**TABLE 9A-14 GTP CONSTRUCTION EMISSIONS: EMISSION FACTORS FOR VEHICLE AND EQUIPMENT COMBUSTION EXHAUST EMISSIONS (ONSITE AND OFFSITE)**

Table 9A-14

**GTP Construction Emissions: Emission Factors For Vehicle and Equipment Combustion Exhaust Emissions (onsite and offsite)**

| | | | | | Emission Factors (unit: lb/hr for both nonroad equipment and on-road vehicle) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Equipment/Vehicle Type | Hoursepower (Hp) | Load Factor | Exhausted $PM_{10}$ | Exhausted $PM_{2.5}$ | CO | VOC | $NO_x$ | $SO_x$ | $CO_2$ |
| **Nonroad Equipment** | | | | | | | | | | | |
| GTP -- Non-Phase-Specific Rolling Stock, Passenger,and Equipment (November 2014 - August 2020) | N4 | Power Generation - 200 Main Pioneer Camp | 268.20 | 0.34 | 0.06 | 0.06 | 0.29 | 0.09 | 1.02 | 0.00 | 119.55 |
| | N5 | Power Generation - 700 Main Pioneer Camp | 938.72 | 1.00 | 0.19 | 0.18 | 1.11 | 0.27 | 3.58 | 0.00 | 421.38 |
| | N6 | Power Generation - 335 Main Pioneer Camp | 449.24 | 0.30 | 0.10 | 0.09 | 0.55 | 0.13 | 1.79 | 0.00 | 210.69 |
| | N7 | Site CNST Power Generation - 1 MW | 1,341.02 | 1.00 | 0.07 | 0.06 | 7.72 | 0.42 | 1.48 | 0.01 | 1,566.38 |
| | N8 | Heat - 10,000 sq. ft. Pioneer Camp | 196.33 | 1.00 | 0.03 | 0.03 | 0.04 | 0.00 | 0.16 | 0.00 | 173.87 |
| | N9 | Heat - 46,550 sq. ft. Temp CNSRT Camp | 913.93 | 1.00 | 0.12 | 0.12 | 0.18 | 0.01 | 0.72 | 0.01 | 809.36 |
| | N10 | Heat - 44,555 sq. ft. Perm Ops and Cnst Camp | 874.76 | 1.00 | 0.11 | 0.11 | 0.17 | 0.01 | 0.69 | 0.01 | 774.67 |
| | N11 | Heat - 64,000 sq. ft. Perm Warehouse | 1,256.53 | 1.00 | 0.31 | 0.30 | 0.47 | 0.03 | 1.86 | 0.02 | 2,086.43 |
| | N12 | Heat - 43,000 sq. ft. Perm Maintenance Facil | 844.23 | 1.00 | 0.21 | 0.20 | 0.31 | 0.02 | 1.25 | 0.01 | 1,401.82 |
| | N13 | Heat - 84,000 sq. ft. Perm Ops Cnst and Dining | 1,649.19 | 1.00 | 0.22 | 0.21 | 0.33 | 0.02 | 1.31 | 0.01 | 1,460.50 |
| | N18 | Snow Blower (150-600 hp) / Loader Mount (501hp) | 600.00 | 0.41 | 0.13 | 0.12 | 0.73 | 0.11 | 1.81 | 0.00 | 292.51 |
| | N19 | Light Plant | 30.00 | 0.38 | 0.01 | 0.01 | 0.05 | 0.01 | 0.10 | 0.00 | 12.38 |
| | N20 | Tioga Heaters | 235.60 | 1.00 | 0.02 | 0.02 | 0.03 | 0.00 | 0.11 | 0.00 | 125.31 |
