcab, or equivalent              | 1                           | 1.9              |
| Light Duty Truck                      | Ford F-250, or equivalent                      | 1                           | 1.9              |
| Mine Ambulance                        | Chevrolet Express 2500 Standard, or equivalent | 1                           | 0.2              |
| Fire Truck                            | Ford F-450 Crew Cab Flat Deck; or equivalent   | 1                           | 0.2              |
| Fire Truck, Pumps/Foam Package        | Fire Truck, Pumps/Foam Package                 | 1                           | 0.2              |
| Light Duty Truck, Diesel              | Ford F-250 Supercab, or equivalent             | 1                           | 1.9              |
| Light Duty Truck                      | Ford F-250 Crewcab, or equivalent              | 1                           | 1.9              |
| Light Duty Truck                      | Ford F-250, or equivalent                      | 1                           | 1.9              |
| Light Duty Truck                      | Ford F-250, or equivalent                      | 2                           | 1.9              |
| Community Bus                         | Girardin Minibus Inc; 3000                     | 1                           | 3.8              |
| Light Duty Truck                      | Ford F-250 Crewcab, or equivalent              | 1                           | 1.9              |
| Telescopic Handler                    | Caterpillar TL943; or Equivalent               | 1                           | 1.9              |
| Self Propelled Telescopic Boom        | Terex Genie; or Equivalent                     | 1                           | 1.9              |
| Scissor Lift, Rough Terrain           | Genie Scissor lift RT 2668; or Equivalent      | 1                           | 3.8              |
| Scissor Lift, Rough Terrain           | Genie Scissorlift RT 2668; or Equivalent       | 2                           | 4.0              |
| Light Duty Truck                      | Ford F-250 Crewcab, or equivalent              | 1                           | 12.0             |
| Portable Pipe Fusion Machine          | McElroy Rolling 250/TracStar 250               | 1                           | 1.2              |
| Tracked Mobile Jaw Crusher            | Sandvik QJ340; or equivalent                   | 1                           | 1.2              |
| Tracked Mobile Cone Crusher           | Sandvik QH 440; or equivalent                  | 1                           | 1.2              |
| Tracked Mobile Screening Plant        | Sandvik QA 450; or equivalent                  | 1                           | 1.2              |
| Excavator                             | Caterpillar 345 BL                             | 1                           | 1.2              |
| Backhoe                               | Caterpillar 450E; or Equivalent                | 1                           | 1.2              |
| Self Propelled Telescopic Boom        | Terex Genie: or Equivalent                     | 2                           | 4.0              |

A - Fugitive Emissions

### Summary of Daily Maximum (Winter) Emissions During the Closure Phase

| December 1                            | 0  | T                      |          |          |          |          |          |          | Emission Rate (kg | g/day)   |           |              |     |     |     |     |
|---------------------------------------|--|------------------------|----------|----------|----------|----------|----------|----------|-------------------|----------|-----------|--------------|-----|-----|-----|-----|
| II - CDF Cover II                     | Source                                     | Туре                   | TSP      | PM10     | PM2.5    | SO2      | NOx      | CO       | VOC               | PAH      | CO2e      | DIOXIN/FURAN | As  | Bi  | Co  | Cu  |
|                                       | I.1 - General land clearing                | A - Fugitive Emissions | 1.50E+02 | 4.92E+01 | 1.58E+01 | N/A      | N/A      | N/A      | N/A               | N/A      | N/A       | N/A          | N/A | N/A | N/A | N/A |
| I - I and Clearing and Debris Removal | 1.1 - General land cleaning                | B- Exhaust Emissions   | 5.06E-01 | 5.06E-01 | 4.91E-01 | 2.20E-02 | 1.00E+01 | 3.56E+00 | 6.02E-01          | 3.84E-03 | 2.63E+03  | N/A          | N/A | N/A | N/A | N/A |
| 1 - Land Cleaning and Debns Removal   | I.2 - Loading of land clear debris         | A - Fugitive Emissions | 1.06E+01 | 5.49E+00 | 1.11E+00 | N/A      | N/A      | N/A      | N/A               | N/A      | N/A       | N/A          | N/A | N/A | N/A | N/A |
|                                       | i.z - Loading of land clear debris         | B- Exhaust Emissions   | 4.30E-01 | 4.30E-01 | 4.17E-01 | 2.37E-02 | 9.09E+00 | 2.98E+00 | 4.50E-01          | 4.15E-03 | 2.83E+03  | N/A          | N/A | N/A | N/A | N/A |
|                                       | II.1 - Bulldozer                           | A - Fugitive Emissions | 5.00E+01 | 1.64E+01 | 5.25E+00 | N/A      | N/A      | N/A      | N/A               | N/A      | N/A       | N/A          | N/A | N/A | N/A | N/A |
|                                       | II.1 - Buildozei                           | B- Exhaust Emissions   | 2.01E-01 | 2.01E-01 | 1.95E-01 | 9.18E-03 | 4.49E+00 | 1.53E+00 | 2.11E-01          | 1.60E-03 | 1.10E+03  | N/A          | N/A | N/A | N/A | N/A |
|                                       | II.2 - Material Handling (burrows)         | A - Fugitive Emissions | 3.88E-01 | 1.84E-01 | 2.78E-02 | N/A      | N/A      | N/A      | N/A               | N/A      | N/A       | N/A          | N/A | N/A | N/A | N/A |
|                                       | II.2 - Material Hariding (burlows)         | B- Exhaust Emissions   | 2.39E-01 | 2.39E-01 | 2.31E-01 | 9.12E-03 | 3.72E+00 | 2.23E+00 | 2.75E-01          | 1.59E-03 | 1.09E+03  | N/A          | N/A | N/A | N/A | N/A |
| II - CDE Cover                        | II.3- Loading of material onto trucks      | A - Fugitive Emissions | 1.18E+01 | 6.11E+00 | 1.23E+00 | N/A      | N/A      | N/A      | N/A               | N/A      | N/A       | N/A          | N/A | N/A | N/A | N/A |
| II - CDI Covei                        | II.3- Loading of material onto trucks      | B- Exhaust Emissions   | 2.79E-01 | 2.79E-01 | 2.71E-01 | 1.54E-02 | 6.24E+00 | 2.13E+00 | 2.93E-01          | 2.70E-03 | 1.84E+03  | N/A          | N/A | N/A | N/A | N/A |
|                                       | II.4 Hauling material from burrows to CDF  | A - Fugitive Emissions | 4.20E+02 | 1.75E+02 | 1.75E+01 | N/A      | N/A      | N/A      | N/A               | N/A      | N/A       | N/A          | N/A | N/A | N/A | N/A |
|                                       | II.4 Hadiling material from burlows to CDF | B- Exhaust Emissions   | 1.55E+00 | 1.55E+00 | 1.50E+00 | 7.06E-02 | 3.29E+01 | 1.09E+01 | 1.62E+00          | 1.23E-02 | 8.43E+03  | N/A          | N/A | N/A | N/A | N/A |
|                                       | II.5 - Material Handling (CDF)             | A - Fugitive Emissions | 3.88E-01 | 1.84E-01 | 2.78E-02 | N/A      | N/A      | N/A      | N/A               | N/A      | N/A       | N/A          | N/A | N/A | N/A | N/A |
|                                       | ii.5 - Material Hariding (CDF)             | B- Exhaust Emissions   | 7.38E-02 | 7.38E-02 | 7.16E-02 | 3.69E-03 | 1.65E+00 | 5.63E-01 | 7.73E-02          | 6.45E-04 | 4.40E+02  | N/A          | N/A | N/A | N/A | N/A |
| III - General Closure                 | III.1 - Vehicular traffic                  | A - Fugitive Emissions | 3.63E+02 | 1.51E+02 | 1.51E+01 | N/A      | N/A      | N/A      | N/A               | N/A      | N/A       | N/A          | N/A | N/A | N/A | N/A |
| iii - Gerierai Giosure                | III. I - VEHICUIAI II AIIIC                | B- Exhaust Emissions   | 8.29E+00 | 8.29E+00 | 8.04E+00 | 2.67E-01 | 1.68E+02 | 6.39E+01 | 7.55E+00          | 4.67E-02 | 3.19E+04  | N/A          | N/A | N/A | N/A | N/A |
| Total                                 |  |                        | 1,017.15 | 415.00   | 67.22    | 0.42     | 236.14   | 87.75    | 11.08             | 0.074    | 50,289.02 | N/A          | N/A | N/A | N/A | N/A |

N/A- No applicable emission

| Description                          | Emission Rate (kg/day) |        |       |       |        |       |       |        |           |              |     |     |     |     |
|--------------------------------------|------------------------|--------|-------|-------|--------|-------|-------|--------|-----------|--------------|-----|-----|-----|-----|
| Description                          | TSP                    | PM10   | PM2.5 | SO2   | NOx    | co    | VOC   | PAH    | CO2e      | DIOXIN/FURAN | As  | Bi  | Со  | Cu  |
| I - Land Clearing and Debris Removal | 161.58                 | 55.58  | 17.78 | 0.046 | 19.11  | 6.53  | 1.05  | 0.0080 | 5,461.82  | N/A          | N/A | N/A | N/A | N/A |
| II - CDF Cover                       | 484.70                 | 200.08 | 26.30 | 0.11  | 49.04  | 17.32 | 2.47  | 0.019  | 12,900.33 | N/A          | N/A | N/A | N/A | N/A |
| III - General Closure                | 370.87                 | 159.33 | 23.15 | 0.27  | 167.99 | 63.89 | 7.55  | 0.047  | 31,926.88 | N/A          | N/A | N/A | N/A | N/A |
| Total                                | 1,017.15               | 415.00 | 67.22 | 0.42  | 236.14 | 87.75 | 11.08 | 0.074  | 50,289.02 | N/A          | N/A | N/A | N/A | N/A |

N/A- No applicable emission



# Air Quality Assessment - NICO Project Calculation of Emissions During the Closure Phase

### I - Land Clearing and Debris Removal

I.1 - General land clearing

### A - Fugitive Emissions

| Dust Control Technique            |       | No control |         |
|-----------------------------------|-------|------------|---------|
|                                   |       |            |         |
| Number of equipment               | рс    | A          | 3 (a    |
| Hours of operation per day - peak | h/day | В          | 6.0 (b  |
| Material silt content             | (%)   | С          | 56 (c   |
| Material moisture content         | (%)   | D          | 16.8 (d |
| Emission reduction efficiency     | (%)   | E          | 0       |

Source: (a) Assumed similar vehicles as in the construction phase. Information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx"; it was assumed that a skidder, harvester and dozer was used.

- (b) Numbers of work hours per day taken as the maximum construction equipment operation for a tractor/dozer.
- (c) Material silt content taken as average silt content of the till and glacio-lacustrine deposit from Golder FEED document.
- (d) Moisture content taken as the maximum overburden moisture content from AP 42 chapter 11.9 Western surface Coal Mine/ Table 11.9-3 (Metric and English Units). Typical Values For Correction Factors Applicable to the Predictive Emission Factor Equations.

|                                      |       |                          | TSP <= 30 um | TSP <= 15 um | PM <sub>10</sub> | PM <sub>2.5</sub> | í       |
|--------------------------------------|-------|--------------------------|--------------|--------------|------------------|-------------------|---------|
| Constant (a)                         | -     | F                        | 2.6          | 0.45         | <u>-</u>         | -                 | (a)     |
| Constant (b)                         | -     | G                        | 1.2          | 1.5          | -                | -                 | (a)     |
| Constant (c)                         | -     | Н                        | 1.3          | 1.4          | -                | -                 | (a)     |
| Scaling factor                       |       | I                        | -            | -            | 0.75             | 0.105             | (a) (b) |
| Emission rate (uncontrolled)         | g/hr  | J = F*(C^G)/(D^H)*1000*A | 24,946.99    | 10,893.89    | 8,170.41         | 2,619.43          | (a) (c) |
| Emission rate (controlled)           | g/hr  | $K = J^*(1-E/100)$       | 24,946.99    | 10,893.89    | 8,170.41         | 2,619.43          | l       |
| Daily emission rate (uncontrolled)   | g/day | L = J*B                  | 150,092.03   | 65,542.39    | 49,156.79        | 15,759.66         | i       |
| Daily emission rate (controlled)     | g/day | M = K*B                  | 150,092.03   | 65,542.39    | 49,156.79        | 15,759.66         | i       |
| Maximum emission rate (uncontrolled) | g/s   | N = L/(B*3600)           | 6.93         | 3.03         | 2.27             | 0.73              | i       |
| Maximum emission rate (controlled)   | g/s   | O = M/(B*3600)           | 6.93         | 3.03         | 2.27             | 0.73              | i       |
| Quality rating                       | -     |                          | В            | С            | D                | D                 | 1       |

Source: (a) AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines (bulldozing overburden). According to recommendations in AP-42 / Section 13.2.3 - Heavy Construction Operations (USEPA, January 1995) / Table 13.2.3-1 - Recommended Emission Factors for Construction Operations (reference to dozer equation (overburden) in Section 11.9 / Table 11.9.7)

- (b) Scaling factor to convert TSP <= 30 um to  $PM_{2.5}$  and TSP <= 15 um to  $PM_{10}$ .
- (c) PM10 and PM2.5 calculated multiplying TSP emission rates by respective scaling factors.

| Equipment/Vehicle | Model   | Number of Equipment/Vehicle | Daily Use |
|-------------------|---|-----------------------------|-----------|
| Skidder           | Caterpillar 527; or equivalent                    | 1                           | 3.0       |
| Harvester         | Caterpillar 501 HD Track Harvester; or equivalent | 1                           | 3.0       |
| Track-dozer       | Caterpillar D8T/Komatsu D155AX-6                  | 1                           | 6.0       |

|                     |           |                                    | SO <sub>2</sub> | NO <sub>x</sub> | СО     | PM <sub>2.5</sub> | PM <sub>10</sub> | voc      | PAH      | CO <sub>2</sub> e |
|---------------------|-----------|------------------------------------|-----------------|-----------------|--------|-------------------|------------------|----------|----------|-------------------|
| Daily emission rate | tonne/day | (refer to Construction combustion) | 2.20E-05        | 0.010           | 0.0036 | 4.91E-04          | 5.06E-04         | 6.02E-04 | 3.84E-06 | 2.63              |



Dust Control Technique

# **Calculation of Emissions During the Closure Phase**

### I.2 - Loading of land clear debris

A - Fugitive Emissions

|                                  |            |   | •        |
|----------------------------------|------------|---|----------|
| Hours of operation per day       | h/day      | A | 6.0 (a   |
| Amount of debris removed per day | tonnes/day | В | 586.5 (I |
| Emission reduction efficiency    | (%)        | С | 0        |

Source: (a) Assume similar equipment as in construction phase. Numbers of work hours per day taken as the maximum construction equipment operation for a wheeled front end loading.

(b) Information based on construction specifications (GOLDER), 175,000 m<sup>3</sup> of topsoil removed.

No control

|                                      |          |                        | TSP       | PM <sub>10</sub> | PM <sub>2.5</sub> |             |
|--------------------------------------|----------|------------------------|-----------|------------------|-------------------|-------------|
| Emission factor (uncontrolled)       | kg/tonne | D                      | 0.018     | 0.0094           | 0.0019            | (a) (b) (c) |
| Daily emission rate (controlled)     | g/day    | E = B*D*1000*(1-C/100) | 10,556.74 | 5,489.51         | 1,108.46          |             |
| Daily emission rate (uncontrolled)   | g/day    | F = B*D*1000           | 10,556.74 | 5,489.51         | 1,108.46          |             |
| Maximum emission rate (controlled)   | g/s      | G = E/(A*3600)         | 0.49      | 0.25             | 0.051             |             |
| Maximum emission rate (uncontrolled) | g/s      | H = F/(A*3600)         | 0.49      | 0.25             | 0.051             |             |
| Quality rating                       | -        |                        | E         | -                | -                 |             |

Source: (a) TSP emission factor extracted from AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9.4 - Uncontrolled Particulate Emission Factors for Open Dust Sources at Western Surface Coal Mine (truck loading by power shovel (batch drop) / overburden).

(b) Emission factor for PM10 based on the ratio between TSP and PM10 emission factors for blasting in AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines.

(c) Emission factor for PM2.5 based on the ratio between TSP and PM2.5 emission factors for bulldozing overburden in AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines.

| Equipment/Vehicle        | Model                             | Number of Equipment/Vehicle | Daily Use |
|--------------------------|-----------------------------------|-----------------------------|-----------|
| Wheeled Front End Loader | Caterpillar 992K/Komatsu WA 900-3 | 1                           | 6.0       |

|                     |           |                                    | SO <sub>2</sub> | NO <sub>x</sub> | СО     | PM <sub>2.5</sub> | PM <sub>10</sub> | voc      | PAH      | CO <sub>2</sub> e |
|---------------------|-----------|------------------------------------|-----------------|-----------------|--------|-------------------|------------------|----------|----------|-------------------|
| Daily emission rate | tonne/day | (refer to Construction combustion) | 2.37E-05        | 0.0091          | 0.0030 | 4.17E-04          | 4.30E-04         | 4.50E-04 | 4.15E-06 | 2.83              |



# Air Quality Assessment - NICO Project Calculation of Emissions During the Closure Phase

### II - CDF Cover

### II.1 - Bulldozer

# A - Fugitive Emissions

| Dust Control Technique            |       | No control |         |
|-----------------------------------|-------|------------|---------|
|                                   |       |            |         |
| Number of equipment               | рс    | A          | 1 (a    |
| Hours of operation per day - peak | h/day | В          | 6.0 (b  |
| Material silt content             | (%)   | С          | 56 (c   |
| Material moisture content         | (%)   | D          | 16.8 (d |
| Emission reduction efficiency     | (%)   | E          | 0       |

### Source: (a) Assume 1 bulldozer used.

- (b) Information provided by Fortune. Daily operating time assumed to the same as bulldozer.
- (c) Material silt content taken as average silt content of the till and glacio-lacustrine deposit from Golder FEED document.
- (d) Moisture content taken as the maximum overburden moisture content from AP 42 chapter 11.9 Western surface Coal Mine/ Table 11.9-3 (Metric and English Units). Typical Values For Correction Factors Applicable to the Predictive Emission Factor Equations.

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|                                      |       |                          | TSP <= 30 um | TSP <= 15 um | PM <sub>10</sub> | PM <sub>2.5</sub> |          |
|--------------------------------------|-------|--------------------------|--------------|--------------|------------------|-------------------|----------|
| Constant (a)                         | -     | F                        | 2.6          | 0.45         | -                | -                 | (a)      |
| Constant (b)                         | -     | G                        | 1.2          | 1.5          | -                | -                 | (a)      |
| Constant (c)                         | -     | Н                        | 1.3          | 1.4          | -                | -                 | (a)      |
| Scaling factor                       |       | I                        | -            | -            | 0.75             | 0.105             | (a) (b)  |
| Emission rate (uncontrolled)         | g/hr  | J = F*(C^G)/(D^H)*1000*A | 8,315.66     | 3,631.30     | 2,723.47         | 873.14            | (a) (c)  |
| Emission rate (controlled)           | g/hr  | K = J*(1-E/100)          | 8,315.66     | 3,631.30     | 2,723.47         | 873.14            | [        |
| Daily emission rate (controlled)     | g/day | L = K*B                  | 50,030.68    | 21,847.46    | 16,385.60        | 5,253.22          | [        |
| Daily emission rate (uncontrolled)   | g/day | M = J * B                | 50,030.68    | 21,847.46    | 16,385.60        | 5,253.22          | [        |
| Maximum emission rate (controlled)   | g/s   | N = L/(B*3600)           | 2.31         | 1.01         | 0.76             | 0.24              | Ī        |
| Maximum emission rate (uncontrolled) | g/s   | O = M / (B*3600)         | 2.31         | 1.01         | 0.76             | 0.24              | <u>[</u> |
| Quality rating                       | -     |                          | В            | С            | D                | D                 |          |

Source: (a) AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines (bulldozing overburden). According to recommendations in AP-42 / Section 13.2.3 - Heavy Construction Operations (USEPA, January 1995) / Table 13.2.3-1 - Recommended Emission Factors for Construction Operations (reference to dozer equation (overburden) in Section 11.9 /

(b) Scaling factor to convert TSP <= 30 um to  $PM_{2.5}$  and TSP <= 15 um to  $PM_{10}$ .