| Gravel Site Construction and Site Conditioning, North Access and Ice Road to PUT 23 (11/27/14 - May 10, 2016) | G2 | CAT 16G/H Motor Grader | 250.00 | 0.45 | 0.06 | 0.06 | 0.22 | 0.06 | 0.65 | 0.00 | 161.27 |
| | G3 | CAT 345 Large Excavator | 345.00 | 0.46 | 0.06 | 0.06 | 0.21 | 0.06 | 0.61 | 0.00 | 162.74 |
| | G4 | Cat 740 Rock Truck | 436.00 | 0.41 | 0.11 | 0.10 | 0.43 | 0.09 | 1.07 | 0.00 | 292.94 |
| | G5 | CAT 966 Loader | 220.00 | 0.45 | 0.06 | 0.06 | 0.25 | 0.07 | 0.75 | 0.00 | 160.41 |
| | G6 | Cat 988B Loader | 375.00 | 0.45 | 0.06 | 0.06 | 0.25 | 0.07 | 0.75 | 0.00 | 160.41 |
| | G7 | Cat 988H Loader | 555.00 | 0.41 | 0.13 | 0.12 | 0.73 | 0.11 | 1.81 | 0.00 | 292.51 |
| | G8 | Cat CS563E Roller | 150.00 | 0.45 | 0.05 | 0.05 | 0.19 | 0.04 | 0.47 | 0.00 | 92.19 |
| | G9 | Cat D-10 Dozer | 700.00 | 0.56 | 0.20 | 0.19 | 1.47 | 0.17 | 2.63 | 0.00 | 493.18 |
| | G10 | CAT D-8 Dozer | 310.00 | 0.46 | 0.06 | 0.06 | 0.23 | 0.06 | 0.67 | 0.00 | 164.26 |
| | G11 | CAT D-9 Dozer | 475.00 | 0.42 | 0.12 | 0.11 | 0.62 | 0.10 | 1.58 | 0.00 | 296.67 |
| | G15 | Heater | 392.67 | 1.00 | 0.03 | 0.03 | 0.04 | 0.00 | 0.16 | 0.00 | 179.02 |
| | G16 | IR CM 2000 Drill and 1600 Compressor | 550.00 | 0.31 | 0.09 | 0.08 | 0.46 | 0.11 | 1.60 | 0.00 | 214.85 |
| | G17 | Blasting equipment | 600.00 | 0.30 | 0.08 | 0.07 | 0.39 | 0.09 | 1.47 | 0.00 | 212.78 |
| | G18 | Pumps/equipment de-watering | 10.00 | 0.33 | 0.00 | 0.00 | 0.04 | 0.01 | 0.04 | 0.00 | 4.72 |
| | G19 | Light Plant | 30.00 | 0.38 | 0.01 | 0.01 | 0.05 | 0.01 | 0.10 | 0.00 | 12.38 |
| | G20 | Portable generators | 100.00 | 0.37 | 0.04 | 0.04 | 0.22 | 0.05 | 0.39 | 0.00 | 48.23 |
| Piles and VSM Installation ( SL1 11/16-1/2017, SL2 12/17-2/2018, SL3 12/18-3/19) | P4 | Crane Hyd 80 Ton | 275.00 | 0.34 | 0.04 | 0.04 | 0.13 | 0.05 | 0.59 | 0.00 | 119.52 |
| | P5 | Drill Watson 3000 | 996.00 | 0.37 | 0.25 | 0.24 | 1.43 | 0.39 | 5.01 | 0.00 | 436.32 |
| | P6 | Drill Texoma | 602.00 | 0.32 | 0.11 | 0.11 | 0.62 | 0.14 | 2.04 | 0.00 | 224.65 |
| | P7 | Envirorac field office | - | 1.00 | - | - | - | - | - | - | - |
| | P10 | Generator 8kw | 14.00 | 0.36 | 0.01 | 0.01 | 0.04 | 0.01 | 0.07 | 0.00 | 7.56 |