(c) PM<sub>10</sub> and PM<sub>2.5</sub> calculated multiplying TSP emission rates by respective scaling factors.

| Tracked-Dozer Caterpillar D4H 1 6.0 |
|-------------------------------------|
| Tradition Bozof                     |

|                     |           |                                    | SO <sub>2</sub> | NO <sub>x</sub> | СО     | PM <sub>2.5</sub> | PM <sub>10</sub> | voc      | PAH      | CO₂e |
|---------------------|-----------|------------------------------------|-----------------|-----------------|--------|-------------------|------------------|----------|----------|------|
| Daily emission rate | tonne/day | (refer to Construction combustion) | 9.18E-06        | 0.0045          | 0.0015 | 1.95E-04          | 2.01E-04         | 2.11E-04 | 1.60E-06 | 1.10 |



# **Calculation of Emissions During the Closure Phase**

# II.2 - Material Handling (burrows)

A - Fugitive Emissions

| Dust Control Technique                |            | No control |           |
|---------------------------------------|------------|------------|-----------|
|                                       |            |            |           |
| Hours of operation per day - peak     | h/day      | A          | 6 (a      |
| Amount of material handled per day    | tonnes/day | В          | 652.8 (l  |
| Mean wind speed - maximum daily value | m/s        | С          | 12.82 (0  |
| Material moisture content             | %          | D          | 16.8 (0   |
| Constant (a)                          | -          | E          | 0.0016 (6 |
| Constant (b)                          | -          | F          | 1.3 (6    |
| Constant (c)                          | -          | G          | 2.2 (6    |
| Constant (d)                          | -          | Н          | 1.4 (6    |
| Constant (e)                          | -          | I          | 2 (6      |
| Emission reduction efficiency         | (%)        | J          | 0         |

Source: (a) Assumed similar vehicles as in construction. Information provided by Fortune. Daily operating time assumed to the same as the integrated tool carrier.

(b) Information based on Cost Estimate, Golder January 2011, 275,000 m³ of material to cover the CDF from burrowed area over two years. 17 kN/m³ of density from FEED Report.

(c) Value derived from Fortune 2004-2007 onsite meteorological station (Fortune\_2004\_2007\_MetData(Oct8 04 - Sep27 07)\_MD.xls).

(d) Moisture content taken as the maximum overburden moisture content from AP 42 chapter 11.9 Western surface Coal Mine/ Table 11.9-3 (Metric and English Units). Typical Values For Correction Factors Applicable to the Predictive Emission Factor Equations.

(e) AP-42 / Section 13.2.4 - Aggregate Handling And Storage Piles (USEPA, November 2006)/ equation 1 - emission factor for drop operation.

|                                      |          |                                 | TSP <= 30 um | PM <sub>10</sub> | PM <sub>2.5</sub> |
|--------------------------------------|----------|---------------------------------|--------------|------------------|-------------------|
|                                      |          |                                 |              |                  |                   |
| Particle size multiplier             | -        | K                               | 0.74         | 0.35             | 0.053 (a          |
| Emission factor (uncontrolled)       | kg/tonne | $L = K*E*((C/G)^F)/((D/I)^H)$   | 5.95E-04     | 2.81E-04         | 4.26E-05 (a       |
| Maximum emission rate (controlled)   | g/s      | M = B*L*(1-J/100)*1000/(A*3600) | 0.018        | 0.0085           | 0.0013            |
| Maximum emission rate (uncontrolled) | g/s      | N = B*L*1000/(A*3600)           | 0.018        | 0.0085           | 0.0013            |
| Quality rating                       | -        |                                 | Α            | Α                | Α                 |

Source: (a) AP-42 / 13.2.4 - Aggregate Handling And Storage Piles (USEPA, November 2006)/ equation 1 - emission factor for drop operation.

| Equipment/Vehicle       | Model                               | Number of Equipment/Vehicle | Daily Use |
|-------------------------|-------------------------------------|-----------------------------|-----------|
| Dump Truck              | Western Star 4900 SA; or Equivalent | 1                           | 2.0       |
| Backhoe                 | Caterpillar 450E; or Equivalent     | 1                           | 3.0       |
| Integrated Tool Carrier | Caterpillar IT24F                   | 1                           | 6.0       |

|                     |           |                                    | SO <sub>2</sub> | NO <sub>X</sub> | CO     | PM <sub>2.5</sub> | PM <sub>10</sub> | VOC      | PAH      | CO <sub>2</sub> e |
|---------------------|-----------|------------------------------------|-----------------|-----------------|--------|-------------------|------------------|----------|----------|-------------------|
| Daily emission rate | tonne/day | (refer to Construction combustion) | 9.12E-06        | 0.0037          | 0.0022 | 2.31E-04          | 2.39E-04         | 2.75E-04 | 1.59E-06 | 1.09              |



# **Calculation of Emissions During the Closure Phase**

### II.3- Loading of material onto trucks

### A - Fugitive Emissions

| Dust Control Technique           |            | No control |         |
|----------------------------------|------------|------------|---------|
|                                  |            |            |         |
| Hours of operation per day       | h/day      | A          | 6.0     |
| Amount of debris removed per day | tonnes/day | В          | 652.8 ( |
| Emission reduction efficiency    | (%)        | С          | 0       |

Source: (a) Assume similar equipment as in construction phase. Numbers of work hours per day taken as the maximum construction equipment operation for a tractor/dozer.

(b) Information based in Golder construction calculations of 1,105,000 m<sup>3</sup> of material to cover the CDF from burrowed area. Assuming 1 year of closure and 17 kN/m<sup>3</sup> of density.

|                                      |          |                        | TSP       | PM <sub>10</sub> | PIM <sub>2.5</sub> | ı           |
|--------------------------------------|----------|------------------------|-----------|------------------|--------------------|-------------|
| Emission factor (uncontrolled)       | kg/tonne | D                      | 0.018     | 0.0094           | 0.0019             | (a) (b) (c) |
| Daily emission rate (controlled)     | g/day    | E = B*D*1000*(1-C/100) | 11,750.66 | 6,110.34         | 1,233.82           | ĺ           |
| Daily emission rate (uncontrolled)   | g/day    | F = B*D*1000           | 11,750.66 | 6,110.34         | 1,233.82           | ĺ           |
| Maximum emission rate (controlled)   | g/s      | G = E/(A*3600)         | 0.54      | 0.28             | 0.057              | ĺ           |
| Maximum emission rate (uncontrolled) | g/s      | H = F/(A*3600)         | 0.54      | 0.28             | 0.057              | ĺ           |
| Quality rating                       | -        |                        | E         | -                | -                  | ĺ           |

Source: (a) TSP emission factor extracted from AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9.4 - Uncontrolled Particulate Emission Factors for Open Dust Sources at Western Surface Coal Mine (truck loading by power shovel (batch drop) / overburden).

(b) Emission factor for PM<sub>10</sub> based on the ratio between TSP and PM<sub>10</sub> emission factors for blasting in AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines.

(c) Emission factor for PM<sub>2.5</sub> based on the ratio between TSP and PM<sub>2.5</sub> emission factors for bulldozing overburden in AP-42 / Section 11.9 - Western Surface Coal Mining (USEPA, October 1998) / Table 11.9-2 (Metric Units) - Emission Factor Equations for Uncontrolled Open Dust Sources at Western Surface Coal Mines.

| Equipment/Vehicle        | Model                           | Number of Equipment/Vehicle | Daily Use |
|--------------------------|---------------------------------|-----------------------------|-----------|
| Wheeled Front End Loader | Caterpillar 988H/Komatsu WA 600 | 1                           | 6.0       |

|                     |           |                                    | SO <sub>2</sub> | NO <sub>X</sub> | СО     | PM <sub>2.5</sub> | PM <sub>10</sub> | VOC      | PAH      | CO <sub>2</sub> e |
|---------------------|-----------|------------------------------------|-----------------|-----------------|--------|-------------------|------------------|----------|----------|-------------------|
| Daily emission rate | tonne/day | (refer to Construction combustion) | 1.54E-05        | 0.0062          | 0.0021 | 2.71E-04          | 2.79E-04         | 2.93E-04 | 2.70E-06 | 1.84              |

# **Calculation of Emissions During the Closure Phase**

### II.4 Hauling material from burrows to CDF

### A - Fugitive Emissions

| Dust Control Technique |  | Watering twice a day | (a) |
|------------------------|--|----------------------|-----|
| Source:                | (a) Information provided by Fortune in an email of | lated Feb. 15, 2011  |     |

| Hours of operation per day - peak           | h/day     | A | 6 (a      |
|---|-----------|---|-----------|
| Surface material silt content               | (%)       | В | 56.0 (b   |
| Mean vehicle weight                         | tonnes    | С | 118.63 (c |
| Vehicle kilometer traveled (VKT)            | km/day    | D | 22.46 (c  |
| Number of working days                      | days/year | E | 365 (a    |
| Number of days with precipitation >= 0.2 mm | days/year | F | 58 (d     |
| Emission reduction efficiency               | (%)       | G | 55 (e     |

Source: (a) Assume the same vehicles as used in construction phase. Information provided by Fortune. Daily operating time assumed to the same as construction haulage times.

- (b) Material silt content taken as average silt content of the till and glacio-lacustrine deposit from Golder FEED document.
- (c) See Mean Vehicle Weight table below.
- (d) Value derived from Fortune 2004-2007 onsite meteorological station (Fortune\_2004\_2007\_MetData(Oct8 04 Sep27 07)\_MD.xls).
- (e) Assumed wet suppression. Unpaved Industrial Road Dust Calculator (Environment Canada website, accessed in December 2009).

|   |        |  | PM-30 (TSP) | PM <sub>10</sub> | PM <sub>2.5</sub> |
|---|--------|--|-------------|------------------|-------------------|
| Constant (k)  | -      | Н  | 4.9         | 1.5              | 0.15              |
| Constant (a)  | -      | ſ  | 0.7         | 0.9              | 0.9               |
| Constant (b)  | -      | J  | 0.45        | 0.45             | 0.45              |
| Emission factor (uncontrolled)                        | lb/VMT | $K = H*((B/12)^{1})*((C*1.1/3)^{1})*[(E-G)/E]$ | 66.30       | 27.62            | 2.76              |
| Emission factor (metric uncontrolled)                 | g/VKT  | L = K * 281.9                                  | 18,691.32   | 7,786.40         | 778.64            |
| Emission factor (controlled)                          | g/VKT  | M = L*281.9*(1-G/100)                          | 8,411.09    | 3,503.88         | 350.39            |
| Emission factor (metric uncontrolled, without precip) | g/VKT  | $N = H*((B/12)^{I})*((C*1.1/3)^{J})*281.9$     | 22,198.48   | 9,247.40         | 924.74            |
| Emission factor (controlled, without precip)          | g/VKT  | O = N * (1-G/100)                              | 9,989.31    | 4,161.33         | 416.13            |
| Daily emission rate (uncontrolled)                    | g/day  | P = L *D                                       | 419,806.07  | 174,882.06       | 17,488.21         |
| Daily emission rate (controlled)                      | g/day  | Q= M*D   | 188,912.73  | 78,696.92        | 7,869.69          |
| Daily emission rate (uncontrolled, without precip)    | g/day  | R = N*D  | 498,576.62  | 207,696.15       | 20,769.62         |
| Daily emission rate (controlled, without precip)      | g/day  | S = O*D  | 224,359.48  | 93,463.27        | 9,346.33          |
| Maximum emission rate (uncontrolled)                  | g/s    | T = P/(A*3600)                                 | 19.38       | 8.07             | 0.81              |
| Maximum emission rate (controlled)                    | g/s    | U = Q/(A*3600)                                 | 8.72        | 3.63             | 0.36              |
| Maximum emission rate (uncontrolled, without precip)  | g/s    | V = R/(A*3600)                                 | 23.02       | 9.59             | 0.96              |
| Maximum emission rate (controlled, without precip)    | g/s    | W = S/(A*3600)                                 | 10.36       | 4.32             | 0.43              |
| Quality rating  | -      |  | В           | В                | В                 |

Source: (a) AP-42 / Section 13.2.2 - Unpaved Roads (USEPA, November 2006)/ Equation (1a) - unpaved surfaces at industrial sites and Table 13.2.2-2.

(b) 281.9 constant to convert lb/VMT (pounds per vehicle mile travelled) to g/VKT (grams per vehicle kilometer travelled).

### Mean Vehicle Weight

| -      | Haulage Unit                                      | Total  |  |
|--------|---|--|--|
| tonne  | 73.98   |  | (a)  |
| tonne  | 163.29  |  | (b)  |
| tonne  | 118.63  |  |  |
| number | 7   |  | ( c)   |
| km/day | 3.07  |  | ( d)   |
| km/day | 22.46   | 22.46  |  |
| %      | 100%  |  |  |
| tonne  | 118.63  | 118.63   |  |
|        | tonne<br>tonne<br>number<br>km/day<br>km/day<br>% | tonne     73.98       tonne     163.29       tonne     118.63       number     7       km/day     3.07       km/day     22.46       %     100% | tonne     73.98       tonne     163.29       tonne     118.63       number     7       km/day     3.07       km/day     22.46     22.46       %     100% |

**Source:** (a) Information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx".

- (b) Haul trucks the loaded weight was taken as the maximum specified load in CAT 777F specification sheet.
- (c) Information based on Cost Estimate, Golder January 2011, 275,000 m<sup>3</sup> of material to cover the CDF from burrowed area over two years. 17 kN/m<sup>3</sup> of density from FEED Report.
- (d) Assume that the distance is the same as the distance from the CDF to the topsoil stock piles.

| Equipment/Vehicle           | Model                             | Number of Equipment/Vehicle | Daily Use |
|-----------------------------|-----------------------------------|-----------------------------|-----------|
| Surface rock haulage trucks | Caterpillar 777F/Komatsu HD 785-7 | 2                           | 6.0       |
| Underground Haulage Unit    | Sandvik 50                        | 2                           | 2.0       |

|                     |           |                                    | SO <sub>2</sub> | NO <sub>X</sub> | co    | PM <sub>2.5</sub> | PM <sub>10</sub> | voc    | PAH      | CO₂e |
|---------------------|-----------|------------------------------------|-----------------|-----------------|-------|-------------------|------------------|--------|----------|------|
| Daily emission rate | tonne/day | (refer to Construction combustion) | 7.06E-05        | 0.033           | 0.011 | 0.0015            | 0.0015           | 0.0016 | 1.23E-05 | 8.43 |



# **Calculation of Emissions During the Closure Phase**

### II.5 - Material Handling (CDF)

### A - Fugitive Emissions

| . 48.0.00                             |            |            |            |
|---------------------------------------|------------|------------|------------|
| Dust Control Technique                |            | No control |            |
|                                       |            |            |            |
| Hours of operation per day - peak     | h/day      | A          | 2 (a)      |
| Amount of material handled per day    | tonnes/day | В          | 652.8 (b)  |
| Mean wind speed - maximum daily value | m/s        | С          | 12.82 (c)  |
| Material moisture content             | %          | D          | 16.8 (d)   |
| Constant (a)                          | -          | E          | 0.0016 (e) |
| Constant (b)                          | -          | F          | 1.3 (e)    |
| Constant (c)                          | -          | G          | 2.2 (e)    |
| Constant (d)                          | -          | Н          | 1.4 (e)    |
| Constant (e)                          | -          | I          | 2 (e)      |
| Emission reduction efficiency         | (%)        | J          | 0          |

Model

Source: (a) Assumed similar vehicles as in construction. Information provided by Fortune. Daily operating time assumed to the same as the ecavator time.

- (b) Information based on Cost Estimate, Golder January 2011, 275,000 m³ of material to cover the CDF from burrowed area over two years. 17 kN/m³ of density from FEED Report.
- (c) Value derived from Fortune 2004-2007 onsite meteorological station (Fortune\_2004\_2007\_MetData(Oct8 04 Sep27 07)\_MD.xls).
- (d) Moisture content taken as the maximum overburden moisture content from AP 42 chapter 11.9 Western surface Coal Mine/ Table 11.9-3 (Metric and English Units). Typical Values For Correction Factors Applicable to the Predictive Emission Factor Equations.

Daily Use

(e) AP-42 / Section 13.2.4 - Aggregate Handling And Storage Piles (USEPA, November 2006)/ equation 1 - emission factor for drop operation.

|                                      |          |                                 | TSP <= 30 um | PM <sub>10</sub> | PM <sub>2.5</sub> | l   |
|--------------------------------------|----------|---------------------------------|--------------|------------------|-------------------|-----|
| Particle size multiplier             | -        | К                               | 0.74         | 0.35             | 0.053             | (a) |
| Emission factor (uncontrolled)       | kg/tonne | $L = K*E*((C/G)^F)/((D/I)^H)$   | 5.95E-04     | 2.81E-04         | 4.26E-05          | (a) |
| Maximum emission rate (controlled)   | g/s      | M = B*L*(1-J/100)*1000/(A*3600) | 0.055        | 0.0259           | 0.0039            | ĺ   |
| Maximum emission rate (uncontrolled) | g/s      | N = B*L*1000/(A*3600)           | 0.055        | 0.0259           | 0.0039            | ĺ   |
| Quality rating                       | -        |                                 | Α            | Α                | Α                 | İ   |

Source: (a) AP-42 / 13.2.4 - Aggregate Handling And Storage Piles (USEPA, November 2006)/ equation 1 - emission factor for drop operation.

### **B- Exhaust Emissions**

Equipment/Vehicle

| Excavator | Caterpillar 345 BL | 1 | 2.0             | )   |    |                   |                  |     |     |                   |
|-----------|--------------------|---|-----------------|-----|----|-------------------|------------------|-----|-----|-------------------|
|           |                    |   |                 |     |    |                   |                  |     |     |                   |
|           |                    | Ī |                 |     |    |                   | DM               |     |     |                   |
|           |                    |   | SO <sub>2</sub> | NO√ | co | PM <sub>2</sub> s | PM <sub>40</sub> | VOC | PAH | CO <sub>2</sub> e |

Number of Equipment/Vehicle

|                     |           |                                    | SO <sub>2</sub> | NO <sub>X</sub> | со       | PM <sub>2.5</sub> | PM <sub>10</sub> | voc      | PAH      | CO₂e |
|---------------------|-----------|------------------------------------|-----------------|-----------------|----------|-------------------|------------------|----------|----------|------|
| Daily emission rate | tonne/day | (refer to Construction combustion) | 3.69E-06        | 0.0016          | 5.63E-04 | 7.16E-05          | 7.38E-05         | 7.73E-05 | 6.45E-07 | 0.44 |



# **Calculation of Emissions During the Closure Phase**

### III - General Closure

III.1 - Vehicular traffic

| A - I | ugitive Emissions      |                      |     |
|-------|------------------------|----------------------|-----|
|       | Dust Control Technique | Watering twice a day | (a) |
|       |                        |                      | _   |

**Source:** (a) Information provided by Fortune in an email dated Feb. 15, 2011.

| ·   |           |   |         |
|---|-----------|---|---------|
| Hours of operation per day                  | h/day     | А | 5.3 (   |
| Surface material silt content               | (%)       | В | 56 (    |
| Mean vehicle weight                         | (tons)    | С | 7.39 (  |
| Vehicle kilometer traveled (VKT)            | km/day    | D | 70.68 ( |
| Number of working days                      | days/year | E | 365     |
| Number of days with precipitation >= 0.2 mm | days/year | F | 58 (    |
| Emission reduction efficiency               | (%)       | G | 55 (    |

Source: (a) Assumed 10 light day truck, 12 heavy duty trucks and one Fuel and Lube truck. Assume operating time same as Heavey duty truck.

- (b) Material silt content taken as average silt content of the till and glacio-lacustrine deposit from Golder FEED document.
- (c ) See Mean Vehicle Weight table below.
- (d) Value derived from Fortune 2004-2007 onsite meteorological station (Fortune\_2004\_2007\_MetData(Oct8 04 Sep27 07)\_MD.xls).
- (e) Unpaved Industrial Road Dust Calculator (Environment Canada website, accessed in December 2009).

|   |        |  | PM-30 (TSP) | PM <sub>10</sub> | PM <sub>2.5</sub> |
|---|--------|--|-------------|------------------|-------------------|
|   |        |  |             |                  |                   |
| Constant (k)  | -      | Н  | 4.9         | 1.5              | 0.15              |
| Constant (a)  | -      | 1  | 0.7         | 0.9              | 0.9               |
| Constant (b)  | -      | J  | 0.45        | 0.45             | 0.45              |
| Emission factor (uncontrolled)                              | lb/VMT | $K = H*((B/12)^{1})*((C/3)^{1})*[(E-G)/E]$ | 18.20       | 7.58             | 0.76              |
| Emission factor (uncontrolled, metric)                      | g/VKT  | L = K * 281.9                              | 5,130.02    | 2,137.06         | 213.71            |
| Emission factor (controlled)                                | g/VKT  | M = L*281.9*(1-G/100)                      | 2,308.51    | 961.68           | 96.17             |
| Emission factor (uncontrolled, without precipitation)       | g/VKT  | N=H*((B/12)^I)*((C/3)^J)*281.9             | 6,092.60    | 2,538.04         | 253.80            |
| Emission factor (controlled, without precipitation)         | g/VKT  | O = N*(1-G/100)                            | 2,741.67    | 1,142.12         | 114.21            |
| Daily emission rate (uncontrolled)                          | g/day  | P= L * D                                   | 362,577.09  | 151,041.71       | 15,104.17         |
| Daily emission rate (controlled)                            | g/day  | Q = M*D                                    | 163,159.69  | 67,968.77        | 6,796.88          |
| Daily emission rate (uncontrolled, without precipitation)   | g/day  | R = N * D                                  | 430,609.45  | 179,382.51       | 17,938.25         |
| Daily emission rate (controlled, without precipitation)     | g/day  | S = O* D                                   | 193,774.25  | 80,722.13        | 8,072.21          |
| Maximum emission rate (uncontrolled)                        | g/s    | T = P/(A*3600)                             | 19.15       | 7.98             | 0.80              |
| Maximum emission rate (controlled)                          | g/s    | U = Q/(A*3600)                             | 8.62        | 3.59             | 0.36              |
| Maximum emission rate (uncontrolled, without precipitation) | g/s    | V = R/(A*3600)                             | 22.74       | 9.47             | 0.95              |
| Maximum emission rate (controlled, without precipitation)   | g/s    | W = S/(A*3600)                             | 10.23       | 4.26             | 0.43              |
| Quality rating  | -      |  | В           | В                | В                 |

Source: (a) AP-42 / Section 13.2.2 - Unpaved Roads (USEPA, November 2006)/ Equation (1a) - unpaved surfaces at industrial sites and Table 13.2.2-2.

(b) 281.9 constant to convert lb/VMT (pounds per vehicle mile travelled) to g/VKT (grams per vehicle kilometer travelled).

### Mean Vehicle Weight

| Equipment                        | -      | Light Duty Trucks | , ,    | Fuel and Lube | Total | Ī   |
|----------------------------------|--------|-------------------|--------|---------------|-------|-----|
| Equipment                        |        | Light Daty Tracks | Trucks | Truck         |       | ╛   |
| Weight - Empty                   | tonne  | 4.26              | 6.58   | 27.27         |       | (a) |
| Weight - Loaded                  | tonne  | 4.26              | 6.58   | 47.27         |       | (b) |
| Mean Weight                      | tonne  | 4.26              | 6.58   | 37.27         | 48.11 | 1   |
| Number of two way trips          | number | 12                | 10     | 1             |       | (c) |
| Distance of two way trip         | km/day | 3.07              | 3.07   | 3.07          |       | 1   |
| Vehicle kilometer traveled (VKT) | km/day | 36.88             | 30.73  | 3.07          | 70.68 | Ī   |
| Percentage of traffic            | %      | 52%               | 43%    | 4%            |       | Ī   |
| Mean vehicle weight              | tonne  | 2.22              | 2.86   | 1.62          | 6.70  | 1   |

Source: (a) Information provided by Fortune in "NICO Mobile Equipment\_REVC\_without Aker fuel.xlsx".

- (b) Assumed full fuel and Lube truck is 20 tonnes heavier when loaded.
- (c ) Assume each vehicle takes one trip per day.



# Air Quality Assessment - NICO Project Calculation of Emissions During the Closure Phase

| Equipment/Vehicle                     | Model  | Number of Equipment/Vehicle | Daily Use |
|---------------------------------------|--|-----------------------------|-----------|
| Fuel & Lube Truck                     | Western Star 4900 SA; or Equivalent            | 1                           | 2.0       |
| Water Truck                           | Western Star 4900 SA; or Equivalent            | 1                           | 2.0       |
| Light Duty Truck, Diesel              | Ford F-250 Supercab, or equivalent             | 1                           | 2.6       |
| Light Duty Truck, Diesel              | Ford F-250 Supercab, or equivalent             | 1                           | 2.6       |
| Light Duty Truck                      | Ford F-250, or equivalent                      | 4                           | 2.6       |
| Light Duty Truck                      | Ford F-250, or equivalent                      | 1                           | 2.6       |
| Light Duty Truck                      | Ford F-250, or equivalent                      | 1                           | 5.3       |
| Light Duty Truck                      | Ford F-250, or equivalent                      | 1                           | 5.3       |
| Light Duty Truck                      | Ford F-250 Crewcab, or equivalent              | 3                           | 5.3       |
| Heavy Duty Truck, Diesel              | Ford F-450 Crew Cab Flat Deck; or equivalent   | 1                           | 5.3       |
| Heavy Duty Truck, Diesel              | Ford F-450 Crew Cab Flat Deck; or equivalent   | 1                           | 5.3       |
| Heavy Duty Truck, Diesel              | Ford F-450 Crew Cab Flat Deck; or equivalent   | 1                           | 5.3       |
| Heavy Duty Truck, Diesel              | Ford F-450 Crew Cab Flat Deck; or equivalent   | 2                           | 5.3       |
| Heavy Duty Truck, Diesel              | Ford F-450 Crew Cab Flat Deck; or equivalent   | 1                           | 5.3       |
| Heavy Duty Truck, Diesel              | Ford F-450 Crew Cab Flat Deck; or equivalent   | 2                           | 5.3       |
| Heavy Duty Truck, Diesel              | Ford F-450 Crew Cab Flat Deck; or equivalent   | 1                           | 5.3       |
| Welding Truck                         | Ford F-450 Crew Cab Flat Deck; or equivalent   | 1                           | 5.3       |
| Welding Truck                         | Ford F-450 Crew Cab Flat Deck; or equivalent   | 2                           | 5.3       |
| Personnel Carrier                     | Chevrolet Express 2500 Standard, or equivalent | 1                           | 5.3       |
| Mine Ambulance                        | Chevrolet Express 2500 Standard, or equivalent | 1                           | 0.3       |
| Fire Truck                            | Ford F-450 Crew Cab Flat Deck; or equivalent   | 1                           | 0.3       |
| Rough Terrain Vehicle                 | Kubota RTV900; or equivalent                   | 1                           | 0.3       |
| Rough Terrain Crane; 135 tonnes       | Grove RT9150E; or equivalent                   | 1                           | 4.0       |
| Boom Truck (Alternative "Hiab Truck") | Western Star 4900 SA; or Equivalent            | 1                           | 6.0       |
| Telescopic Handler                    | Caterpillar TL943; or Equivalent               | 1                           | 5.3       |
| Medium Forklift                       | Clark, ECX 32                                  | 1                           | 0.0       |
| Scissor Lift, Rough Terrain           | Genie Scissorlift RT 2668; or Equivalent       | 1                           | 4.0       |
| Skid Steer-Loader                     | Bobcat S150                                    | 1                           | 4.0       |
| Skid Steer-Loader                     | Bobcat S70                                     | 1                           | 4.0       |
| Skid Steer-Loader                     | Bobcat S150                                    | 1                           | 4.0       |
| Skid Steer-Loader                     | Bobcat S150                                    | 1                           | 4.0       |
| Rough Terrain Crane; 36.2 tonnes      | Manitowoc (Grove) RT540E type; or Equivalent   | 1                           | 6.0       |
| Telescopic Handler                    | Caterpillar TL943; or Equivalent               | 1                           | 5.3       |
| Telescopic Handler                    | Caterpillar TL642                              | 1                           | 5.3       |
| Walkie Straddle Pallet Truck          | Clark, CSM 15                                  | 1                           | 0.0       |
| Scissor Lift, Rough Terrain           | Genie Scissorlift RT 2668; or Equivalent       | 2                           | 4.0       |

|                     |           |                                    | SO <sub>2</sub> | NO <sub>x</sub> | СО    | PM <sub>2.5</sub> | PM <sub>10</sub> | VOC    | PAH      | CO₂e  |
|---------------------|-----------|------------------------------------|-----------------|-----------------|-------|-------------------|------------------|--------|----------|-------|
| Daily emission rate | tonne/day | (refer to Construction combustion) | 2.67E-04        | 0.17            | 0.064 | 0.008             | 0.0083           | 0.0076 | 4.67E-05 | 31.93 |