| | P11 | Generator 50KW | 67.05 | 0.34 | 0.03 | 0.03 | 0.16 | 0.03 | 0.29 | 0.00 | 33.46 |
| | P12 | Generator 150kw | 240.00 | 0.34 | 0.06 | 0.06 | 0.29 | 0.09 | 1.02 | 0.00 | 119.55 |
| | P13 | Indirect Heater | 14.00 | 1.00 | 0.01 | 0.01 | 0.02 | 0.00 | 0.08 | 0.00 | 87.27 |
| | P14 | Light Plant | 13.50 | 0.37 | 0.01 | 0.00 | 0.03 | 0.01 | 0.06 | 0.00 | 7.66 |
| | P15 | Loader L150 | 269.00 | 0.45 | 0.06 | 0.06 | 0.25 | 0.07 | 0.75 | 0.00 | 160.41 |
| | P16 | Manlifts | 49.00 | 0.19 | 0.02 | 0.02 | 0.14 | 0.04 | 0.12 | 0.00 | 14.53 |
| | P20 | Slurry Truck 10 yrds | 285.00 | 0.48 | 0.05 | 0.05 | 0.14 | 0.05 | 0.49 | 0.00 | 170.43 |
| | P21 | Snow Blower | 475.00 | 0.41 | 0.13 | 0.12 | 0.73 | 0.11 | 1.81 | 0.00 | 292.51 |
| | P25 | Welding Machine | 33.00 | 0.17 | 0.01 | 0.01 | 0.08 | 0.02 | 0.08 | 0.00 | 10.57 |
| | P26 | Maxihaul 30 yard | 750.00 | 0.54 | 0.17 | 0.17 | 1.09 | 0.14 | 1.76 | 0.00 | 480.05 |
| | P28 | Sideboom 583 | 300.00 | 0.34 | 0.04 | 0.04 | 0.13 | 0.05 | 0.59 | 0.00 | 119.52 |

Table 9A-14

**GTP Construction Emissions: Emission Factors For Vehicle and Equipment Combustion Exhaust Emissions (onsite and offsite)**

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GTP -- Infra - CC 5-10/2016, W/Maint 6-11/2016, V Maint 7-12/2016, WS Tor 8/16-1/2017, Fstor 10/16-3/2017 | Construction Camp | IC1 | Light plants with generators | 100.00 | 0.38 | 0.04 | 0.04 | 0.21 | 0.04 | 0.38 | 0.00 | 49.68 |
| | | IC2 | 966 w Bucket and Forks | 220.00 | 0.14 | 0.04 | 0.04 | 0.22 | 0.06 | 0.42 | 0.00 | 57.83 |
| | | IC4 | 150 tonne crane | 500.00 | 0.30 | 0.07 | 0.07 | 0.35 | 0.08 | 1.39 | 0.00 | 207.16 |
| | | IC5 | 25-35 ton crane, 50% shift at 12 hrs/day | 240.00 | 0.34 | 0.04 | 0.04 | 0.13 | 0.05 | 0.59 | 0.00 | 119.52 |
| | | IC6 | 60' JLG 50% at 12 hrs/day/bldg. | 63.00 | 0.37 | 0.02 | 0.02 | 0.13 | 0.02 | 0.24 | 0.00 | 35.76 |
| | | IC7 | 8,000 lb Lull RT Forklift, 12 hrs/day per bldg | 115.00 | 0.42 | 0.05 | 0.05 | 0.19 | 0.04 | 0.49 | 0.00 | 87.85 |
| | | IC8 | Welding Machines, 20% Utilization, 12 hr shift | 33.00 | 0.20 | 0.01 | 0.01 | 0.09 | 0.02 | 0.09 | 0.00 | 12.21 |
| | Warehouse / Maintenance | IW1 | Light plants with generators | 100.00 | 0.38 | 0.04 | 0.04 | 0.21 | 0.04 | 0.38 | 0.00 | 49.68 |