|   |   | Number of             | Annual hours of    | Engine              |                  | Equipment          | Engine                   | Fue          | l Sulphur        | PM                   | In use fuel               | Annual Fuel        | Zero             | hour emission fa | actor (g/hp-hr)              |                      | Deteriorat | tion Factor |       | Transi      | ent Adjust | ment Facto   | or   | Emission factor ba   | ased on fue | el consumption   | 1         |           |                     | Exhaust em    | ission rate ( | (tonne/day | y)          |                                  |
|---|---|-----------------------|--------------------|---------------------|------------------|--------------------|--------------------------|--------------|------------------|----------------------|---------------------------|--------------------|------------------|------------------|------------------------------|----------------------|------------|-------------|-------|-------------|------------|--------------|------|----------------------|-------------|------------------|-----------|-----------|---------------------|---------------|---------------|------------|-------------|----------------------------------|
| Model   | Type of Equipment   | Equipment/<br>Vehicle | Operation          | Horse<br>Power (hp) | Fuel Type        | Category           | Technology I<br>Category |              | weight)          | Adjustment<br>Factor | consumption<br>(lb/hp-hr) | Consumption<br>(L) | NOx              | со               | PM10 VO                      | NOx                  | СО         | PM10        | voc   | NOx         | со         | PM10         | voc  | PAH N2O              | g/L<br>CH4  | CO2              | Nox       | СО        | ) P                 | M10 PM2       | 2.5 VO        | nc s       | SO2 F       | PAH CO2e                         |
| A   | В   | С                     | D                  | E                   | F                | G                  | Н                        | 1            | J                | K                    | L                         | М                  | N1               | N2               | N3 N4                        |                      |            | 03          | 04    |             |            | P3           | P4 ( |                      | Q3          | Q4               | R1        | R2        | R3                  | R4            | R5            | R6         | R7          | R8                               |
| Construction  |   |                       |                    |                     |                  |                    |                          |              |                  |                      |                           |                    |                  |                  |                              |                      |            |             |       |             |            |              |      |                      |             |                  |           |           |                     |               |               |            |             |                                  |
| Caterpillar 527; or equivalent  | Skidder   | 1                     | 1 1,098            | 166                 | Diesel           | Main               | Tier 2                   | 0.23         | 0.0015           | 0.05                 | 0.37                      | 35,726             | 4.1              | 0.8667           | 0.18 0.356                   | 374 1.00             | 1.101      | 1.473       | 1.034 | 1.1         | 2.57       | 1.97         | 2.29 | 0.0044 1             | .1 0.1      | 15 266           | 3 5.24E-0 | 04 2.82E  | -04   5.4           | 1E-05   5.24E | E-05   9.91E  | E-05 2.4   | 6E-06   4.5 | 31E-07 2.94E-0                   |
| Caterpillar 501 HD Track Harvester; or equivalent   | Harvester   | 1                     | 1 1,098            | , 101               | Diesel           | Main               | Tier 2                   | 0.58         | 0.0015           | 0.05                 | 0.37                      |                    | 4.1              |                  | 0.18 0.356                   |                      | 1.101      |             | 1.034 | 0.95        | 1.53       | 1.23         |      | 0.0011               | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 06E-07 2.78E-0                   |
| Caterpillar 777F/Komatsu HD 785-7<br>Sandvik 50   | Surface rock haulage trucks   | 3                     | 2 2,196            |                     | Diesel<br>Diesel | Main<br>Main       | Tier 2                   | 0.58         | 0.0015           | 0.05                 | 0.37                      |                    | 4.1<br>4.3351    |                  | 0.1316 0.175                 |                      | 1.101      |             | 1.034 | 0.95        | 1.53       | 1.23         |      | 0.0044 1             | .1 0.1      | 15 266<br>15 266 |           |           |                     |               |               |            |             | 05E-05 7.20E+                    |
| Western Star 4900 SA: or Equivalent   | Underground Haulage Unit  | -                     | 1 732              |                     | Diesel           |                    | Tier 2<br>Tier 2         | 0.58         | 0.0015           | 0.05                 | 0.37                      | 110,011            | 1.0001           | 0.8425           | 0.1316 0.175<br>0.1316 0.175 |                      |            | 1.110       | 1.034 | 0.95        | 1.53       | 1.23         | 1.00 | 0.0044 1             | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 81E-06 1.23E+<br>77E-07 5.31E-0  |
| Caterpillar 992K/Komatsu WA 900-3   | Wheeled Front End Loader  |                       | 1 2,196            |                     | Diesel           | Main               | Tier 2                   | 0.48         | 0.0015           | 0.05                 | 0.37                      | 344,003            | 4.3331           | 0.7642           | 0.1316 0.175                 | 1.00                 |            | 1.473       | 1.034 | 0.95        | 1.53       | 1.23         |      | 0.0044 1             | .1 0.1      | 5 266            | 3 9.09E-0 | 03 2.98E- | E-03 4.30           | 0E-04 4.17E   | E-04 4.50E    | E-04 2.3   | 7E-05 4.1   | 15E-06 2.83E+                    |
| Caterpillar 988H/Komatsu WA 600   | Wheeled Front End Loader  | 1                     | 1 2,196            |                     | Diesel           |                    | Tier 2                   | 0.48         | 0.0015           | 0.05                 | 0.37                      |                    | 4.3351           |                  | 0.1316 0.175                 | 1.00                 |            | 1.473       | 1.034 | 0.95        | 1.53       | 1.23         |      | 0.0044 1             | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 70E-06 1.84E+                    |
| Caterpillar IT24F Caterpillar D8T/Komatsu D155AX-6  | Integrated Tool Carrier Track-dozer                                 | 1                     | 1 2,196            |                     | Diesel<br>Diesel | Main               | Tier 2<br>Tier 2         | 0.48<br>0.58 | 0.0015<br>0.0015 | 0.06                 | 0.41<br>0.37              |                    |                  | 2.3655<br>0.8425 | 0.24 0.387<br>0.1316 0.175   |                      |            | 1.473       | 1.034 | 0.95        | 1.53       | 1.23         |      | 0.0044 1<br>0.0044 1 | .1 0.1      | 5 266            |           |           |                     |               |               |            |             | 48E-07 3.75E-0<br>01E-06 2.06E+  |
| Caterpillar D4H   | Tracked-Dozer   |                       | 1 2,190            |                     | Diesel           | Main               | Tier 2                   | 0.58         | 0.0015           | 0.05                 | 0.37                      |                    | 4.3351           |                  | 0.1316 0.175                 |                      |            | 1.473       | 1.034 | 0.95        | 1.53       | 1.23         |      | 0.0044 1             | 1 0.1       | 15 266           |           |           |                     |               |               |            |             | 60E-06 1.10E+                    |
| Caterpillar D6T; Aker request; not req if D10 over ice  | Track-dozer   | 1                     | 1 2,196            | 3 200               | Diesel           | Support            | Tier 1                   | 0.58         | 0.0015           | 0.09                 | 0.37                      |                    |                  | 0.7475           | 0.2521 0.325                 |                      | 1.101      | 1.473       | 1.036 | 0.95        | 1.53       | 1.23         | 1.05 | 0.0044 1             | .1 0.1      | 15 266           | 3.78E-0   | 03 8.78E- | E-04 2.58           | 8E-04 2.50E   | E-04 2.52E    | E-04 5.9   | 2E-06 1.0   | 03E-06 7.07E-0                   |
| Caterpillar 345 BL  | Excavator   | 1                     | 1 720              |                     | Diesel           | Main               | Tier 2                   | 0.53         | 0.0015           | 0.05                 | 0.37                      | 53,466             | 4.3351           | 0.8425           | 0.1316 0.175                 | 1.00                 | 1.101      | 1.473       | 1.034 | 0.95        | 1.53       | 1.23         | 1.05 | 0.0044 1             | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 45E-07 4.40E-0                   |
| Caterpillar 450E; or Equivalent Caterpillar 14M/Komatsu GD675-3                                   | Backhoe<br>Surface grader   | 1                     | 1 1,080            |                     | Diesel<br>Diesel |                    | Tier 2<br>Tier 2         | 0.21         | 0.0015           | 0.06                 | 0.41                      |                    | 4.7              | 2.3655<br>0.7475 | 0.24 0.387<br>0.1316 0.325   | 029 1.00<br>159 1.00 | 1.101      | 1.473       | 1.034 | 1.1<br>0.95 | 2.57       | 1.97         |      | 0.0044 1<br>0.0044 1 | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 70E-07 1.84E-0<br>20E-07 1.50E-0 |
| Caterpillar 14M/Komatsu GD675-3 Caterpillar 815F/Komatsu CP76; or equivalent                      | Compactor, Sheep Foot   |                       | 1 360              |                     | Diesel           |                    | Tier 1                   | 0.43         | 0.0015           | 0.05                 | 0.37                      | 16,342             | 5 5772           | 0.7475           | 0.1316 0.325                 | 159 1.00             | 1.101      | 1.473       | 1.034 | 0.95        | 1.00       | 1.23         |      | 0.0044 1             | 1 0.1       | 15 266           |           |           |                     |               |               |            |             | 97E-07 1.35E-0                   |
| Caterpillar CS-323C; or equivalent  | Compactor, Vibrating Soil   | -                     | 1 360              |                     | Diesel           | Support            |                          | 0.43         | 0.0015           | 0.10                 | 0.41                      |                    | 5.5988           | 2.3655           | 0.473 0.54                   | 345 1.02             | 1.101      | 1.473       | 1.036 | 1           | 1.00       | 1.00         |      | 0.0044 1             | .1 0.1      | 5 266            |           |           |                     |               |               |            |             | 85E-08 5.36E-0                   |
| Sandvik D45KS; Atlas Copco DML; or similar  | Self-Propelled Blast Hole Drill                                     | 1                     | 1 360              | 451                 | Diesel           | Main               | Tier 2                   | 0.43         | 0.0015           | 0.05                 | 0.37<br>0.41              | 31,739             | 4.3351           | 0.8425           | 0.1316 0.175                 | 1.00                 |            | 1.473       | 1.034 | 1           | 1.00       | 1.00         |      | 0.0044 1             | .1 0.1      | 15 266           | 3 8.36E-0 | )4 1.77E  | -04 2.7             | 0E-05 2.62E   | E-05 3.55E    | E-05 2.19  | €-06 3.8    | 83E-07 2.61E-0                   |
| ATD 3100 B, Drifter Attachment PP 123  Grove RT9150F: or equivalent                               | Air Trac Drill Rough Terrain Crane: 135 tonnes                      | 1                     | 1 100              | 0 0                 | Diesel<br>Diesel | Main               | Tier 2<br>Tier 1         | 0.43         | 0.0015           | 0.06                 | 0.41                      | 86 049             | 4.3<br>6.0153    | 4.1127           | 0.5 0.580<br>0.2008 0.213    | 1.00<br>135 1.02     |            | 1.473       | 1.034 | 1           | 1.00       | 1.00         |      | 0.0044 1             | .1 0.1      | 5 266            | 3 0.00E+0 | 00 0.00E+ | +00 0.00            | 0E+00 0.00E   | +00 0.00E     | E-04 5.00  | E+00 0.0    | 00E+00 0.00E+<br>04E-06 7.09E-0  |
| Manitowoc (Grove) RT540E type; or Equivalent  | Rough Terrain Crane, 135 tonnes<br>Rough Terrain Crane; 36.2 tonnes | +                     | 1 2.196            |                     | Diesel           |                    | Tier 2                   | 0.43         | 0.0015           | 0.09                 | 0.37                      |                    | 4.1              |                  | 0.2008 0.213                 |                      | 1.101      | 1,473       | 1.034 | 1           | 1.00       | 1.00         | 1.00 | 0.0044 1             | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 29E-07 5.66E-0                   |
| Western Star 4900 SA; or Equivalent   | Boom Truck (Alternative "Hiab Truck")                               | 1                     | 1 2,196            |                     | Diesel           | Main               | Tier 2                   | 0.58         | 0.0015           | 0.05                 | 0.37                      |                    | 4.3351           |                  | 0.1316 0.175                 |                      | 1.101      | 1.473       | 1.034 | 0.95        | 1.53       | 1.23         | 1.05 | 0.0044 1             | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 33E-06 1.59E+                    |
| Caterpillar TL943; or Equivalent  | Telescopic Handler  | ,                     | 1 1,952            |                     | Diesel           |                    | Tier 2                   | 0.48         | 0.0015           | 0.06                 | 0.41                      |                    | 4.7              |                  | 0.24 0.387                   |                      | 1.101      | 1.473       | 1.034 | 0.95        | 1.53       | 1.23         | 1.00 | 0.0044 1             | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 11E-07 3.50E-0                   |
| Caterpillar TL943; or Equivalent<br>Caterpillar TL642   | Telescopic Handler Telescopic Handler                               | 1                     | 1 1,952            |                     | Diesel<br>Diesel | Support<br>Support | Tier 1<br>Tier 1         | 0.48         | 0.0015<br>0.0015 | 0.10                 | 0.41<br>0.41              |                    | 5.5988<br>5.5988 | 2.3655<br>2.3655 | 0.473 0.54<br>0.473 0.54     |                      |            | 1.473       | 1.036 | 0.95        | 1.53       | 1.23         | 1.00 | 0.0044 1<br>0.0044 1 | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 11E-07 3.50E-0<br>11E-07 3.50E-0 |
| Clark, ECX 32   | Medium Forklift   |                       | 1 1,952            |                     | Diesel           |                    | Tier 2                   | 0.46         | 0.0015           | 0.10                 | 0.41                      |                    | 5.5966           | 2.3000<br>4.1127 | 0.473 0.54                   |                      |            | 1.473       | 1.036 | 0.95        | 1.53       | 1.23         |      | 0.0044 1             | 1 0.1       | 15 266           |           |           |                     | 0E+00 0.00E   |               |            |             | 00E+00 0.00E+                    |
| Clark, CSM 15   | Walkie Straddle Pallet Truck  | -                     | 1 0                |                     | Diesel           |                    | Tier 2                   | 0.48         | 0.0015           | 0.06                 | 0.41                      |                    | 4.3              | 4.1127           | 0.5 0.580                    |                      | 1.101      |             | 1.034 | 0.95        | 1.53       | 1.23         | 1.05 | 0.0044 1             | .1 0.1      | 5 266            | 3 0.00E+0 | 00 0.00E  | +00 0.0             | 0E+00 0.00E   | +00 0.00E     | +00 0.00   |             | 00E+00 0.00E+                    |
| Terex Genie; or Equivalent  | Self Propelled Telescopic Boom                                      | 1                     | 1 1,464            |                     | Diesel           |                    | Tier 2                   | 0.48         | 0.0015           | 0.06                 | 0.41                      |                    | 4.7              |                  | 0.24 0.387                   |                      | 1.101      |             | 1.034 | 0.95        | 1.53       | 1.23         |      | 0.0044 1             | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 19E-07 2.18E-0                   |
| Terex Genie; or Equivalent<br>Genie Scissorlift RT 2668: or Equivalent                            | Self Propelled Telescopic Boom                                      |                       | 2 1,464            |                     | Diesel<br>Diesel | Support            | Tier 1<br>Tier 2         | 0.48<br>0.48 | 0.0015           | 0.10                 | 0.41                      |                    | 5.5988<br>4.4399 | 2.3655<br>2.161  | 0.473 0.54<br>0.2665 0.461   |                      |            | 1.473       | 1.036 | 0.95        | 1.53       | 1.23         | 1.00 | 0.0044 1<br>0.0044 1 | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 38E-07 4.36E-0<br>58E-08 6.54E-0 |
| Genie Scissorlift RT 2668; or Equivalent  | Scissor Lift, Rough Terrain Scissor Lift, Rough Terrain             |                       | 1,464              |                     | Diesel           | Support            | Tier 1                   | 0.48         | 0.0015           | 0.06                 | 0.41                      |                    |                  | 2.161            | 0.2665 0.461                 |                      |            | 1.473       | 1.034 | 0.95        | 1.53       | 1.23         |      | 0.0044 1             | 1 0.1       | 15 266           |           |           |                     | 4E-05 1.98E   |               |            |             | 92E-07 1.31E-0                   |
| Bobcat S150   | Skid Steer-Loader   | 1                     | 1 1,464            | 49                  | Diesel           |                    | Tier 2                   | 0.23         | 0.0015           | 0.06                 | 0.41                      | 15,588             |                  | 1.5323           | 0.3389 0.293                 |                      | 1.101      |             | 1.034 | 1.1         | 2.57       | 1.97         |      |                      | .1 0.1      | 5 266            | 3 2.37E-0 | 04 1.96E- | E-04 4.18           | 8E-05 4.05E   | E-05 3.21E    | E-05 1.0   | 7E-06 1.8   | 88E-07 1.28E-0                   |
| Bobcat S70  | Skid Steer-Loader   | 1                     | 1 1,464            | . 20                | Diesel           |                    | Tier 2                   | 0.23         | 0.0015           | 0.06                 | 0.41                      |                    |                  |                  | 0.2665 0.461                 |                      | 1.101      | 1.473       | 1.034 | 1.1         | 2.57       | 1.97         | 2.20 | 0.0011               | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 01E-08 6.16E-0                   |
| Bobcat S150<br>Bobcat S150  | Skid Steer-Loader<br>Skid Steer-Loader                              | 1                     | 1 1,464            |                     | Diesel<br>Diesel | Support<br>Support | Tier 1<br>Tier 1         | 0.23         | 0.0015           | 0.10                 | 0.41<br>0.41              |                    | 4.7279<br>4.7279 | 1.5323           | 0.3389 0.293<br>0.3389 0.293 |                      | 1.101      | 1.473       | 1.036 | 1.1         | 2.57       | 1.97<br>1.97 |      | 0.0044 1<br>0.0044 1 | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 88E-07 1.28E-0<br>88E-07 1.28E-0 |