| | | IW2 | 966 w Bucket and Forks | 220.00 | 0.14 | 0.04 | 0.04 | 0.22 | 0.06 | 0.42 | 0.00 | 57.83 |
| | | IW4 | Propane powered scissor lifts, 12 hr shifts | 75.00 | 0.37 | 0.00 | 0.00 | 1.73 | 0.09 | 0.34 | 0.00 | 36.45 |
| | | IW5 | 34ft. RT Scissor Lift | 49.00 | 0.55 | 0.01 | 0.01 | 0.05 | 0.01 | 0.22 | 0.00 | 36.42 |
| | | IW6 | 25-35 ton crane, 50% shift at 12 hrs/day | 240.00 | 0.34 | 0.04 | 0.04 | 0.13 | 0.05 | 0.59 | 0.00 | 119.52 |
| | | IW7 | 60' JLG 50% at 12 hrs/day/bldg. | 63.00 | 0.37 | 0.02 | 0.02 | 0.13 | 0.02 | 0.24 | 0.00 | 35.76 |
| | | IW8 | 8,000 lb Lull RT Forklift, 12 hrs/day per bldg | 115.00 | 0.42 | 0.05 | 0.05 | 0.19 | 0.04 | 0.49 | 0.00 | 87.85 |
| | | IW9 | Welding Machines, 20% Utilization, 12 hr shift | 33.00 | 0.20 | 0.01 | 0.01 | 0.09 | 0.02 | 0.09 | 0.00 | 12.21 |
| | | IW10 | Portable Concrete Batch Plant | 100.00 | 1.00 | 0.04 | 0.04 | 0.21 | 0.05 | 0.40 | 0.00 | 46.57 |
| | | IW12 | Rotary Drill for Thermo-syphons | 300.00 | 0.34 | 0.06 | 0.06 | 0.28 | 0.08 | 1.05 | 0.00 | 120.17 |
| | Vehicle Maintenance | IV1 | Light plants with generators | 100.00 | 0.38 | 0.04 | 0.04 | 0.21 | 0.04 | 0.38 | 0.00 | 49.68 |
| | | IV2 | 966 w Bucket and Forks | 220.00 | 0.14 | 0.04 | 0.04 | 0.22 | 0.06 | 0.42 | 0.00 | 57.83 |
| | | IV4 | Propane powered scissor lifts, 12 hr shifts | 75.00 | 0.37 | 0.00 | 0.00 | 1.73 | 0.09 | 0.34 | 0.00 | 36.45 |
| | | IV5 | 34ft. RT Scissor Lift | 49.00 | 0.55 | 0.01 | 0.01 | 0.05 | 0.01 | 0.22 | 0.00 | 36.42 |
| | | IV6 | 25-35 ton crane, 50% shift at 12 hrs/day | 240.00 | 0.34 | 0.04 | 0.04 | 0.13 | 0.05 | 0.59 | 0.00 | 119.52 |
| | | IV7 | 60' JLG 50% at 12 hrs/day/bldg. | 63.00 | 0.37 | 0.02 | 0.02 | 0.13 | 0.02 | 0.24 | 0.00 | 35.76 |
| | | IV8 | 8,000 lb Lull RT Forklift, 12 hrs/day per bldg | 115.00 | 0.42 | 0.05 | 0.05 | 0.19 | 0.04 | 0.49 | 0.00 | 87.85 |
| | | IV9 | Welding Machines, 20% Utilization, 12 hr shift | 33.00 | 0.20 | 0.01 | 0.01 | 0.09 | 0.02 | 0.09 | 0.00 | 12.21 |
| | | IV10 | Portable Concrete Batch Plant | 100.00 | 1.00 | 0.04 | 0.04 | 0.21 | 0.05 | 0.40 | 0.00 | 46.57 |
| | | IV12 | Rotary Drill for Thermo-syphons | 300.00 | 0.34 | 0.06 | 0.06 | 0.28 | 0.08 | 1.05 | 0.00 | 120.17 |
| | Waste Storage Bldg | IS1 | Light plants with generators | 100.00 | 0.38 | 0.04 | 0.04 | 0.21 | 0.04 | 0.38 | 0.00 | 49.68 |
| | | IS2 | 966 w Bucket and Forks | 220.00 | 0.14 | 0.04 | 0.04 | 0.22 | 0.06 | 0.42 | 0.00 | 57.83 |
| | | IS4 | Propane powered scissor lifts, 12 hr shifts | 75.00 | 0.37 | 0.00 | 0.00 | 1.73 | 0.09 | 0.34 | 0.00 | 36.45 |
| | | IS5 | 25-35 ton crane, 50% shift at 12 hrs/day | 240.00 | 0.34 | 0.04 | 0.04 | 0.13 | 0.05 | 0.59 | 0.00 | 119.52 |
| | | IS6 | 60' JLG 50% at 12 hrs/day/bldg. | 63.00 | 0.37 | 0.02 | 0.02 | 0.13 | 0.02 | 0.24 | 0.00 | 35.76 |
| | | IS7 | 8,000 lb Lull RT Forklift, 12 hrs/day per bldg | 115.00 | 0.42 | 0.05 | 0.05 | 0.19 | 0.04 | 0.49 | 0.00 | 87.85 |
| | | IS8 | Welding Machines, 20% Utilization, 12 hr shift | 33.00 | 0.20 | 0.01 | 0.01 | 0.09 | 0.02 | 0.09 | 0.00 | 12.21 |
| | | IS9 | Portable Concrete Batch Plant | 100.00 | 1.00 | 0.04 | 0.04 | 0.21 | 0.05 | 0.40 | 0.00 | 46.57 |
| | Fuel Storage Bldg | IF1 | Light plants with generators | 100.00 | 0.38 | 0.04 | 0.04 | 0.21 | 0.04 | 0.38 | 0.00 | 49.68 |
| | | IF2 | 966 w Bucket and Forks | 220.00 | 0.14 | 0.04 | 0.04 | 0.22 | 0.06 | 0.42 | 0.00 | 57.83 |
| | | IF4 | Propane powered scissor lifts, 12 hr shifts | 75.00 | 0.37 | 0.00 | 0.00 | 1.73 | 0.09 | 0.34 | 0.00 | 36.45 |
| | | IF5 | 25-35 ton crane, 50% shift at 12 hrs/day | 240.00 | 0.34 | 0.04 | 0.04 | 0.13 | 0.05 | 0.59 | 0.00 | 119.52 |
| | | IF6 | 60' JLG 50% at 12 hrs/day/bldg. | 63.00 | 0.37 | 0.02 | 0.02 | 0.13 | 0.02 | 0.24 | 0.00 | 35.76 |
| | | IF7 | 8,000 lb Lull RT Forklift, 12 hrs/day per bldg | 115.00 | 0.42 | 0.05 | 0.05 | 0.19 | 0.04 | 0.49 | 0.00 | 87.85 |
| | | IF8 | Welding Machines, 20% Utilization, 12 hr shift | 33.00 | 0.20 | 0.01 | 0.01 | 0.09 | 0.02 | 0.09 | 0.00 | 12.21 |
| | | IF9 | Portable Concrete Batch Plant | 100.00 | 1.00 | 0.04 | 0.04 | 0.21 | 0.05 | 0.40 | 0.00 | 46.57 |
| GTP -- DH2 Upgrade (May 2016 - August 2016) | | D1 | Cat 740 Rock Truck | 436.00 | 0.41 | 0.11 | 0.10 | 0.43 | 0.09 | 1.07 | 0.00 | 292.94 |
| | | D2 | Cat 966G Loader | 220.00 | 0.45 | 0.06 | 0.06 | 0.25 | 0.07 | 0.75 | 0.00 | 160.41 |
| | | D3 | Cat 988B Loader | 375.00 | 0.45 | 0.06 | 0.06 | 0.25 | 0.07 | 0.75 | 0.00 | 160.41 |