| Western Star 4900 SA Mixer  | Concrete Truck  |                       | 1 720              |                     | Diesel           |                    | Tier 1                   | 0.58         | 0.0015           | 0.10                 | 0.41                      |                    | 1 2.10           | 1.306            | 0.2008 0.213                 |                      |            | 1.110       | 1.036 | 0.95        | 1.53       | 1.23         |      | 0.0044 1             | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 64E-07 5.22E-0                   |
| Western Star 4900 SA; or Equivalent   | Fuel & Lube Truck   | 1                     | 1 720              |                     | Diesel           | Main               | Tier 2                   | 0.58         | 0.0015           | 0.05                 | 0.37                      | 63,388             |                  | 0.8425           | 0.1316 0.175                 | 1.00                 | 1.101      | 1.473       | 1.034 | 0.95        | 1.53       | 1.23         |      | 0.0044 1             | .1 0.1      | 15 266           | 3 2.14E-0 | 03 7.31E- | E-04 9.57           | 7E-05 9.28E   | E-05 1.00E    | E-04 4.3   | 7E-06 7.6   | 64E-07 5.22E-0                   |
| Western Star 4900 SA; or Equivalent   | Water Truck   | ,                     | 1 720              |                     | Diesel           |                    | Tier 2                   | 0.58         | 0.0015           | 0.05                 | 0.37                      |                    |                  | 0.8425           | 0.1316 0.175                 |                      |            | 1.473       | 1.034 | 0.95        | 1.53       | 1.23         |      | 0.0044 1             | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 64E-07 5.22E-0                   |
| Ford F-250 Supercab, or equivalent<br>Ford F-250 Supercab, or equivalent                          | Light Duty Truck, Diesel<br>Light Duty Truck, Diesel                | 1                     | 1 960              |                     | Diesel<br>Diesel | Main<br>Support    | Tier 2<br>Tier 1         | 0.58<br>0.58 | 0.0015<br>0.0015 | 0.05                 | 0.37                      |                    | 4.3351<br>6.0153 | 0.8425<br>1.306  | 0.1316 0.175<br>0.2008 0.213 |                      |            | 1.473       | 1.034 | 0.95        | 1.53       | 1.23         |      | 0.0044 1<br>0.0044 1 | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 05E-07 6.18E-0<br>08E-07 6.21E-0 |
| Ford F-250, or equivalent   | Light Duty Truck  | 4                     | 4 960              |                     | Diesel           | Support            |                          | 0.58         | 0.0015           | 0.09                 | 0.37                      |                    |                  | 1.306            | 0.2008 0.213                 |                      |            | 1.110       | 1.036 | 0.95        | 1.53       | 1.23         |      | 0.0044 1             | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 62E-06 2.47E+                    |
| Ford F-250, or equivalent   | Light Duty Truck  | 1                     | 1 960              |                     | Diesel           | Support            |                          | 0.58         | 0.0015           | 0.09                 | 0.37                      | 75,066             | 6.0153           | 1.306            | 0.2008 0.213                 | 1.02                 | 1.101      | 1.473       | 1.036 | 0.95        | 1.53       | 1.23         | 1.05 | 0.0044 1             | .1 0.1      | 15 266           | 3.57E-0   | 03 1.34E- | E-03 1.69           | 9E-04 1.64E   | E-04 1.44E    | E-04 5.18  | 8E-06 9.0   | 05E-07 6.18E-0                   |
| Ford F-250, or equivalent   | Light Duty Truck  |                       | 1 1,920            |                     | Diesel           |                    | Tier 1                   | 0.58         | 0.0015           | 0.09                 | 0.37                      | 150,132<br>150,132 | 6.0153<br>6.0153 | 1.306            | 0.2008 0.213                 |                      | 1.101      | 1.473       | 1.036 | 0.95        | 1.53       | 1.23         | 1.05 | 0.0044 1             | .1 0.1      | 5 266            |           |           |                     |               |               |            |             | 81E-06 1.24E+                    |
| Ford F-250, or equivalent<br>Ford F-250 Crewcab, or equivalent                                    | Light Duty Truck Light Duty Truck                                   |                       | 1 1,920            |                     | Diesel<br>Diesel | Support<br>Support | Tier 1                   | 0.58         | 0.0015           | 0.09                 | 0.37                      |                    |                  | 1.306            | 0.2008 0.213<br>0.2008 0.213 | 135 1.02             |            | 1.473       | 1.036 | 0.95        | 1.53       | 1.23         |      | 0.0044 1             | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 81E-06 1.24E+<br>43E-06 3.71E+   |
| Ford F-450 Crew Cab Flat Deck; or equivalent  | Heavy Duty Truck, Diesel  | 1                     | 1 1,920            |                     | Diesel           |                    | Tier 1                   | 0.58         | 0.0015           | 0.09                 | 0.37                      |                    |                  | 1.306            | 0.2008 0.213                 |                      | 1.101      | 1.473       | 1.036 | 0.95        | 1.53       | 1.23         |      | 0.0044 1             | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 81E-06 1.24E+                    |
| Ford F-450 Crew Cab Flat Deck; or equivalent  | Heavy Duty Truck, Diesel  | 1                     | 1 1,920            |                     | Diesel           | Support            |                          | 0.58         | 0.0015           | 0.09                 | 0.37                      |                    | 0.0.00           | 1.306            | 0.2008 0.213                 |                      |            | 1.473       | 1.036 | 0.95        | 1.53       | 1.23         | 1.00 | 0.0044 1             | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 81E-06 1.24E+                    |
| Ford F-450 Crew Cab Flat Deck; or equivalent<br>Ford F-450 Crew Cab Flat Deck; or equivalent      | Heavy Duty Truck, Diesel<br>Heavy Duty Truck, Diesel                | 1                     | 1 1,920            | 400                 | Diesel           | Support<br>Support | Tier 1                   | 0.58         | 0.0015           | 0.09                 | 0.37                      | 150,132<br>300,264 | 6.0153<br>6.0153 | 1.306<br>1.306   | 0.2008 0.213                 | 135 1.02             | 1.101      | 1.473       | 1.036 | 0.95        | 1.53       | 1.23         |      | 0.0044 1<br>0.0044 1 | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 81E-06 1.24E+<br>62E-06 2.47E+   |
| Ford F-450 Crew Cab Flat Deck; or equivalent  | Heavy Duty Truck, Diesel  | +                     | 1 1,920            | 400                 | Diesel           | Support            |                          | 0.58         | 0.0015           | 0.09                 | 0.37                      | 150.132            | 6.0153           | 1.306            | 0.2008 0.213                 | 135 1.02             | 1.101      |             | 1.036 | 0.95        | 1.53       | 1.23         |      |                      | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 81E-06 1.24E+                    |
| Ford F-450 Crew Cab Flat Deck; or equivalent  | Heavy Duty Truck, Diesel  | 2                     | 2 1,920            | 400                 | Diesel           | Support            | Tier 1                   | 0.58         | 0.0015           | 0.09                 | 0.37                      |                    |                  | 1.306            | 0.2008 0.213                 |                      | 1.101      | 1.473       | 1.036 | 0.95        | 1.53       | 1.23         | 1.05 | 0.0044 1             | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 62E-06 2.47E+                    |
| Ford F-450 Crew Cab Flat Deck; or equivalent  | Heavy Duty Truck, Diesel  | 1                     | 1 1,920            |                     | Diesel           |                    | Tier 1                   | 0.58         | 0.0015           | 0.09                 | 0.37                      |                    |                  | 1.306            | 0.2008 0.213                 |                      |            | 1.473       | 1.036 | 0.95        | 1.53       | 1.23         |      | 0.0044 1             | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 81E-06 1.24E+                    |
| Ford F-450 Crew Cab Flat Deck; or equivalent<br>Ford F-450 Crew Cab Flat Deck; or equivalent      | Welding Truck Welding Truck   |                       | 1 1,920            |                     | Diesel<br>Diesel |                    | Tier 2<br>Tier 1         | 0.58         | 0.0015           | 0.05                 | 0.37                      |                    | 1.0001           | 0.8425           | 0.1316 0.175<br>0.2008 0.213 |                      | 1.101      | 1.473       | 1.034 | 0.95        | 1.53       | 1.23         | 1.00 | 0.0044 1<br>0.0044 1 | .1 0.1      | 15 266<br>15 266 |           |           |                     |               |               |            |             | 81E-06 1.24E+<br>62E-06 2.47E+   |
| Chevrolet Express 2500 Standard, or equivalent  | Personnel Carrier   | 1                     | 1 1,920            |                     | Diesel           |                    | Tier 2                   | 0.58         | 0.0015           | 0.05                 | 0.37                      |                    |                  | 0.7475           | 0.1316 0.325                 |                      |            | 1.473       | 1.034 | 0.95        | 1.53       | 1.23         |      | 0.0044 1             | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 13E-06 7.74E-0                   |
| Chevrolet Express 2500 Standard, or equivalent  | Mine Ambulance  | 1                     | 1 100              |                     | Diesel           |                    | Tier 2                   | 0.58         | 0.0015           | 0.05                 | 0.37                      | 4,891              | 4                | 0.7475           | 0.1316 0.325                 | 1.00                 | 1.101      | 1.473       | 1.034 | 0.95        | 1.53       | 1.23         |      | 0.0044 1             | .1 0.1      | 15 266           | 3 1.52E-0 | 04 5.00E- | E-05 7.39           | 9E-06 7.16E   | E-06 1.43E    | E-05 3.3   | 7E-07 5.9   | 90E-08 4.03E-0                   |
| Ford F-450 Crew Cab Flat Deck; or equivalent  | Fire Truck  |                       | 1 100              |                     | Diesel<br>Diesel |                    | Tier 2                   | 0.58         | 0.0015<br>0.0015 | 0.05                 | 0.37                      |                    |                  |                  | 0.1316 0.175                 |                      | 1.101      | 1.473       | 1.034 | 0.95        | 1.53       | 1.23         |      | 0.0044 1<br>0.0044 1 | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 43E-08 6.44E-0<br>25E-07 8.56E-0 |
| Kubota RTV900; or equivalent<br>Caterpillar 777F/Komatsu HD 785-7                                 | Rough Terrain Vehicle Surface rock haulage trucks                   |                       | 1 120<br>1 7.44F   |                     | Diesel           |                    | Tier 1<br>Tier 1         | 0.43         | 0.0015           | 0.09                 | 0.37                      |                    | 6.0153           | 0.7642           | 0.2008 0.213<br>0.1934 0.301 |                      |            | 1.473       | 1.036 | 0.95        | 1.00       | 1.00         |      | 0.0044 1             | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 79E-05 1.22E+                    |
| Caterpillar 740   | Articulated Truck   | 2                     | 2 7,446            |                     | Diesel           |                    | Tier 1                   | 0.58         | 0.0015           | 0.09                 | 0.37                      |                    | 6.0153           | 1.306            | 0.2008 0.213                 |                      |            | 1.473       | 1.036 | 0.95        | 1.53       | 1.23         | 1.05 | 0.0044 1             | .1 0.1      | 15 266           | 3 4.40E-0 | 02 1.65E- | E-02 2.08           | 8E-03 2.02E   | E-03 1.78E    | E-03 6.3   | 9E-05 1.1   | 12E-05 7.63E+                    |
| Caterpillar 992K/Komatsu WA 900-3   | Wheeled Front End Loader  | 1                     | 1 7,446            |                     | Diesel           | Support            | Tier 1                   | 0.48         | 0.0015           | 0.09                 | 0.37                      | 1,166,416          | 6.1525           | 0.7642           | 0.1934 0.301                 |                      | 1.101      | 1.473       | 1.036 | 0.95        | 1.53       | 1.23         |      | 0.0044 1             | .1 0.1      | 15 266           |           | 02 1.01E- |                     | 7E-03 2.00E   | -03 2.62E     | E-03 8.0   | 4E-05 1.4   | 41E-05 9.61E+                    |
| Caterpillar 980H/Komatsu WA 500-6 Caterpillar 365C L/Komatsu PC650LC-8                            | Wheeled Front End Loader  Excavator                                 | 1                     | 1 7,446<br>1 7.446 | , 0.10              | Diesel           | Support            | Tier 1                   | 0.48         | 0.0015<br>0.0015 | 0.09                 | 0.37                      |                    |                  | 1.306<br>1.306   | 0.2008 0.213<br>0.2008 0.213 |                      | 1.101      | 1.473       | 1.036 | 0.95        | 1.53       | 1.23         | 1.00 | 0.0044 1             | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 12E-06 4.19E+<br>11E-06 4.86E+   |
| Caterpillar 365C L/Komatsu PC650LC-8 Caterpillar 14M/Komatsu GD675-3                              | Surface grader  | 1                     | 1 7,446<br>1 7.446 | , 100               | Diesel           |                    | Tier 1                   | 0.58         | 0.0015           | 0.09                 | 0.37                      |                    | 5.5772           | 0.7475           | 0.2008 0.213                 | 1.02                 | 1.101      | 1.473       | 1.036 | 0.95        | 1.53       | 1.23         | 1.00 | 0.0044 1             | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 55E-06 3.11E+                    |
| Caterpillar D10T/Komatsu 375A-6   | Tracked-Type tractor, bulldozer                                     | 2                     | 2 7,446            |                     | Diesel           | Support            |                          | 0.58         | 0.0015           | 0.09                 | 0.37                      | 1,691,987          |                  | 1.306            | 0.2008 0.213                 |                      |            |             | 1.036 | 0.95        | 1.53       | 1.23         |      | 0.0044 1             | .1 0.1      | 15 266           | 3 8.04E-0 | 02 3.02E- | E-02 3.8°           | 1E-03 3.69E   | E-03 3.25E    | E-03 1.1   | 7E-04 2.0   | 04E-05 1.39E+                    |
| Atlas Copco Roc D7; or equivalent   | Self-Propelled Blast Hole Drill                                     | - 2                   | 2 7,446            | 225                 | Diesel           | Support            |                          | 0.43         | 0.0015           | 0.09                 | 0.37<br>0.37              | 656,475            | 5.5772           | 0.7475           | 0.2521 0.325                 | 1.02                 | 1.101      |             | 1.036 | 1           | 1.00       | 1.00         |      | 0.0044 1             | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 91E-06 5.41E+                    |
| Caterpillar 815F/Komatsu CP76; or equivalent<br>Caterpillar 501 HD Track Harvester; or equivalent | Compactor, Sheep Foot   | 1                     | 1 7,446            | 232                 | Diesel<br>Diesel | Support<br>Support | Tier 1                   | 0.43         | 0.0015           | 0.09                 | 0.37                      | 338,007<br>11,236  | 5.5772<br>5.6523 | 0.7475           | 0.2521 0.325<br>0.2799 0.356 | 1.02                 | 1.101      | 1.473       | 1.036 | 1           | 1.00       | 1.00         |      | 0.0044 1             | .1 0.1      | 5 266            | 3 1.16E-0 | 12 1.67E  | -03 5.79            | 9E-04 5.62E   | E-04 6.99E    | E-04 2.3   | 3E-05 4.0   | 07E-06 2.78E+0<br>35E-07 9.26E-0 |
| Western Star 4900 SA: or Equivalent   | Fuel & Lube Truck   | 1                     | 1 1.402            | 2 450               | Diesel           |                    | Tier 1                   | 0.43         | 0.0015           | 0.09                 | 0.37                      |                    | 6.0153           | 1,306            | 0.2799 0.356                 |                      | 1.101      | 1,473       | 1.036 | 0.95        | 1.53       | 1.00         |      | 0.0044 1             | .1 0.1      | 15 266           | 3 5.86F-0 | 0.40E-    | -03 2.20<br>-03 2.7 | 8E-04 2.69F   | E-04 2.37F    | E-03 7.74  | 1E-06 1     | 49E-06 1.02E+                    |
| Western Star 4900 SA; or Equivalent   | Road Tractor  |                       | 1 1,402            | 2 450               | Diesel           | Support            | Tier 1                   | 0.58         | 0.0015           | 0.09                 | 0.37                      | 123,395            | 6.0153           | 1.306            | 0.2008 0.213                 | 1.02                 | 1.101      | 1.473       | 1.036 | 0.95        | 1.53       | 1.23         | 1.05 | 0.0044 1             | .1 0.1      | 15 266           | 5.86E-0   | 03 2.20E- | E-03 2.78           | 8E-04 2.69E   | E-04 2.37E    | E-04 8.5   | 1E-06 1.4   | 49E-06 1.02E+                    |
| Ford F-250 Crewcab, or equivalent   | Light Duty Truck  |                       | 2 701              |                     | Diesel           | Support            |                          | 0.58         | 0.0015           | 0.09                 | 0.37                      | 109,596            |                  | 1.306            | 0.2008 0.213                 | 1.02                 | 1.101      |             | 1.036 | 0.95        | 1.53       | 1.23         |      | 0.0044 1             | .1 0.1      | 266              | 3 5.21E-0 | J3 1.96E  | -03 2.4             | 6E-04 2.39E   | E-04 2.11E    | E-04 7.5   | 3E-06 1.3   | 32E-06 9.03E-0                   |
| Chevrolet Express 2500 Standard, or equivalent<br>Ford F-450 Crew Cab Flat Deck; or equivalent    | Personnel Carrier Heavy Duty Truck, Diesel                          | 1                     | 1 1,402            |                     | Diesel<br>Diesel | o                  | Tier 1<br>Tier 1         | 0.58         | 0.0015<br>0.0015 | 0.09                 | 0.37                      | 68,553<br>109,596  | 5.5772<br>6.0153 | 0.7475<br>1.306  | 0.2521 0.325<br>0.2008 0.213 |                      | 1.101      | 1.473       | 1.036 | 0.95        | 1.53       | 1.23         |      | 0.0044 1<br>0.0044 1 | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 26E-07 5.65E-0<br>32E-06 9.03E-0 |
| Ford F-450 Crew Cab Flat Deck; or equivalent<br>Ford F-450 Crew Cab Flat Deck; or equivalent      | Heavy Duty Truck, Diesel Heavy Duty Truck, Diesel                   | 1                     | 1 1,402            |                     | Diesel           | Support            |                          | 0.58         | 0.0015           | 0.09                 | 0.37                      |                    |                  | 1.306            | 0.2008 0.213                 |                      | 1.101      |             | 1.036 | 0.95        | 1.53       | 1.23         |      | 0.0044 1             | .1 0.1      | 15 266           |           |           |                     |               |               |            |             | 33E-06 9.06E-0                   |
| TOTAL   | ,                             |                       | .,402              | .01                 |                  |                    |                          | 2.00         | 2.2010           | 0.00                 | 0.07                      | .00,004            | 0.0100           | 1.000            | J00 0.210                    |                      |            |             |       | 2.00        | 50         |              |      |                      | J.1         |                  |           |           | <del></del>         | L. 70L        |               |            |             | 0.00E-1                          |