| | | D4 | Cat D-9 Dozer | 475.00 | 0.42 | 0.12 | 0.11 | 0.62 | 0.10 | 1.58 | 0.00 | 296.67 |
| | | D5 | Cat 345 Excavator | 345.00 | 0.46 | 0.06 | 0.06 | 0.21 | 0.06 | 0.61 | 0.00 | 162.74 |
| | | D9 | APE 200-6 Vibratory Hammer (or MKT Model V-20) | 300.00 | 0.34 | 0.06 | 0.06 | 0.28 | 0.08 | 1.05 | 0.00 | 120.17 |
| | | D10 | Link Belt 418 Crane | 190.00 | 0.36 | 0.03 | 0.03 | 0.10 | 0.03 | 0.39 | 0.00 | 73.00 |
| | | D11 | Manlift, 78', Genie Z80/60, Diesel | 78.00 | 0.17 | 0.02 | 0.02 | 0.16 | 0.03 | 0.17 | 0.00 | 19.38 |
| | | D12 | Welding Machine | 33.00 | 0.17 | 0.01 | 0.01 | 0.08 | 0.02 | 0.08 | 0.00 | 10.57 |
| | | D14 | Cat CS653E Roller | 150.00 | 0.45 | 0.05 | 0.05 | 0.19 | 0.04 | 0.47 | 0.00 | 92.19 |

Table 9A-14

**GTP Construction Emissions: Emission Factors For Vehicle and Equipment Combustion Exhaust Emissions (onsite and offsite)**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pipelines (CCP/CGF to GTP) Temp Fuelg Gas 8/15-3/16, CO2 / FEED 12/16-8/17 | | T4 | Crane 80 Ton | 275.00 | 0.34 | 0.04 | 0.04 | 0.13 | 0.05 | 0.59 | 0.00 | 119.52 |
| | | T5 | Compressor 375 | 115.00 | 0.36 | 0.03 | 0.03 | 0.16 | 0.03 | 0.29 | 0.00 | 46.85 |
| | | T6 | Compressor 1300 | 475.00 | 0.31 | 0.09 | 0.08 | 0.46 | 0.11 | 1.60 | 0.00 | 214.85 |
| | | T7 | Dozer 750 JD | 155.00 | 0.46 | 0.05 | 0.05 | 0.18 | 0.04 | 0.43 | 0.00 | 94.92 |
| | | T9 | FBE Unit | 210.00 | 0.18 | 0.05 | 0.04 | 0.26 | 0.07 | 0.37 | 0.00 | 43.84 |
| | | T10 | Fill Pump | 70.00 | 0.36 | 0.03 | 0.03 | 0.16 | 0.03 | 0.30 | 0.00 | 34.81 |
| | | T11 | Generator, 8kw | 14.00 | 0.36 | 0.01 | 0.01 | 0.04 | 0.01 | 0.07 | 0.00 | 7.56 |
| | | T12 | Generator, 50kw | 63.00 | 0.34 | 0.03 | 0.03 | 0.16 | 0.03 | 0.29 | 0.00 | 33.46 |
| | | T13 | Grader 14G | 225.00 | 0.45 | 0.06 | 0.06 | 0.22 | 0.06 | 0.65 | 0.00 | 161.27 |
| | | T14 | Hydro Pump | 110.00 | 0.37 | 0.04 | 0.04 | 0.22 | 0.05 | 0.39 | 0.00 | 48.16 |
| | | T15 | Loader 150 | 269.00 | 0.45 | 0.06 | 0.06 | 0.25 | 0.07 | 0.75 | 0.00 | 160.41 |
| | | T16 | Maxihaul | 750.00 | 0.54 | 0.17 | 0.17 | 1.09 | 0.14 | 1.76 | 0.00 | 480.05 |
| | | T17 | Sideboom 583 | 300.00 | 0.34 | 0.04 | 0.04 | 0.13 | 0.05 | 0.59 | 0.00 | 119.52 |