Pauls.

| Model  | Type of Equipment                                   | Number of<br>Equipment/ | Annual hours of | engine<br>Horse | Fuel Typ  | Equipment | Engine<br>Technology | Load Factor | Fuel Sulphur | PM<br>Adjustment | In use fuel | Annual Fuel     | Zer    | ro hour emission | factor (g/hp-hr)   |  | Dete   | rioration Facto | or     | Tra     | ınsient Adju | stment Facto | Em       | ssion factor | pased on fue | l consump | tion        |             | Ext        | naust emis | sion rate (to | nne/day) |                       |             |
|--|---|-------------------------|-----------------|-----------------|-----------|-----------|----------------------|-------------|--------------|------------------|-------------|-----------------|--------|------------------|--|--|--------|-----------------|--------|---------|--------------|--------------|----------|--------------|--------------|-----------|-------------|-------------|------------|------------|---------------|----------|-----------------------|-------------|
|  | 3,600   | Vehicle                 | Operation       | Power (hp       |           | Category  | Category             |             | (% weight)   | Factor           | (lb/hp-hr)  | (L)             | NOx    | со               | PM10 V   | OC NO  | Ox C   | O PM10          | voc    | NOx     | со           | PM10         | VOC P    | AH N2C       | CH4          | CO2       | Nox         | СО          | PM10       | PM2.5      | voc           | so       | 2 PA                  | AH CO       |
| A  | В   | С                       | D               | Е               | F         | G         | Н                    | 1           | J            | K                | L           | М               | N1     | N2               | N3 N   | 14 O   | 1 O    | 2 03            | 04     | P1      | P2           | P3           | P4 Q1    | Q2           | Q3           | Q4        | R1          | R2          | R3         | R4         | R5            | R6       | R7                    | R8          |
| Operation  |   |                         |                 | •               | •         |           |                      |             |              |                  |             |                 |        | •                |  |  |        |                 |        |         | -            | *            |          |              |              |           |             |             |            |            |               |          |                       |             |
| Sandvik D45KS; Atlas Copco DML; or similar                       | Self-Propelled Blast Hole Drill                     | 1 1                     | 7.44            | 46 45           | 1 Diesel  | Main      | Tier 2               | 0.43        | 0.0015       | 0.052495504      | 0.367       | 656.475         | 4,3351 | 1 0.8425         | 0.1316 0.17  | 75913 1  | 1.009  | 1.101 1.47      | 3 1.03 | 34 1.00 | 1.00         | 1.00         | 1.00 0.0 | 044          | 1.1 0.1      | 5         | 2663 1.73E- | 02 3.67E-0  | 3 5.59E-04 | 1 5.42E-0  | 04 7.33E-0    | 4.53E    | -05 7.91E             | 1E-06 5.41E |
| Sandvik D45KS: Atlas Copco DML; or similar                       | Self-Propelled Blast Hole Drill                     | 1                       | 7,44            |                 |           | Main      | Tier 2               | 0.43        |              | 0.052495504      | 0.367       | 656,475         | 4.3351 | 1 0.8425         | 0.1316 0.17  | 75913 1  | 1.009  | 1.101 1.47      | 3 1.03 | 34 1.00 | 1.00         | 1.00         | 1.00 0.0 | 044          | 1.1 0.1      | 5         |             | 02 3.67E-0  |            |            |               | 4.53E    | -05 7.91E             | 1E-06 5.41E |
| Caterpillar 992K/Komatsu WA 900-3                                | Wheeled Front End Loader                            | 1                       | 7,44            | 46 80           | 1 Diesel  | Main      | Tier 2               | 0.48        | 0.0015       | 0.052495504      | 0.367       | 1.166.416       | 4.1    | 1 0.7642         | 0.1316 0.17  | 75913 1  | 1.009  | 1.101 1.47      | 3 1.03 | 34 0.95 | 1.53         | 1.23         | 1.05 0.0 | 044          | 1.1 0.1      | 5         | 2663 3.08E- | -02 1.01E-0 | 2 1.46E-03 | 3 1.41E-0  | 03 1.53E-0    | 3 8.04E  | -05 1.41'             | 1E-05 9.61E |
| Caterpillar 777F/Komatsu HD 785-7                                | Surface rock haulage trucks                         | 2                       | 7,44            | 46 101          | 6 Diesel  | Main      | Tier 2               | 0.58        |              | 0.052495504      | 0.367       | 2.961.954       | 4.1    | 1 0.7642         | 0.1316 0.17  | 75913 1  | 1.009  | 1.101 1.47      | 3 1.03 | 34 0.95 |              | 1.23         | 1.05 0.0 | 044          | 1.1 0.1      | 5         |             |             |            |            |               |          |                       | 7E-05 2.44E |
| Caterpillar 777F/Komatsu HD 785-7                                | Surface rock haulage trucks                         | 1                       | 7,44            | 46 101          | 6 Diesel  | Main      | Tier 2               | 0.58        | 0.0015       | 0.052495504      | 0.367       | 1,480,977       | 4.1    | 1 0.7642         | 0.1316 0.17  | 75913 1  | 1.009  | 1.101 1.47      | 3 1.03 | 34 0.95 | 1.53         | 1.23         | 1.05 0.0 | 044          | 1.1 0.1      | 5         | 2663 4.73E- | -02 1.55E-0 | 2 2.24E-03 | 3 2.17E-0  | 03 2.34E-0    | 3 1.02E  | -04 1.79 <sup>r</sup> | 9E-05 1.22E |
| Caterpillar D10T/Komatsu 375A-6                                  | Tracked-Type tractor, bulldozer                     | 1                       | 3.94            | 42 58           | 1 Diesel  | Main      | Tier 2               | 0.58        | 0.0015       | 0.052495504      | 0.367       | 447,879         | 4.3351 | 1 0.8425         | 0.1316 0.17  | 75913 1  | 1.009  | 1.101 1.47      | 3 1.03 | 34 0.95 | 1.53         | 1.23         | 1.05 0.0 | 044          | 1.1 0.1      | 5         | 2663 1.51E- | -02 5.16E-0 | 3 6.76E-04 | 4 6.56E-0  | 04 7.09E-0    | 4 3.09E  | -05 5.40E             | 0E-06 3.69E |
| Caterpillar 14M/Komatsu GD675-3                                  | Surface grader                                      | 1                       | 1,40            | 02 25           | 9 Diesel  | Main      | Tier 2               | 0.58        | 0.0015       | 0.052495504      | 0.367       | 70.980          | 4      | 4 0.7475         | 0.1316 0.32  | 25159 1  | 1.009  | 1.101 1.47      | 3 1.03 | 34 0.95 | 1.53         | 1.23         | 1.05 0.0 | 044          | 1.1 0.1      | 5         | 2663 2.21E- | -03 7.26E-0 | 4 1.07E-04 | 1 1.04E-0  | 04 2.08E-0    | 4.89E    | -06 8.56 <sup>r</sup> | 6E-07 5.85E |
| Western Star 4900 SA; or Equivalent                              | Explosives Truck                                    | 1                       | 1.40            | 12 45           | 0 Diesel  | Support   | Tier 1               | 0.58        |              | 0.086875431      |             | 123,395         | 6.0153 | 3 1.306          | 0.2008 0.21  | 13435 1  | 1.024  | 1.101 1.47      | 3 1.03 |         |              | 1.23         | 1.05 0.0 | 144          | 1.1 0.1      | 5         |             |             |            |            |               |          |                       | 9F-06 1.02F |
| Customized Package   | Explosives Truck                                    | 1                       | 1,40            | 02 45           | 0 Diesel  | Support   | Tier 1               | 0.58        |              | 0.086875431      | 0.367       | 123,395         | 6.0153 | 3 1.306          | 0.2008 0.21  | 13435 1  | 1.024  | 1.101 1.47      | 3 1.03 | 36 0.95 | 1.53         | 1.23         | 1.05 0.0 | 044          | 1.1 0.1      | 5         | 2663 5.86E- | -03 2.20E-0 | 3 2.78E-04 | 1 2.69E-0  | 04 2.37E-0    | 4 8.51E  | -06 1.49              | 9E-06 1.02E |
| Ford F-450 Crew Cab Flat Deck; or equivalent                     | Heavy Duty Truck, Diesel                            | 1                       | 1,40            | 02 40           | 0 Diesel  | Support   | Tier 1               | 0.58        |              | 0.086875431      | 0.367       | 109,596         | 6.0153 | 3 1.306          | 0.2008 0.21  | 13435 1  | 1.024  | 1.101 1.47      | 3 1.03 | 36 0.95 | 1.53         | 1.23         | 1.05 0.0 | 044          | 1.1 0.1      | 5         |             | -03 1.96E-0 |            |            |               |          | -06 1.32E             |             |
| Boss Hawg BMHP104MH-40FT, Perkins Genset                         | Portable Light Stands                               | 2                       | 4.38            | 30 1            | 3 Diesel  | Main      | Tier 2               | 0.43        | 3 0.0015     | 0.058360124      | 0.408       | 25,554          | 4,4399 | 9 2.161          | 0.2665 0.46  | 51652 1  | 1.009  | 1.101 1.47      | 3 1.03 | 34 1.00 | 1.00         | 1.00         | 1.00 0.0 | 044          | 1.1 0.1      | 5         | 2663 6.20E- | -04 3.29E-0 | 4 4.63E-05 | 4.49E-0    | 05 6.74E-0    | 5 1.76E  | -06 3.08 <sup>r</sup> | 3E-07 2.11E |
| Chevrolet Express 2500 Standard, or equivalent                   | Personnel Carrier                                   | 1                       | 70              |                 | 0 Diesel  | Main      | Tier 2               | 0.58        |              | 0.052495504      | 0.367       |                 |        | 4 0.7475         |  |  | 1.009  |                 |        | 34 0.95 | 1.53         | 1.23         | 1.05 0.0 | 044          | 1.1 0.1      | 5         |             | -03 3.51E-0 |            |            |               |          |                       | 3E-07 2.82E |
| Ford F-250 Supercab, or equivalent                               | Light Duty Truck, Diesel                            | 1 1                     | 70              |                 | 0 Diesel  | Main      | Tier 2               | 0.58        |              | 0.052495504      |             | 54,798          | 4.3351 |                  |  | 75913 1  | 1.009  | 1.101 1.47      |        | 34 0.95 |              | 1.23         |          | 044          | 1.1 0.1      | 5         |             |             |            |            |               |          |                       | IF-07 4.51F |
| Ford F-250 Crewcab, or equivalent                                | Light Duty Truck                                    | 1                       | 1.40            | 02 40           | 0 Diesel  | Main      | Tier 2               | 0.58        |              | 0.052495504      | 0.367       | 109.596         | 4.3351 |                  |  |  |        |                 |        | 34 0.95 | 1.53         | 1.23         |          |              | 1.1 0.1      | 5         |             |             |            |            |               |          |                       |             |
| Ford F-250 or equivalent   | Light Duty Truck                                    | 1 1                     | 1,40            |                 | 0 Diesel  | Main      | Tier 2               | 0.58        |              | 0.052495504      | 0.367       | ,               | 4.3351 |                  |  |  | 1.000  |                 |        | 34 0.95 | 1.53         | 1.23         |          |              | 1.1 0.1      | 5         |             |             |            |            |               |          |                       |             |
| Ford F-250, or equivalent  | Light Duty Truck                                    | 1                       | 1.40            |                 | 0 Diesel  | Main      | Tier 2               | 0.58        |              | 0.052495504      |             |                 | 4.3351 |                  |  |  |        |                 |        |         |              | 1.23         |          |              | 11 0         | 5         |             |             |            |            |               |          |                       |             |
| Ford F-250, or equivalent  | Light Duty Truck                                    | 1                       | 1.40            |                 | 0 Diesel  | Main      | Tier 2               | 0.56        |              | 0.052495504      |             | 109,596         | 4.3351 |                  |  |  | 1.000  |                 |        |         |              | 1.23         |          |              | 1.1          | •         |             |             |            |            |               |          |                       |             |
| Bobcat S150  | Skid Steer-Loader                                   | 1                       | 1.40            |                 | O Diesel  | Main      | Tier 2               | 0.30        |              | 0.058360124      | 0.408       |                 | 4.7279 |                  |  |  |        |                 |        | 34 1.10 | 2.57         | 1.23         |          |              | 1.1 0.       | 5         |             |             |            |            |               |          |                       |             |
| Bobcat S70   | Skid Steer-Loader                                   | + +                     | 1.40            |                 | 3 Diesel  | Main      | Tier 2               | 0.23        |              | 0.058360124      | 0.408       | 7 155           | 4.4399 |                  |  |  |        |                 |        | 1.10    | 2.57         | 1.07         |          |              | 1.1 0.       | 5         |             |             |            |            |               |          |                       |             |
| Ford F-250 Crewcab, or equivalent                                | Light Duty Truck                                    | + +                     | 70              | -               | 0 Diesel  | Main      | Tier 2               | 0.20        |              | 0.052495504      |             | 1,100           | 4.3351 |                  | 0.8425 0.1316 0.175913 1.009 1.101 1.473 1.034 0.95 1.53 1.23 1.05 0.0044 1.1 0.15 2663 3.70E-03 1.26E-03 1.65E-04 1.61E-04 1.73E-04 7.58E-06 1.32E-06 0.03E-01 0.8425 0.1316 0.175913 1.009 1.101 1.473 1.034 0.95 1.53 1.23 1.05 0.0044 1.1 0.15 2663 3.70E-03 1.26E-03 1.65E-04 1.61E-04 1.73E-04 7.58E-06 1.32E-06 0.03E-01 0.8425 0.1316 0.175913 1.009 1.101 1.473 1.034 0.95 1.53 1.23 1.05 0.0044 1.1 0.15 2663 3.70E-03 1.26E-03 1.65E-04 1.61E-04 1.73E-04 7.56E-06 1.32E-06 0.03E-01 1.5322 0.3389 0.239961 1.009 1.101 1.473 1.034 0.95 1.53 1.23 1.05 0.0044 1.1 0.15 2663 3.70E-03 1.26E-03 1.65E-04 1.61E-04 1.73E-04 7.56E-06 1.32E-06 0.03E-01 1.5322 0.0389 0.239961 1.009 1.101 1.473 1.034 1.10 2.57 1.97 2.29 0.0044 1.1 0.15 2663 1.22E-04 1.87E-04 4.00E-05 3.88E-05 3.07E-05 1.03E-05 1.03 |  |        |                 |        |         |              |              |          |              |              |           |             |             |            |            |               |          |                       |             |
| Cateroillar 988H/Komatsu WA 600                                  | Wheeled Front End Loader                            | + +                     | 1.75            |                 |           | Main      | Tier 2               | 0.30        |              | 0.052495504      |             |                 | 4.3351 |                  |  |  | 1.000  |                 |        |         |              | 1.23         |          |              | 1.1 0.       | 5         |             |             |            |            |               |          |                       |             |
| Ford F-250 Crewcab, or equivalent                                | Light Duty Truck                                    | 1                       | 4.38            |                 | 0 Diesel  | Main      | Tier 2               | 0.40        |              | 0.052495504      | 0.367       |                 | 4.3351 |                  |  |  |        |                 |        |         |              | 1.23         |          |              | 1.1 0.       | 5<br>E    |             |             |            |            |               |          |                       |             |
| Caterpillar D8T/Komatsu D155AX-6                                 | Track-dozer   | + ;                     | 1.40            |                 | 0 Diesel  | Main      | Tier 2               | 0.50        |              | 0.052495504      | 0.307       | 84.956          | 4.3351 |                  |  | 75040 4  | 1.009  |                 |        | 0.90    | 1.55         | 1.23         |          |              | 1.1 0.       | 5         |             |             |            |            |               |          |                       |             |
| Boss Hawa BMHP104MH-40FT, Perkins Genset                         | Portable Light Stands                               | + +                     | 4.38            |                 | 3 Diesel  | Main      | Tier 2               | 0.50        |              | 0.052495504      | 0.367       |                 | 4.335  |                  |  | 70913 1  | 1.009  |                 |        | 0.93    | 1.53         | 1.23         |          |              | 1.1 0.       | 5         |             |             |            |            |               |          |                       |             |
| McElrov Rolling 250/TracStar 250                                 | Portable Pipe Fusion Machine                        | + +                     | 4,30            |                 | 1 Diesel  | Main      | Tier 2               | 0.43        |              | 0.058360124      | 0.408       | 1.048           | 4.4398 | 3 4.1127         |  |  | 1.000  |                 |        |         |              | 1.00         |          |              | 1.1 0.       | 5         |             |             |            |            |               |          |                       |             |
| Sandvik QJ340; or equivalent                                     | Tracked Mobile Jaw Crusher                          | + ;                     | 43              |                 | n Diesel  | Main      | Tier 2               | 0.43        |              | 0.052495504      | 0.400       | 29.997          | 4.3351 |                  | 0.0  | 3389 0.2998F1 1.009 1.101 1.473 1.034 1.10 2.57 1.97 2.29 0.0044 1.1 0.15 2663 2.27E-04 1.87E-04 1.48E-05 3.8EE-05 3.07E-05 1.03E-05 2.00E-05 1.00E-05 2.00E-05 1.00E-05 2.00E-05       |                 |        |         |              |              |          |              |              |           |             |             |            |            |               |          |                       |             |
| Sandvik QJ340; or equivalent                                     | Tracked Mobile Cone Crusher                         | + +                     | 43              |                 | 3 Diesel  | Support   | Tier 1               | 0.43        |              | 0.052495504      | 0.367       |                 | 6.0153 |                  |  | 00.0   | 1.000  |                 |        | 96 1.00 | 1.00         | 1.00         | 1.00     |              | 1.1 0.       | 5         |             |             |            |            |               |          |                       |             |
| Sandvik QA 450; or equivalent                                    | Tracked Mobile Screening Plant                      | + ;                     | 43              |                 | M Diesel  | Support   | Tier 1               | 0.40        |              | 0.086875431      | 0.367       |                 | 5.6523 |                  |  |  |        |                 |        | 00 1.00 | 1.00         | 1.00         |          |              | 1.1 0.       | 5         |             |             |            |            |               |          |                       |             |
| Manitowoc (Grove) RT540E type: or Equivalent                     | Rough Terrain Crane: 36.2 tonnes                    | +                       | 43              | 10              | n Diesel  | Main      | Tier 2               | 0.43        |              | 0.052495504      |             |                 | 5.0523 |                  |  | 30011  | 1.021  | 1.101           | 1.00   | 1.00    | 1.00         | 1.00         | 1.00     |              | 1.1 0.       | 5         |             |             |            |            |               |          |                       |             |
| Caterpillar 345 BL   | Excavator   | +                       | 43              |                 | O Diesel  | Main      | Tier 2               | 0.43        |              | 0.052495504      | 0.367       | 32,525          | 4.3351 |                  |  |  |        |                 |        | 1.00    | 1.00         | 1.00         |          |              |              | 5         |             |             |            |            |               |          |                       |             |
|  |   | + ;                     | 43              | 30 30           | 5 Diesel  | Main      |                      | 0.53        |              |                  |             |                 | 4.335  | 7 0.0425         | 0.1316 0.17  | 75913 1  | 1.009  |                 |        | 0.93    | 1.53         | 1.23         |          |              | 1.1 0.       | 5         |             |             |            |            |               | 5 2.24E  | -06 3.92E             |             |
| Caterpillar 450E; or Equivalent Caterpillar TL943: or Equivalent | Backhoe   | 1                       | 70              | 38 8            | Diesel    | Main      | Tier 2<br>Tier 2     | 0.21        |              | 0.058360124      | 0.408       | 9,072<br>15,230 | 4.7    | 7 2.3655         | 0.24 0.38  | 37029 1  | 1.009  |                 |        | 34 1.10 | 2.57         | 1.97         |          |              | 1.1 0.1      | 5         |             |             |            |            |               | 5 6.25E  | 07 1.000              | )           |
|  | Surface grader                                      |                         | 70              | 01 10           |           | Main      |                      | 0.48        |              |                  |             |                 | 4.7    |                  |  |  |        |                 |        |         |              | 1.23         |          |              | 1.1 0.       | 5         |             |             |            |            |               |          |                       |             |
| Terex Genie; or Equivalent<br>Caterpillar IT24F                  | Telescopic Handler                                  | 1                       | 1.40            | J1 8            | 3 Diesel  | Main      | Tier 2               | 0.58        |              | 0.058360124      | 0.408       |                 | 4.7    | . 2.0000         | 0.2.   |  |        |                 |        |         |              | 1.23         | 1.00     | J.1.         | 1.1 0.1      | 5         |             |             |            |            |               |          |                       |             |
| Genie Scissor lift RT 2668; or Equivalent                        | Integrated Tool Carrier Scissor Lift, Rough Terrain | 1                       | 1,40            |                 | Diodoi    | Main      | Tier 2<br>Tier 2     | 0.58        |              | 0.058360124      | 0.408       | 29,029<br>7,605 | 4.4399 |                  | 0.21 0.00  | 31 OEO 1   | 1.000  |                 |        | 0.00    | 1.00         | 1.23         | 1.00     |              | 1.1 0.1      | 5         |             |             |            |            |               |          |                       |             |
|  |   |                         |                 |                 | Diesel    | Main      |                      | 0.48        |              |                  | 0.406       |                 | 4.4398 |                  |  |  | 1.009  | 1.101 1.47      |        | 0.95    | 1.53         | 1.23         |          |              | 1.1 0.       | 5         |             |             |            |            |               |          |                       |             |
| Western Star 4900 SA; or Equivalent                              | Fuel & Lube Truck                                   | 1                       | 1,40            |                 | Dicco     | Main      | Tier 2               | 0.58        |              | 0.052495504      |             |                 |        |                  |  |  | 1.000  | 1.101           | 1.00   | 34 0.95 | 1.53         | 1.23         |          | 044          | 1.1 0.1      | 5         |             |             |            |            |               |          |                       |             |
| Western Star 4900 SA; or Equivalent                              | Boom Truck (Alternative "Hiab Truck")               | 1                       | 70              |                 | 0 Diesel  | Main      | Tier 2               | 0.58        |              | 0.052495504      | 0.367       | 61,698          | 4.3351 |                  | 0.1316 0.17  |  | 1.009  | 1.101 1.47      |        | 34 0.95 |              | 1.23         |          |              | 1.1 0.1      | 5         |             |             |            |            |               |          |                       | 4E-07 5.08E |
| Western Star 4900 SA; or Equivalent                              | Water Truck   | 1                       | 70              |                 | 0 Diesel  | Main      | Tier 2               | 0.58        |              | 0.052495504      |             |                 | 4.3351 |                  |  |  | 1.009  | 1.101 1.47      |        | 0.95    |              | 1.23         |          | 044          | 1.1 0.1      | 5         |             |             |            |            |               |          |                       | 1E-07 5.08E |
| Ford F-450 Crew Cab Flat Deck; or equivalent                     | Welding Truck                                       | 1                       | 1,40            |                 |           | Main      | Tier 2               | 0.58        |              | 0.052495504      | 0.367       | 109,596         | 4.3351 |                  |  |  | 1.009  | 1.101 1.47      |        | 0.95    |              | 1.23         |          | 044          | 1.1 0.1      | 5         |             | 03 1.26E-0  |            |            |               |          |                       |             |
| Ford F-250 Crewcab, or equivalent                                | Light Duty Truck                                    | 1                       | 70              |                 | 0 Diesel  | Main      | Tier 2               | 0.58        |              | 0.052495504      | 0.367       |                 | 4.3351 |                  |  |  | 1.009  | 1.101 1.47      |        | 34 0.95 |              | 1.23         |          | 044          | 1.1 0.1      | 5         |             | -03 6.32E-0 |            |            | 05 8.67E-0    |          |                       |             |
| Ford F-250, or equivalent  | Light Duty Truck                                    | 1                       | /0              | 01 40           | Diodoi    | Main      | Tier 2               | 0.58        |              | 0.052495504      | 0.367       | 54,798          | 4.3351 |                  | 0.1316 0.17  |  | 1.009  | 1.101 1.47      |        | 34 0.95 |              | 1.23         |          | 044          | 1.1 0.1      | 5         |             |             |            |            |               |          |                       | IE-07 4.51E |
| Chevrolet Express 2500 Standard, or equivalent                   | Mine Ambulance                                      | 1                       | 8               |                 | i0 Diesel | Main      | Tier 2               | 0.58        |              | 0.052495504      | 0.367       | 4,285           |        | 4 0.7475         | 0.1316 0.32  |  | 1.000  | 1.101 1.47      |        | 34 0.95 |              | 1.23         |          | 044          | 1.1 0.1      |           |             |             |            |            |               |          |                       | SE-08 3.53E |
| Ford F-450 Crew Cab Flat Deck; or equivalent                     | Fire Truck  | 1                       | 8               | 88 40           | 0 Diesel  | Main      | Tier 2               | 0.58        |              | 0.052495504      |             |                 |        |                  |  |  | 1.009  | 1.101 1.47      |        | 0.00    | 1.53         | 1.23         |          | 044          | 1.1 0.1      | 5         |             |             |            |            |               |          |                       | SE-08 5.64E |
| Fire Truck, Pumps/Foam Package                                   | Fire Truck, Pumps/Foam Package                      | 1 1                     | 8               | 58 2            | 5 Diesel  | Main      | Tier 2               | 0.58        |              | 0.058360124      | 0.408       | 475             | 4.4399 |                  |  | 3100L  | 1.009  | 1.101 1.47      |        | 34 0.95 | 1.53         | 1.23         |          | 044          | 1.1 0.1      | 5         |             | 05 1.26E-0  |            |            | 06 1.78E-0    |          |                       |             |
| Ford F-250 Supercab, or equivalent                               | Light Duty Truck, Diesel                            | 1                       | 70              |                 | 0 Diesel  | Main      | Tier 2               | 0.58        |              | 0.052495504      | 0.367       | 54,798          | 4.3351 |                  |  |  | 1.009  | 1.101 1.47      |        | 34 0.95 |              | 1.23         |          | 044          | 1.1 0.       | 5         |             | -03 6.32E-0 |            |            |               |          |                       |             |
| Ford F-250 Crewcab, or equivalent                                | Light Duty Truck                                    | 1 1                     | 70              | 01              | 0 Diesel  | Main      | Tier 2               | 0.58        |              | 0.052495504      |             |                 |        |                  |  |  | 1.000  | 1.101 1.47      |        | 0.00    |              | 1.23         |          | 044          | 1.1 0.1      | 5         |             |             |            |            |               |          |                       | IE-07 4.51E |
| Ford F-250, or equivalent  | Light Duty Truck                                    | 1                       | 70              | U1 40           | 0 Diesel  | Main      | Tier 2               | 0.58        |              | 0.052495504      | 0.367       | 54,798          | 4.3351 |                  |  |  | 1.009  | 1.101 1.47      |        | 34 0.95 |              | 1.23         | 1.05 0.0 |              | 1.1 0.1      | 5         |             |             |            |            |               |          |                       | 1E-07 4.51E |
| Ford F-250, or equivalent  | Light Duty Truck                                    | 2                       | 70              | 01 40           | 0 Diesel  | Main      | Tier 2               | 0.58        |              | 0.052495504      | 0.367       | 109,596         | 4.3351 |                  |  | 75913 1  | 1.009  | 1.101 1.47      |        | 0.95    | 1.53         | 1.23         |          | 044          | 1.1 0.1      | 5         |             | -03 1.26E-0 |            |            | 04 1.73E-0    |          |                       |             |
| Girardin Minibus Inc; 300D                                       | Community Bus                                       | 1                       | 1,40            |                 | 5 Diesel  | Main      | Tier 2               | 0.58        |              | 0.052495504      | 0.367       | 89,001          | 4.3351 |                  | 0.1316 0.17  | 75913 1  | 1.009  | 1.101 1.47      |        | 0.95    | 1.53         | 1.23         |          | 044          | 1.1 0.1      | 5         |             | -03 1.03E-0 |            |            |               |          |                       |             |
| Terex Genie; or Equivalent                                       | Personnel Carrier                                   | 2                       | 1,46            |                 | 3 Diesel  | Support   | Tier 1               | 0.48        |              | 0.09658086       |             | 52,956          | 5.5988 |                  |  |  | 1.02 1 | 1.101 1.47      |        | 0.95    |              | 1.23         |          | 044          | 1.1 0.1      | -         |             |             |            |            |               |          |                       | 3E-07 4.36E |
| Genie Scissorlift RT 2668; or Equivalent                         | Scissor Lift, Rough Terrain                         | 2                       | 1,46            | 64 2            | 5 Diesel  |           | Tier 1               | 0.48        |              | 0.09658086       |             |                 | 4.4399 |                  |  |  | 1.027  | 1.101 1.47      |        |         |              | 1.23         |          | 044          | 1.1 0.1      | -         |             |             |            |            |               |          |                       | 2E-07 1.31E |
| Western Star 4900 SA Mixer                                       | Concrete Truck                                      | 1                       | 72              | 20 45           | 0 Diesel  | Support   | Tier 1               | 0.58        | 0.0015       | 0.086875431      | 0.367       | 63,388          | 6.0153 | 3 1.306          | 0.2008 0.21  | 13435 1  | 1.024  | 1.101 1.47      | 3 1.03 | 36 0.95 | 1.53         | 1.23         | 1.05 0.0 | 044          | 1.1 0.1      | 5         |             | -03 1.13E-0 |            |            |               |          |                       |             |
| TOTAL  | •   |                         |                 |                 |           |           |                      |             |              |                  |             |                 |        |                  | •  |  |        |                 |        |         |              |              |          |              |              |           | 3.21F-      | -01 1 06F-0 | 1 1 48F-02 | 1.43F-0    | 1 1 58F-0     | 2 7.05F  | -04 1 23              | 3E-04 8.42E |



| Model  | Type of Equipment                     | Number of<br>Equipment/ | Annual hours of | Engine<br>Horse | Fuel Type | Equipment | Engine<br>Technology | Load Factor | Fuel Sulphur | PM<br>Adjustment | In use fuel consumptio | Annual Fuel n Consumption | Zero   | o hour emission | factor (g/hp-hr) |         | De    | terioration Fact | tor     | Tra     | ınsient Adju | ustment Fac | tor  | Emission | factor based | on fuel coi | nsumption |          |          | Exha      | ust emissi | on rate (tonn | e/day)   |          |          |
|--|---------------------------------------|-------------------------|-----------------|-----------------|-----------|-----------|----------------------|-------------|--------------|------------------|------------------------|---------------------------|--------|-----------------|------------------|---------|-------|------------------|---------|---------|--------------|-------------|------|----------|--------------|-------------|-----------|----------|----------|-----------|------------|---------------|----------|----------|----------|
|  |                                       | Vehicle                 | Operation       | Power (hp       | )         | Category  | Category             |             | (% weight)   | Factor           | (lb/hp-hr)             | (L)                       | NOx    | СО              | PM10             | VOC N   | NOx   | CO PM10          | voc     | NOx     | co           | PM10        | voc  | PAH      | N2O          | CH4         | CO2       | Nox      | СО       | PM10      | PM2.5      | VOC           | SO2      | PAH      | CO2e     |
| A  | В                                     | С                       | D               | E               | F         | G         | Н                    | 1           | J            | K                | L                      | M                         | N1     | N2              | N3               | N4 (    | 01    | 02 03            | 04      | P1      | P2           | P3          | P4   | 21       | Q2 Q:        | 3 Q-        | 4         | R1       | R2       | R3        | R4         | R5            | R6       | R7       | R8       |
| Closure  | ·                                     | •                       |                 | •               |           | •         | •                    |             | •            |                  | •                      |                           |        | •               |                  | •       | •     | •                |         | -       |              |             |      | •        | •            | •           | -         | •        |          |           | •          | •             |          | •        |          |
| Caterpillar 527: or equivalent                         | Skidder                               | 1                       | 109             | 8 166,28648     | 7 Diesel  | Main      | Tier 2               | 0.23        | 0.0015       | 0.052495504      | 0.36                   | 35725.65252               | 4.1    | 0.8667          | 0.18 0.          | 356674  | 1.009 | 1.101 1.4        | 173 1.0 | 34 1.1  | 2.57         | 1.97        | 2.29 | 0.0044   | 1.1          | 0.15        | 2663      | 5.24E-04 | 2.82E-04 | 5.41E-05  | 5.24E-05   | 9.91E-05      | 2.46E-06 | 4.31E-07 | 2.94E-01 |
| Caterpillar 501 HD Track Harvester: or equivalent      | Harvester                             | 1                       | 109             | 8 156.89934     | 7 Diesel  | Main      | Tier 2               | 0.58        | 0.0015       | 0.052495504      | 0.36                   | 37 33708.88182            | 4.1    | 0.8667          | 0.18 0.          | 356674  | 1.009 | 1.101 1.4        | 173 1.0 | 34 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      | 1.08E-03 | 4.00E-04 | 7.49E-05  | 7.27E-05   | 1.08E-04      | 2.32E-06 | 4.06E-07 | 2.78E-01 |
| Caterpillar 777F/Komatsu HD 785-7                      | Surface rock haulage trucks           | 2                       | 219             | 6 1016.4932     | 1 Diesel  | Main      | Tier 2               | 0.58        | 0.0015       | 0.052495504      | 0.36                   | 67 873549.8262            | 4.1    | 0.7642          | 0.1316 0.        | 175913  | 1.009 | 1.101 1.4        | 173 1.0 | 34 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      | 2.79E-02 | 9.13E-03 | 1.32E-03  | 1.28E-03   | 1.38E-03      | 6.02E-05 | 1.05E-05 | 7.20E+00 |
| Sandvik 50   | Underground Haulage Unit              | 2                       | 73:             | 2 522.99782     | 4 Diesel  | Main      | Tier 2               | 0.58        | 0.0015       | 0.052495504      | 0.36                   | 7 149817.2525             | 4.3351 | 0.8425          | 0.1316 0.        | 175913  | 1.009 | 1.101 1.4        | 173 1.0 | 34 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      | 5.06E-03 | 1.73E-03 | 2.26E-04  | 2.19E-04   | 2.37E-04      | 1.03E-05 | 1.81E-06 | 1.23E+00 |
| Western Star 4900 SA; or Equivalent                    | Dump Truck                            | 1                       | 73:             | 2 449.93905     | 1 Diesel  | Main      | Tier 2               | 0.58        | 0.0015       | 0.052495504      | 0.36                   | 67 64444.46739            | 4.3351 | 0.8425          | 0.1316 0.        | 175913  | 1.009 | 1.101 1.4        | 173 1.0 | 34 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      | 2.17E-03 | 7.43E-04 | 9.73E-05  | 9.44E-05   | 1.02E-04      | 4.44E-06 | 7.77E-07 | 5.31E-01 |
| Caterpillar 992K/Komatsu WA 900-3                      | Wheeled Front End Loader              | 1                       | 219             | 6 800.58897     | 6 Diesel  | Main      | Tier 2               | 0.48        | 0.0015       | 0.052495504      | 0.36                   | 344003.4606               | 4.1    | 0.7642          | 0.1316 0.        | 175913  | 1.009 | 1.101 1.4        | 173 1.0 | 34 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      | 9.09E-03 | 2.98E-03 | 4.30E-04  | 4.17E-04   | 4.50E-04      | 2.37E-05 | 4.15E-06 | 2.83E+00 |
| Caterpillar 988H/Komatsu WA 600                        | Wheeled Front End Loader              | 1                       | 219             | 6 520.31578     | 3 Diesel  | Main      | Tier 2               | 0.48        | 0.0015       | 0.052495504      | 0.36                   | 37 223573.4384            | 4.3351 | 0.8425          | 0.1316 0.        | 175913  | 1.009 | 1.101 1.4        | 173 1.0 | 34 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      | 6.24E-03 | 2.13E-03 | 2.79E-04  | 2.71E-04   | 2.93E-04      | 1.54E-05 | 2.70E-06 | 1.84E+00 |
| Caterpillar IT24F                                      | Integrated Tool Carrier               | 1                       | 219             | 6 95.212424     | 3 Diesel  | Main      | Tier 2               | 0.48        | 0.0015       | 0.058360124      | 0.40                   | 08 45482.1439             | 4.7    | 2.3655          | 0.24 0.          | 387029  | 1.009 | 1.101 1.4        | 173 1.0 | 34 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      | 1.24E-03 | 1.10E-03 | 1.04E-04  | 1.00E-04   | 1.18E-04      | 3.13E-06 | 5.48E-07 | 3.75E-01 |
| Caterpillar D8T/Komatsu D155AX-6                       | Track-dozer                           | 1                       | 219             | 6 580.66168     | 6 Diesel  | Main      | Tier 2               | 0.58        | 0.0015       | 0.052495504      | 0.36                   | 37 249503.3475            | 4.3351 | 0.8425          | 0.1316 0.        | 175913  | 1.009 | 1.101 1.4        | 173 1.0 | 34 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      | 8.42E-03 | 2.88E-03 | 3.77E-04  | 3.65E-04   | 3.95E-04      | 1.72E-05 | 3.01E-06 | 2.06E+00 |
| Caterpillar D4H  | Tracked-Dozer                         | 1                       | 219             | 6 309.77563     | 4 Diesel  | Main      | Tier 2               | 0.58        | 0.0015       | 0.052495504      | 0.36                   | 37 133106.8667            | 4.3351 | 0.8425          | 0.1316 0.        | 175913  | 1.009 | 1.101 1.4        | 173 1.0 | 34 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      | 4.49E-03 | 1.53E-03 | 2.01E-04  | 1.95E-04   | 2.11E-04      | 9.18E-06 | 1.60E-06 | 1.10E+00 |
| Caterpillar D6T; Aker request; not req if D10 over ice | Track-dozer                           | 1                       | 219             | 6 199.81198     | 9 Diesel  | Support   | Tier 1               | 0.58        | 0.0015       | 0.086875431      | 0.36                   | 85856.8101                | 5.5772 | 0.7475          | 0.2521 0.        | 325159  | 1.024 | 1.101 1.4        | 173 1.0 | 36 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      | 3.78E-03 | 8.78E-04 | 2.58E-04  | 2.50E-04   | 2.52E-04      | 5.92E-06 | 1.03E-06 | 7.07E-01 |
| Caterpillar 345 BL                                     | Excavator                             | 1                       | 72              | 0 379.50867     | 7 Diesel  | Main      | Tier 2               | 0.53        | 0.0015       | 0.052495504      | 0.36                   | 57 53465.67776            | 4.3351 | 0.8425          | 0.1316 0.        | 175913  | 1.009 | 1.101 1.4        | 173 1.0 | 34 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      | 1.65E-03 | 5.63E-04 | 7.38E-05  | 7.16E-05   | 7.73E-05      | 3.69E-06 | 6.45E-07 | 4.40E-01 |
| Caterpillar 450E; or Equivalent                        | Backhoe                               | 1                       | 108             | 0 95.212424     | 3 Diesel  | Main      | Tier 2               | 0.21        | 0.0015       | 0.058360124      | 0.40                   | 08 22368.26749            | 4.7    | 2.3655          | 0.24 0.          | 387029  | 1.009 | 1.101 1.4        | 173 1.0 | 34 1.1  | 2.57         | 1.97        | 2.29 | 0.0044   | 1.1          | 0.15        | 2663      | 3.09E-04 | 3.96E-04 | 3.77E-05  | 3.66E-05   | 5.53E-05      | 1.54E-06 | 2.70E-07 | 1.84E-01 |
| Grove RT9150E; or equivalent                           | Rough Terrain Crane; 135 tonnes       | 1                       |                 | 4 300.38849     |           | Support   | Tier 1               | 0.43        | 0.0015       | 0.086875431      | 0.36                   | 67 86048.8835             | 6.0153 | 1.306           | 0.2008 0.        | 213435  | 1.024 | 1.101 1.4        | 173 1.0 | 36 1    | 1            | 1           | 1    | 0.0044   | 1.1          | 0.15        | 2663      | 3.19E-03 | 7.45E-04 | 1.08E-04  | 1.05E-04   | 1.17E-04      | 5.93E-06 | 1.04E-06 | 7.09E-01 |
| Manitowoc (Grove) RT540E type; or Equivalent           | Rough Terrain Crane; 36.2 tonnes      | 1                       | 219             | 6 159.97832     | 9 Diesel  | Main      | Tier 2               | 0.43        | 0.0015       | 0.052495504      | 0.36                   | 68740.76522               | 4.1    | 0.8667          | 0.18 0.          | 356674  | 1.009 | 1.101 1.4        | 173 1.0 | 34 1    | 1            | 1           | 1    | 0.0044   | 1.1          | 0.15        | 2663      | 1.71E-03 | 3.95E-04 | 8.80E-05  | 8.54E-05   | 1.56E-04      | 4.74E-06 | 8.29E-07 | 5.66E-01 |
| Western Star 4900 SA; or Equivalent                    | Boom Truck (Alternative "Hiab Truck") | 1                       | 219             | 6 449.93905     | 1 Diesel  | Main      | Tier 2               | 0.58        | 0.0015       | 0.052495504      | 0.36                   | 67 193333.4022            | 4.3351 | 0.8425          | 0.1316 0.        | 175913  | 1.009 | 1.101 1.4        | 173 1.0 | 34 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      | 6.52E-03 | 2.23E-03 | 2.92E-04  | 2.83E-04   | 3.06E-04      | 1.33E-05 | 2.33E-06 | 1.59E+00 |
| Caterpillar TL943; or Equivalent                       | Telescopic Handler                    | 1                       | 195             | 2 99.905994     | 5 Diesel  | Main      | Tier 2               | 0.48        | 0.0015       | 0.058360124      | 0.40                   | 08 42421.53015            | 4.7    | 2.3655          | 0.24 0.          | 387029  | 1.009 | 1.101 1.4        | 173 1.0 | 34 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      | 1.16E-03 | 1.02E-03 | 9.65E-05  | 9.37E-05   | 1.10E-04      | 2.92E-06 | 5.11E-07 | 3.50E-01 |
| Caterpillar TL943; or Equivalent                       | Telescopic Handler                    | 1                       | 195             | 2 99.905994     | 5 Diesel  | Support   | Tier 1               | 0.48        | 0.0015       | 0.09658086       | 0.40                   | 08 42421.53015            | 5.5988 | 2.3655          | 0.473            | 0.54945 | 1.024 | 1.101 1.4        | 173 1.0 | 36 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      | 1.40E-03 | 1.02E-03 | 1.95E-04  | 1.89E-04   | 1.56E-04      | 2.92E-06 | 5.11E-07 | 3.50E-01 |
| Caterpillar TL642                                      | Telescopic Handler                    | 1                       | 195             | 2 99.905994     | 5 Diesel  | Support   | Tier 1               | 0.48        | 0.0015       | 0.09658086       | 0.40                   | 08 42421.53015            | 5.5988 | 2.3655          | 0.473            | 0.54945 | 1.024 | 1.101 1.4        | 173 1.0 | 36 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      | 1.40E-03 | 1.02E-03 | 1.95E-04  | 1.89E-04   | 1.56E-04      | 2.92E-06 | 5.11E-07 | 3.50E-01 |
| Clark, ECX 32  | Medium Forklift                       | 1                       |                 | 0               | 0 Diesel  | Main      | Tier 2               | 0.48        | 0.0015       | 0.058360124      | 0.40                   | 0 80                      | 4.3    | 4.1127          | 0.5 0.           | 580543  | 1.009 | 1.101 1.4        | 173 1.0 | 34 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      | 0.00E+00 | 0.00E+00 | 0.00E+00  | 0.00E+00   | 0.00E+00      | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Clark, CSM 15  | Walkie Straddle Pallet Truck          | 1                       |                 | 0               | 0 Diesel  | Main      | Tier 2               | 0.48        | 0.0015       | 0.058360124      | 0.40                   | 0 80                      | 4.3    | 4.1127          | 0.5 0.           | 580543  | 1.009 | 1.101 1.4        | 173 1.0 | 34 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      | 0.00E+00 | 0.00E+00 | 0.00E+00  | 0.00E+00   | 0.00E+00      | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Genie Scissorlift RT 2668; or Equivalent               | Scissor Lift, Rough Terrain           | 1                       | 146-            | 4 24.942973     | 1 Diesel  | Main      | Tier 2               | 0.48        | 0.0015       | 0.058360124      | 0.40                   | 08 7943.360343            | 4.4399 | 2.161           | 0.2665 0.        | 461652  | 1.009 | 1.101 1.4        | 173 1.0 | 34 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      | 2.04E-04 | 1.75E-04 | 2.04E-05  | 1.98E-05   | 2.46E-05      | 5.47E-07 | 9.58E-08 | 6.54E-02 |
| Genie Scissorlift RT 2668; or Equivalent               | Scissor Lift, Rough Terrain           | 2                       | 146             | 4 24.942973     | 1 Diesel  | Support   | Tier 1               | 0.48        |              | 0.09658086       | 0.40                   | 08 15886.72069            | 4.4399 | 2.161           | 0.2665 0.        | 461652  | 1.024 | 1.101 1.4        | 173 1.0 | 36 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      | 4.15E-04 | 3.50E-04 | 3.71E-05  | 3.60E-05   | 4.92E-05      | 1.09E-06 | 1.92E-07 | 1.31E-01 |
| Bobcat S150  | Skid Steer-Loader                     | 1                       |                 | 48.947232       |           | Main      | Tier 2               | 0.23        |              | 0.058360124      | 0.40                   | 08 15587.77702            | 4.7279 | 1.5323          | 0.3389 0.        | 293961  | 1.009 | 1.101 1.4        | 173 1.0 | 1.1     | 2.57         | 1.97        | 2.29 | 0.0044   | 1.1          | 0.15        | 2663      | 2.37E-04 | 1.96E-04 | 4.18E-05  | 4.05E-05   | 3.21E-05      | 1.07E-06 | 1.88E-07 | 1.28E-01 |
| Bobcat S70   | Skid Steer-Loader                     | 1                       |                 | 4 23.467851     | 1 Diesel  | Main      | Tier 2               | 0.23        |              | 0.058360124      | 0.40                   | 08 7473.591721            | 4.4399 | 2.161           | 0.2665 0.        | 461652  | 1.009 | 1.101 1.4        | 173 1.0 | 1.1     | 2.57         | 1.97        | 2.29 | 0.0044   | 1.1          | 0.15        | 2663      |          |          | 1.55E-05  |            | 2.41E-05      | 5.15E-07 | 9.01E-08 |          |
| Bobcat S150  | Skid Steer-Loader                     | 1                       | 146             | 48.947232       | 2 Diesel  | Support   | Tier 1               | 0.23        | 0.0015       | 0.09658086       | 0.40                   | 08 15587.77702            | 4.7279 | 1.5323          | 0.3389 0.        | 293961  | 1.024 | 1.101 1.4        | 173 1.0 | 36 1.1  | 2.57         | 1.97        | 2.29 | 0.0044   | 1.1          | 0.15        | 2663      | 2.40E-04 | 1.96E-04 | 4.00E-05  | 3.88E-05   | 3.21E-05      | 1.07E-06 | 1.88E-07 | 1.28E-01 |
| Bobcat S150  | Skid Steer-Loader                     | 1                       |                 | 48.947232       | 2 Diesel  | Support   | Tier 1               | 0.23        |              | 0.09658086       |                        | 08 15587.77702            | 4.7279 | 1.5323          |                  | 293961  | 1.024 | 1.101 1.4        |         | 36 1.1  | 2.57         | 1.97        | 2.29 | 0.0044   | 1.1          | 0.15        | 2663      |          |          | 4.00E-05  |            |               |          | 1.88E-07 |          |
| Western Star 4900 SA; or Equivalent                    | Fuel & Lube Truck                     | 1                       |                 | 0 449.93905     |           | Main      | Tier 2               | 0.58        |              | 0.052495504      |                        | 63388.00071               | 4.3351 |                 |                  | 175913  | 1.009 |                  | 173 1.0 | 34 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      |          |          |           |            | 1.00E-04      | 4.37E-06 | 7.64E-07 | 5.22E-01 |
| Western Star 4900 SA; or Equivalent                    | Water Truck                           | 1                       |                 | 0 449.93905     |           | Main      | Tier 2               | 0.58        |              | 0.052495504      |                        | 63388.00071               | 4.3351 |                 |                  | 175913  | 1.009 | 1.101 1.4        |         | 34 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      |          |          | 9.57E-05  |            |               | 4.37E-06 | 7.64E-07 |          |
| Ford F-250 Supercab, or equivalent                     | Light Duty Truck, Diesel              | 1                       | 96              | 0 399.62397     | 8 Diesel  | Main      | Tier 2               | 0.58        | 0.0015       | 0.052495504      | 0.36                   | 75066.06347               | 4.3351 | 0.8425          | 0.1316 0.        | 175913  | 1.009 | 1.101 1.4        | 173 1.0 | 34 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      | 2.53E-03 | 8.65E-04 | 1.13E-04  | 1.10E-04   | 1.19E-04      | 5.18E-06 | 9.05E-07 | 6.18E-01 |
| Ford F-250 Supercab, or equivalent                     | Light Duty Truck, Diesel              | 1                       |                 | 0 400.96499     |           | Support   | Tier 1               | 0.58        |              | 0.086875431      |                        | 75317.96301               | 6.0153 | 1.306           |                  |         | 1.024 |                  | 173 1.0 | 0.00    |              | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      |          |          |           |            | 1.45E-04      |          |          |          |
| Ford F-250, or equivalent                              | Light Duty Truck                      | 4                       |                 | 0 399.62397     |           |           | Tier 1               | 0.58        |              | 0.086875431      | 0.36                   | 300264.2539               | 6.0153 | 1.306           | 0.2000           | 213435  | 1.024 | 1.101 1.4        |         | 36 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      |          | 0.000    |           | 0.000      | 5.77E-04      |          | 0.000    |          |
| Ford F-250, or equivalent                              | Light Duty Truck                      | 1                       |                 | 0 399.62397     |           | Support   | Tier 1               | 0.58        |              | 0.086875431      | 0.36                   | 7 7 7 0 0 0 0 1 1         | 6.0153 | 1.306           |                  | 213435  | 1.024 | 1.101 1.4        |         | 36 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      |          |          | 1.69E-04  |            | 1.44E-04      |          |          |          |
| Ford F-250, or equivalent                              | Light Duty Truck                      | 1                       |                 | 0 399.62397     |           | Support   | Tier 1               | 0.58        |              | 0.086875431      | 0.36                   | 37 150132.1269            | 6.0153 | 1.306           |                  | 213435  | 1.024 |                  | 173 1.0 | 36 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      |          |          | 3.38E-04  |            |               |          | 1.81E-06 |          |
| Ford F-250, or equivalent                              | Light Duty Truck                      | 1                       |                 | 0 399.62397     |           |           | Tier 1               | 0.58        |              | 0.086875431      |                        | 67 150132.1269            | 6.0153 | 1.306           |                  | 213435  | 1.024 |                  | 173 1.0 | 36 0.95 |              | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      |          |          | 3.38E-04  |            |               |          | 1.81E-06 |          |
| Ford F-250 Crewcab, or equivalent                      | Light Duty Truck                      | 3                       |                 | 0 399.62397     |           | Support   |                      | 0.58        |              | 0.086875431      |                        | 67 450396.3808            | 6.0153 |                 |                  |         | 1.024 | 1.101 1.4        |         | 0.00    |              | 1.20        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      |          |          |           |            | 8.66E-04      |          |          |          |
| Ford F-450 Crew Cab Flat Deck; or equivalent           | Heavy Duty Truck, Diesel              | 1                       |                 | 0 399.62397     | 8 Diesel  |           | Tier 1               | 0.58        |              | 0.086875431      | 0.36                   |                           | 6.0153 | 1.306           |                  | 213435  | 1.024 | 1.101 1.4        |         | 36 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      |          |          |           | 3.28E-04   | 2.89E-04      | 1.04E-05 | 1.81E-06 |          |
| Ford F-450 Crew Cab Flat Deck; or equivalent           | Heavy Duty Truck, Diesel              | 1                       |                 | 0 399.62397     | 8 Diesel  | Support   |                      | 0.58        |              | 0.086875431      | 0.36                   | 77 100 10L:1200           | 6.0153 | 1.306           |                  | 213435  | 1.024 | 1.101 1.4        |         | 36 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      |          | 2.68E-03 |           | 3.28E-04   | 2.89E-04      | 1.04E-05 | 1.81E-06 | 1.24E+00 |
| Ford F-450 Crew Cab Flat Deck; or equivalent           | Heavy Duty Truck, Diesel              | 1                       |                 | 0 399.62397     |           | Support   |                      | 0.58        |              | 0.086875431      |                        | 57 150132.1269            | 6.0153 | 1.306           |                  | 213435  | 1.024 | 1.101 1.4        |         | 0.00    |              | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      |          |          |           |            | 2.89E-04      |          |          |          |
| Ford F-450 Crew Cab Flat Deck; or equivalent           | Heavy Duty Truck, Diesel              | 2                       |                 | 99.62397        |           | Support   | Tier 1               | 0.58        |              | 0.086875431      |                        | 300264.2539               | 6.0153 | 1.306           | 0.2000           |         | 1.024 | 1.101 1.4        |         | 36 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      |          |          |           |            | 5.77E-04      |          |          |          |
| Ford F-450 Crew Cab Flat Deck; or equivalent           | Heavy Duty Truck, Diesel              | 1                       |                 | 0 399.62397     |           | Support   |                      | 0.58        |              | 0.086875431      |                        | 67 150132.1269            | 6.0153 |                 |                  |         | 1.024 |                  | 173 1.0 |         |              |             | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      |          |          |           |            | 2.89E-04      |          |          |          |
| Ford F-450 Crew Cab Flat Deck; or equivalent           | Heavy Duty Truck, Diesel              | 2                       |                 | 0 399.62397     | 8 Diesel  |           | Tier 1               | 0.58        |              | 0.086875431      | 0.36                   |                           | 6.0153 |                 |                  | 213435  | 1.024 | 1.101 1.4        |         | 36 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      |          |          | 6.75E-04  |            | 5.77E-04      |          | 0.022 00 |          |
| Ford F-450 Crew Cab Flat Deck; or equivalent           | Heavy Duty Truck, Diesel              | 1                       | TOL             | 0 399.62397     | 8 Diesel  | Support   | Tier 1               | 0.58        |              | 0.086875431      | 0.36                   | 67 150132.1269            | 6.0153 | 1.306           |                  | 213435  | 1.024 | 1.101 1.4        | 110     | 36 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      | 1.10E 00 |          | 0.00L 0 1 |            | 2.00E 01      |          | 1.81E-06 |          |
| Ford F-450 Crew Cab Flat Deck; or equivalent           | Welding Truck                         | 1                       |                 | 0 399.62397     |           | Main      | Tier 2               | 0.58        |              | 0.052495504      |                        | 67 150132.1269            | 4.3351 |                 |                  |         | 1.003 | 1.101 1.4        |         | 0.00    |              | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      |          |          |           |            | 2.38E-04      |          |          |          |
| Ford F-450 Crew Cab Flat Deck; or equivalent           | Welding Truck                         | 2                       |                 | 0 399.62397     | 8 Diesel  | e-pp      | Tier 1               | 0.58        |              | 0.086875431      |                        | 300264.2539               | 6.0153 |                 | 0.2000           |         | 1.024 | 1.101 1.4        |         | 36 0.95 |              | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      |          |          |           |            | 5.77E-04      |          |          |          |
| Chevrolet Express 2500 Standard, or equivalent         | Personnel Carrier                     | 1                       |                 | 0 249.96613     | 9 Diesel  | Main      | Tier 2               | 0.58        |              | 0.052495504      |                        | 93908.1492                | 4      | 0.7475          |                  | 020100  | 1.009 | 1.101 1.4        |         | 34 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      |          |          |           |            | 2.75E-04      |          |          |          |
| Chevrolet Express 2500 Standard, or equivalent         | Mine Ambulance                        | 1                       |                 | 0 249.96613     |           | Main      | Tier 2               | 0.58        |              | 0.052495504      | 0.36                   | 67 4891.049438            | 4      | 0.7475          |                  | 325159  | 1.009 |                  | 173 1.0 | 34 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      |          |          |           |            | 1.43E-05      |          |          |          |
| Ford F-450 Crew Cab Flat Deck; or equivalent           | Fire Truck                            | 1                       |                 | 0 399.62397     |           | Main      | Tier 2               | 0.58        |              | 0.052495504      | 0.36                   | 7819.381612               | 4.3351 | 0.8425          | 0.1316 0.        | 175913  | 1.009 |                  | 173 1.0 | 34 0.95 | 1.53         | 1.23        | 1.05 | 0.0044   | 1.1          | 0.15        | 2663      |          |          | 1.18E-05  |            |               |          | 9.43E-08 |          |
| Kubota RTV900; or equivalent                           | Rough Terrain Vehicle                 | 1                       | 12              | 442.5366        | 2 Diesel  | Support   | Tier 1               | 0.43        | 0.0015       | 0.086875431      | 0.36                   | 67 10390.8561             | 6.0153 | 1.306           | 0.2008 0.        | 213435  | 1.024 | 1.101 1.4        | 173 1.0 | 36 1    | 1            | 1           | 1    | 0.0044   | 1.1          | 0.15        | 2663      |          |          |           |            | 1.41E-05      |          |          |          |
| TOTAL  | ·                                     |                         |                 |                 |           |           |                      |             |              |                  |                        |                           |        |                 |                  |         |       |                  |         |         |              |             |      |          |              |             |           | 2.40E-01 | 8.86E-02 | 1.18E-02  | 1.15E-02   | 1.13E-02      | 4.27E-04 | 7.46E-05 | 5.10E+01 |

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# Description of the Calculation of Exhaust Emissions During the Construction, Operation and Closure Phases

| A<br>B           |  |
|------------------|--|
|                  | Vehicle model provided by NICO within "NICO Mobile Equipment, REVC, without Aker fuel.xisx".   |
| B<br>C           | Vehicle description of equipment provided by NICO in "NICO Mobile Equipment, REVC, without Aker fuel.sixs".  Number of whicles/mobile equipment provided by NICO in "NICO Mobile Equipment, REVC, without Aker fuel.sixs".   |
| D                | Annual operations hours provided by NICO in "NICO Mobile Equipment_REVC_without Aker fuel.xlsx"  |
| E F              | Engine horsepower provided by NICO in "NICO Mobile Equipment, EEVC_without Aker Fuel Ass"  Vehicle/equipment fuel type provided by NICO in "NICO Mobile Equipment, EEVC_without Aker Fuel Ass"  Vehicle/equipment fuel Type provided by NICO in "NICO Mobile Equipment, EEVC_without Aker Fuel Ass"  |
| G                | NICO provided whether the vehicle/equipment would be owned by NICO or owned by a sub-contractor within "NICO Mobile Equipment, REVC_without Aker fuel.xisx". It was assumed that for all vehiles owned by NICO would be new and thus have a higher tiered emission control technology than those vehicles/equipment that would   |
| н                | be owned by a subcontractor. Equipment owned by NICO was labeled as "MAIN" and equipment owned by the SUPPORT"  See "G" description. It was assumed any weblicles womed by NICO would have a higher tiered emission control (TER 2) and those weblices owned by NICO would have a higher tiered emission control (TER 2) and those weblices owned by NICO would have a higher tiered emission control (TER 3) and those weblices owned by NICO would have a higher tiered emission control (TER 3) and those weblices owned by NICO would have a higher tiered emission control (TER 3) and those weblices owned by NICO would have a higher tiered emission control (TER 3) and those weblices owned by NICO would have a higher tiered emission control technology (TER 1).  |
| I                | Input. Estimated based on information provided by Canadian Zinc.   |
| J                | Fuel sulphur fuel content as spcifed in Canada's Sulphur in Diesel Fuel Regulations (http://www.ec.gc.ca/energie-energy/default.asp?lang=En&n=7A8F92ED-1) Sulfur Adjustment for PM emissions to account for variation in fuel sulphur content in comparison to default values.   |
|                  | SPM adj = BSFC * 453.6 * 7.0 * soxcnv * 0.01 * (soxbas - soxdsl) [Equation 5]  |
|                  | SPM adj = PM sulfur adjustment (g/hp-hr)  BSFC = in-use adjusted thrake-specific fuel consumption (lb fuel/hp-hr) (value L)  |
| К                | 453.6 = conversion from Ib to grams 7.0 = grams PM sulfute/grams PM sulfut soxcm = grams PM sulfut/grams fuel sulfur consumed (extracted from: Exhaust and Crankcase Emission Factors for Nonroad Engine Modelling – Compression Ignition – Report No. NR-009C, page 20 & Appendix C)  |
|                  | 0.01= conversion from percent to fraction soobas = default certification utili utility tereight percent (extracted from: Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition (EPA, April 2004) / Table A4 - Deterioration Factors for Nonroad Diesel Engines) soxdsl = episodic fuel sulfur weight percent (specified by the user)   |
|                  | Source: Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling—Compression-Ignition (EPA, April 2004).   |
| L                | Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling-Compression-Ignition (EPA, 2004) / Table A2. Zero-Hour, Steady-State Emission Factors for Nonroad CI Engines.   |
|                  | Fuel Consumption = EFss * Hp / diesel_density * 3.785412 * Op_Hours * Nu_Equip   |
|                  | EFss = zero-hour, steady-state emission factor (lb/hp-hr) (Value L)  |
|                  | Hp = equipment/vehicle power rating (hp) (value E)   |
| М                | diesel_density = density of diesel taken as 7.1 lb/US gallon 3.785412 is the conversion from 1 gallon to Litre   |
|                  | Op_hours = Vehicle operation hours/year (value D)  |
|                  | Nu_Equip= Number of quipment (value C)   |
|                  | Source: Exhaust and Crankrase Emission Eartors for Monroad Engine Modelline Compression Jenitron (EPA April 2004)  |
| N1; N2; N3; N4   | Extracted from: Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling-Compression-Ignition (EPA, 2004) / Table A2. Zero-Hour, Steady-State Emission Factors for Nonroad CI Engines.   |
|                  | DF = 1 + A * (Age Factor)^b [Equation 4]   |
|                  | Age Factor = fraction of median life expended  |
| 01; 02; 03; 04   | A = constant for a given pollutant/hechnology type (extracted from: Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition (EPA, April 2004) / Table A4 - Deterioration Factors for Nonroad Diesel Engines)   |
|                  | b = constant for a given pollutant/technology type (b = 1 for diesel nonroad engines)  |
|                  | Source: Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling—Compression-Ignition (EPA, April 2004).   |
| P1; P2; P3; P4   | Extracted from: Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling Compression-Ignition (EPA, April 2004) / Table A3 - Transient Adjustment Factors by Equipment Type for Nonroad CI Equipment.  |
| Q1<br>Q2; Q3; Q4 | PAH emission factor taken from (Golder Associates and Conor Pacific), Table 3-51, p: 94 GHG emission factor taken from Environment Canada, National Humenton Report (1990-2008)  |
| α, ω, α          | Emission = (Figs x TAF x DF) * Pop * Power * A** UF  |
|                  | Emission = Annual Emission rate  |
|                  | emission = Annual emission rate EFS= zero-hour, steady-state emission factor (g/hp-hr) (Values N1, N2, and N4)   |
| R1; R2; R5       | TAF = transient adjustment factor (unitless) (Values P1, P2 and P4)  |
|                  | DF = deterioration factor (unitless) (Values 01, 02, 04) Pop = Engine population (value (C) Pop = Engine population (value (C) Pop = Engine population (value (C)  |
|                  | Power = Average power (hp) (Value E)   |
|                  | A = Activity (hours/year) (Value D)  Emission = (EFss × TAF × DF – SPMadj) *Pop * Power * A * LF   |
|                  | Emission - (Ers.) A lar A ur - semiaujj - roji - rowei - A - ur  |
|                  | Emission = Annual Emission rate  |
|                  | EFss = zero-hour, steady-state emission factor (g/hp-hr) (value N3) TAF = transient adjustment factor (unitless) (Value P3)  |
|                  | DF = deterioration factor (unitless) (Value O3)  |
| R3               | SPM adj = adjustment to PM emission factor to account for variations in fuel sulfur content (g/hp-hr) (Value M) Pop = Engine population (value C)  |
|                  | rup = rugine population (sense c) Power = Average power (hp) (Value E)   |
|                  |  |
| 1                | A = Activity (hours/year) (Value D)  |
|                  |  |
|                  | A = Activity (hours/year) (Value D)  |
|                  | A = Activity (hours/year) ( Value D)  LF = Load facotor (Value I)  |
|                  | A = Activity (hours/year) (Value D)  LF = Load factor (Value D)  Source: Exhaust and Crankrase Emission Eartors for Nonroad Engine Modelline Compression limition (EPA_April 2004).  Assumed that PM2.5 is 97% of PM10 mass emissions.   |
| R4               | A = Activity (hours/year) (Value D)  LF = Load factor (Value I)  Source - Exhaust and Crankrase Emission Sectors for Noorcead Engine Modelline Compression-Ispition (EPA_Acril 2004)  Assumed that PM2.5 is 97% of PM10 mass emissions.  Emission = Emission_PM10 * 0.97   |
| R4               | A = Activity (hours/year) (Value D)  IF = Load factor (Value D)  Source: Exhaust and Crankrase Emission Factors for Monroad Engine Modelling Compression Jenition (FRA April 2004)  Assumed that PM2.5 is 97% of PM10 mass emissions.  Emission = Emission_PM10 * 0.97  Emission = Annual Emission rate  |
| R4               | A = Activity (hours/year) (Value 0)  IF = Load facotor (Value 1)  Source: Exhaust and Crankrase Emission Eactors for Monroad Engine Modelling CompressionIgnition (ERA_Actil 2004)  Assumed that PM2.5 is 97% of PM10 mass emissions.  Emission = Emission_PM10 * 0.97  Emission = Annual Emission rate  Emission, PM10 = annual PM10 emission rate (tonne/year) (value R3) 0.97= fraction of PM2.5 emissions  |
| R4               | A = Activity (hours/year) (Value D)  LF = Load factor (Value I)  Source Exhaust and Crankrase Emission Eactors for Nonroad Engine Modelline - Compression-legition (EPA, April 2004)  Assumed that PM2.5 is 97% of PM10 mass emissions.  Emission = Emission = Mn10 * 0.97  Emission = Annual Emission rate  Emission = Annual Emission rate (tonne/year) (value R3)   |
| R4               | a = Activity (hours/year) (Value D)  LF = Load factor (Value I)  Source Exhaust and Crankrase Emission Eartors for Monroad Engine Modeling CompressionJenition (EPA. April 2004)  Assumed that PMZ.5 is 97% of PM10 mass emissions.  Emission = Emission = Emission rate  Emission = Annual Emission rate  Emission = M10 = annual PM10 emission rate (tonne/year) (value R3)  0.97= (raction of PM2.5 emissions  302 = (RSFC* 453.6* (1 - soxcmy) + H()*0.01* soxdsl*2]* Pop * Power * A * LF  502 = Annual Emission rate (tonne/year)  |
| R4               | A = Activity (hours/year) (Value D)  LF = Load factor (Value I)  Source Exhaust and Crankrase Emission Extract for Nonroad Engine Modelline Compression-legition (EPA. April 2004)  Assumed that PM2.5 is 97% of PM10 mass emissions.  Emission = Emission = Mn10 * 0.97  Emission = Annual Emission rate  Emission = Annual Emission rate (tonne/year) (value R3)  0.97   |
| R4               | a = Activity (hours/year) (Value D)  LF = Load factor (Value I)  Source: Evhaust and Crankrase Emission Eartors for Monroad Engine Modeling Commercision-Jenition (EPA. Acril 2004)  Assumed that PMZ.5 is 97% of PM10 mass emissions.  Emission = Emission = Emission rate  Emission = Annual Emission rate  Emission = M10 = annual PM10 emission rate (tonne/year) (value R3)  0.97= (raction of PM2.5 emissions  302 = (ReSFC* 453.6* (1 - soxcmy) + H()* 0.01* soxdsl* 2 ] * Pop * Power * A * LF  502 = Annual Emission rate (tonne/year)  |
| R4               | A = Activity (hours/year) (Value D)  IF = Load factor (Value I)  Source: Exhaust and Crankrase Emission Factors for Nonroad Engine Modelling Compression. Janition (FEA. Actil 2004)  Assumed that PM2.5 is 97% of PM10 mass emissions.  Emission = Emission PM10 * 0.97  Emission = Annual Emission rate  Emission PM10 = annual PM10 emission rate  Emission PM10 = annual PM10 emissions of PM2.5 emissions  SO2 = [(BSFC * 453.6* (1 - socrav) - HC) * 0.01 * soxids * 2 ] * Pop * Power * A * LF  SO2 = Annual Emission rate (tonne/year)  SSFC is the in-use adjusted fuel consumption in lb/hp-hr (Value L)  453.6 is the conversion factor from pounds to grams  soxors is the fraction of fuel sulfur converted to direct PM  KIS the in-use adjusted hydrocrapone emissions in gh-h-r  |
| R4<br>R6         | A = Activity (hours/year) (Value D)  LF = Load factor (Value I)  Source Exhaust and Crankrase Emission Eartors for Nonroad Ensine Modeline Compression Jenition (FEA. Acril 2004)  Assumed that PMZ-5 is 97% of PM10 mass emissions.  Emission = Emission = Mn10 emission rate Emission = Annual Emission rate Emission = Annual Emission rate (Emission = Annual Emission rate (tonne/year) (value R3) 0.97 a fraction of PM2-5 emissions  SOZ = [RISFE * 45.8 oft   3-sox(val)* + HQ * 0.01 * soxisl* * 2   * Pop * Power * A * LF  SOZ = Annual Emission rate (tonne/year)  SSC is the in-use adjusted fuel consumption in lb/hp-hr (Value L)  45.3 is the conversion factor from pounds to grams soxoru is the fraction of fuel suffur converted to direct PM  HC is the in-use adjusted hydrocarbon emissions in g/hp-hr  Old 1s the conversion factor from weight precent to weight fraction   |
|                  | E = Load factor (Value I)   E = Load factor (Value I)   Source Exhaust and Crankrase Emission Eartors for Monroad Engine Modeling Compression.Jenition (FPA. April 2004)   Assumed that PMZ.5 is 97% of PM10 mass emissions.   Emission = Emission = Emission rate   Emission = Emission pM10 = annual PM10 emission rate   Emission = Annual Emission rate   Emission = M10 = annual PM10 emission rate (tonne/year) (value R3)   9.7 = fraction of PM2.5 emissions   302 = [RSFC* +85.6* (1 - soxroy) + R()*0.01* soxidi*2]* Pop * Power * A * LF   SO2 = Annual Emission rate (tonne/year)   SFC is the in-use adjusted fuel consumption in lib/np-hr (Value L)   453.6 is the conversion factor from pounds to grams   soxrow is the fraction of fuel sulfur converted to direct PM   KC is the in-use adjusted hydrocarbon emissions in g/hp-hr   OLD is the conversion factor from weight percent of sulfur in nonroad diesel fuel   2 is the grams of 502 formed from a gram of sulfur  |
|                  | E = Latifyty (hours/year) (Value D)  |
|                  | Extractivity (hours/year) ( Value D)   F = Load factor ( Value I)   F = Load factor ( Value I)   Source-Ephast and Crankrase Emission Extract for Monroad Engine Modeline Compression-Jenition (EPA. April 2004)   Assumed that PM2.5 is 97% of PM10 mass emissions.   Emission = Emission, PM10 * 0.97   Emission = Annual Emission rate (tonnel/year) (value R3)   Oy=F   raction of PM2.5 emissions   SO2 = (IBSFC * 453.5 f* [1 - source) - IRC * 10.1 * souds* * 2 ] * Pop * Power * A * LF   SO2 = Annual Emission rate (tonnel/year)   SSFC is the in-use adjusted fuel consumption in Ib/hp-hr (Value L)   433.6 is the conversion factor from pounds to grams   source is the fraction of fuel suffic converted to direct PM   HC is the in-use adjusted hydrocarbon emissions in g/hp-hr   O.01 is the conversion factor from weight percent to weight fraction sould is the episodic weight percent of suffir in nonroad dises fuel   2 is the grams of SO2 formed from a gram of suffur Pop = Engine population (value C)   Power = Average power (hp) (Value E)   A = Activity (hone)**   A = Activity (hone      |
|                  | E = Load factor (Value I)  |
|                  | Extractivity (hours/year) ( Value D)   F = Load factor ( Value I)   F = Load factor ( Value I)   Source-Ephast and Crankrase Emission Extract for Morroad Engine Modeline Compression-Jenition (ERA. April 2004)   Assumed that PM2.5 is 97% of PM10 mass emissions.   Emission = Emission, PM10 * 0.97   Emission = Annual Emission rate (inner/year) (value R3)   Oy=F inction of PM2.5 emissions   SO2 = (IBSFC * 453.5 f* [1 - source) - IRC * source      |
|                  | a = Activity (hours/year) ( Value D)   |
|                  | A = Activity (hours/year) (Value 1)  En Load factor (Value 1)  Source: Exhaust and Fasicrase Emission Earlors for Monroad Engine Modeline Formoression Ieruition (EPA. Andl 2004)  Assumed that PMZ. 5 is 97% of PM10 mass emissions.  Emission = Emission_PM10 ** 0.97  Emission = Annual Emission rate (tonnelyear) (value R3)  0.97 ** Intention of PM2 of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.3 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.3 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.4 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.3 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.3 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.4 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.3 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.3 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.4 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.5 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.5 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.5 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.5 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.5 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.5 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.5 **     |
|                  | A = Activity (hours/year) (Value D)  **E - Load Factor (Value D)  **Source: Exhaust and Frankrase Ensistion Extros for Montreal Ensiste Modeline. Frankrase Ensistion Extros for Montreal Ensiste Modeline. Frankrase Ensisted Assured Half PM2.5 is 97% of PM10 mass emissions.  **Emission - PM10** 0.97*  **Emission - PM10** 0.97*  **Emission - PM10** annual Emission rate (tonne/year) (value R3)  **Op*= Fraction of PM2.5 emissions  **Op*= Fraction of PM2.5 emissions  **Op*= Fraction of PM2.5 emissions  **Op*= Fraction of PM2.5 emissions  **Op*= Fraction of PM2.5 emissions  **Op*= Fraction of PM2.5 emissions  **Op*= Fraction of PM2.5 emissions  **Op*= Fraction of PM2.5 emissions  **Op*= Fraction of PM2.5 emissions  **Op*= Fraction of PM2.5 emissions  **Op*= Fraction of PM2.5 emissions  **Op*= Fraction of PM2.5 emission in the M2.5 emission in the M2.5 emission of PM2.5 emissions  **Op*= Fraction of PM2.5 emission in the M2.5 emission in the M2.5 emission in the M2.5 emission of PM2.5 emissions  **Op*= Fraction of PM2.5 emission in the M2.5 emission i |
| RG               | A = Activity (hours/year) (Value 1)  En Load factor (Value 1)  Source: Exhaust and Fasicrase Emission Earlors for Monroad Engine Modeline Formoression Ieruition (EPA. Andl 2004)  Assumed that PMZ. 5 is 97% of PM10 mass emissions.  Emission = Emission_PM10 ** 0.97  Emission = Annual Emission rate (tonnelyear) (value R3)  0.97 ** Intention of PM2 of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.2 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.3 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.3 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.4 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.3 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.3 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.4 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.3 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.3 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.4 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.5 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.5 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.5 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.5 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.5 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.5 ** (IBSET** 45.5.6" (L * source)** - IRQ** of emissions  20.5 **     |
| RG               | A = Activity (bours/year) (Value D)  UE 1 coad factor (Value B)  Source: Exhibast and Crackrase Ensiston Eartons for Monroad Ensiste Modellors. Formoression Intention (FER). Acril 2004).  Assumed that PM2.5 is 97% of PM10 mass emissions.  Emission = Armaul Emission rate  Emission = Armaul Emission rate  Emission = Armaul Emission rate  Emission = Armaul Emission rate  Emission = Armaul Emission rate (tonnely-ear) (value R3)  30.2 **(BSEC** 453.5** (1 - sxorm) - HC*** 0.01 * sxords* 2 * 2)** Pop * Power * A * UF  20.2 ** Annual Emission rate (tonnely-ear)  SEC** (SE the horse adjusted fruit consumption in fu/hp hr (Value L)  SEC** (SE the horse adjusted fruit consumption in fu/hp hr (Value L)  40.2 ** Annual Emission rate (tonnely-ear)  SEC** (SE the horse adjusted fruit consumption in fu/hp hr (Value L)  40.2 ** Annual Emission fruit (tonnely-ear)  SEC** (SE the horse adjusted fruit consumption in fu/hp hr (Value L)  40.2 ** Annual Emission rate (tonnely-ear)  SEC** (SE the horse adjusted fruit consumption in fu/hp hr (Value L)  40.2 ** Annual Emission rate (tonnely-ear)  SEC** (SE the horse adjusted fruit consumption in fu/hp hr (Value L)  40.2 ** Annual Emission rate (tonnely-ear)  SEC** (SE the horse adjusted fruit consumption in fu/hp hr (Value L)  40.2 ** Annual Emission rate (tonnely-ear)  Emission (SE the factor (Value B)  Fruit (Fig. 1)  Annual Emission rate (tonnely-ear)  Emission (Fig. 1)  Fruit (Fig. 1)  Fruit (Fig. 1)  Fruit (Fig. 1)  Fruit (Fig. 1)  Fruit (Fig. 2)  |
| RG               | A = Activity (bours/sear ( Value D)  Fourze: Exhibited: and Czacircase Emission Extracts for Moorand Entities Modeline - Compression-Isotition (FEA_Acril 2004)  Assumed that PMCS is 97% of PMIO mass emissions.  Emission = Emission p-PMIO = On Sear ( Value B)  Emission = Annual Emission rate  Emission = Annual Emission rate  Emission = Annual Emission rate  Emission = Mortis = On Sear ( Value B)  902 = Mortis = Mortis = On Sear ( Value B)  902 = Annual Emission rate ( tonnel-year) ( Value B)  902 = Annual Emission rate ( tonnel-year)  802 = Annual Emission rate ( tonnel-year)  802 = Annual Emission rate ( tonnel-year)  802 = Annual Emission rate ( tonnel-year)  802 = Annual Emission rate ( tonnel-year)  803 = Annual Emission rate ( tonnel-year)  804 = Annual Emission rate ( tonnel-year)  805 = Annual Emission rate ( tonnel-year)  805 = Annual Emission rate ( tonnel-year)  805 = Annual Emission rate ( tonnel-year)  805 = Annual Emission rate ( tonnel-year)  805 = Annual Emission rate ( tonnel-year)  805 = Annual Emission rate ( tonnel-year)  805 = Annual Emission rate ( tonnel-year)  805 = Annual Emission rate ( tonnel-year)  805 = Annual Emission rate ( tonnel-year)  807 = Annual Emission rate ( tonnel-year)  808 = Annual Emission rate ( tonnel-year)  809 = Annual Emission rate ( tonnel-year)  800 = Annual Emission rate ( tonnel-year)  800 = Annual Emission rate ( tonnel-year)  801 = Annual Emission rate ( tonnel-year)  802 = Annual Emission rate ( tonnel-year)  803 = Annual Emission rate ( tonnel-year)  804 = Annual Emission rate ( tonnel-year)  805 = Annual Emission rate ( tonnel-year)  806 = Annual Emission rate ( tonnel-year)  807 = Annual Emission rate ( tonnel-year)  808 = Annual Emission rate ( tonnel-year)  809 = Annual Emission rate ( tonnel-year)  800 = Annual Emission rate ( tonnel-year)  801 = Annual Emission rate ( tonnel-year)  802 = Annual Emission rate ( tonnel-year)  803 = Annual Emission rate ( tonnel-year)  804 = Annual Emission rate ( tonnel-year)  805 = Annual Emission rate ( tonnel-year)  8 |
| RG               | A = Activity (bours/year) (Value 1)  Fe - Load factor (Value 1)  Assumed that PMAZ 5 is 97% of PMX10 mass emissions.  Emission = PMX10 - 0.97  Emission = PMX10 - 0.97  Emission = Annual Emission rate Emission = Annual Emission rate (cone)year) (value R3)  932 - (RBX7 - 83.54° (1 - security) rich") 0.01 * sould *2 1 * Pop * Power * A * UF  202 - Annual Emission rate (concey) rich" 0.01 * sould *2 1 * Pop * Power * A * UF  203 - Annual Emission rate (concey) rich" 0.01 * sould *2 1 * Pop * Power * A * UF  303 - Annual Emission rate (concey) rich" 0.01 * sould *2 1 * Pop * Power * A * UF  303 - Annual Emission rate (concey) rich" 0.01 * sould *2 1 * Pop * Power * A * UF  303 - Annual Emission rate (concey) rich" 0.01 * sould *2 1 * Pop * Power * A * UF  303 - Sould Concern read to direct PM  16 - Sould in the epotics of factor for meight percent to weight fraction sould be pressive the fraction of factor from weight percent to weight fraction sould be the potics of the sould rich may are disable the 12 sould read to the 10 so |
| RG               | A = Activity (bours/pearly (value 1)  Exclusif factor (Value 1)  Source Educat and Cracksase Sensitions Existence Ex |
| RG               | A = Activity (Poucs/year) (Value 1)  Fire 1 coal factor (Value 1)  Formation = Emission = Emission Entries for Normal Entries Modeline - Compression-Aerollo (EEA - Acril 2004)  Assumed that PM2.5 is 97% of PM10 *0.037  Emission = Emission mate Emission nate  Emission = Acroula Emission nate  Emission = Acroula Emission nate  Emission = Acroula Emission nate  Emission (PM2.5 emissions)  O.97* Intelligent of PM2.5 emissions  O.92* (ESEX*** 45.87** 1-5.exem)** + 10.01** sounds** 2.3 * Pop** Power* A* 1.5*  O.92* Agranul Emission nate (Emission Signature)  O.93* Emission of the Compression of the Co |
| R6               | A = Activity (bloom/year) (Value 10)  Fire 1 cold fector (Value 1)  Course, Exhautt and Craskicas & Encisions Extract for Monroad Engine Modeling - Compression Isotitos (EPA, April 2004).  Assumed that PMZ 5 is 97% of PM10 mass emissions.  Emission = Remission PM10** 0.097  Emission = Remission pm10** 0.097  Emission = Remission  |
| R6               | A = Activity (Poucs/year) (Value 1)  Fire 1 coal factor (Value 1)  Formation = Emission = Emission Entries for Normal Entries Modeline - Compression-Aerollo (EEA - Acril 2004)  Assumed that PM2.5 is 97% of PM10 *0.037  Emission = Emission mate Emission nate  Emission = Acroula Emission nate  Emission = Acroula Emission nate  Emission = Acroula Emission nate  Emission (PM2.5 emissions)  O.97* Intelligent of PM2.5 emissions  O.92* (ESEX*** 45.87** 1-5.exem)** + 10.01** sounds** 2.3 * Pop** Power* A* 1.5*  O.92* Agranul Emission nate (Emission Signature)  O.93* Emission of the Compression of the Co |
| R6               | A - Activity (mount/year) (Value 1)  To clad Factor (Value 1)  To clad |