| | | T18 | Snowblower | 475.00 | 0.41 | 0.13 | 0.12 | 0.73 | 0.11 | 1.81 | 0.00 | 292.51 |
| | | T19 | Tack Rig | 310.00 | 0.34 | 0.06 | 0.06 | 0.28 | 0.08 | 1.05 | 0.00 | 120.17 |
| | | T29 | Welding Machine | 33.00 | 0.17 | 0.01 | 0.01 | 0.08 | 0.02 | 0.08 | 0.00 | 10.57 |
| | | T30 | Welding Shack Electric | - | 1.00 | - | - | - | - | - | - | - |
| | | T32 | Zoom Boom Loader | 99.00 | 0.50 | 0.05 | 0.05 | 0.32 | 0.03 | 0.36 | 0.00 | 66.18 |
| | | T33 | Heater (salamander) | 393.00 | 1.00 | 0.03 | 0.03 | 0.04 | 0.00 | 0.16 | 0.00 | 179.02 |
| Process Modules Arrival, Offload, Transit, Set ( Aug Thru Sept 2017 / 2018 / 2019) | Dredge Operations | AO1 | Large Clamshell Dredge | 2,000.00 | 1.00 | 0.28 | 0.27 | 2.08 | 0.25 | 3.82 | 0.00 | 517.15 |
| | | AO2 | Dredge Tow Tugs | 5,500.00 | 0.27 | 0.21 | 0.20 | 1.83 | 0.48 | 10.46 | 0.01 | 938.55 |
| | | AO3 | Tending Tug | 2,100.00 | 0.24 | 0.12 | 0.12 | 1.09 | 0.29 | 6.24 | 0.01 | 560.10 |
| | | AO4 | Crew Boat | 250.00 | 0.26 | 0.02 | 0.02 | 0.18 | 0.04 | 0.96 | 0.00 | 91.29 |
| | | AO5 | Survey Boat | 250.00 | 0.26 | 0.02 | 0.02 | 0.18 | 0.04 | 0.96 | 0.00 | 91.29 |
| | | AO6 | Dump Scow | 3,000.00 | 0.27 | 0.21 | 0.20 | 1.83 | 0.48 | 10.46 | 0.01 | 938.55 |
| | | AO7 | Maintenance Dredging Equipment | 1,500.00 | 0.58 | 0.28 | 0.27 | 2.08 | 0.25 | 3.82 | 0.00 | 517.15 |
| | | AO8 | Small Maintenance Clamshell Dredge | 750.00 | 0.58 | 0.28 | 0.27 | 2.08 | 0.25 | 3.82 | 0.00 | 517.15 |
| | Marine Operations | AM1 | Marine Tugs (Time In US Waters) | 7,000.00 | 0.27 | 0.21 | 0.20 | 1.83 | 0.48 | 10.46 | 0.01 | 938.55 |
| | | AM2 | Escort Tugs | 7,000.00 | 0.27 | 0.21 | 0.20 | 1.83 | 0.48 | 10.46 | 0.01 | 938.55 |
| | | AM3 | Tending Tugs | 2,100.00 | 0.24 | 0.12 | 0.12 | 1.09 | 0.29 | 6.24 | 0.01 | 560.10 |
| | | AM4 | Crew Boat | 300.00 | 0.26 | 0.02 | 0.02 | 0.18 | 0.04 | 0.96 | 0.00 | 91.29 |
| | | AM5 | Crane Barge (1) 18-20 Accomodations --250Ton Crane | 400.00 | 0.23 | 0.04 | 0.03 | 0.31 | 0.09 | 1.68 | 0.00 | 158.36 |
| | | AM6 | Barges | 300.00 | 0.26 | 0.02 | 0.02 | 0.18 | 0.04 | 0.96 | 0.00 | 91.29 |
| | | AM7 | Ballast Pumps (Power Pack -- 50KW) | 67.00 | 0.36 | 0.03 | 0.03 | 0.16 | 0.03 | 0.30 | 0.00 | 34.81 |
| | | AM10 | Winches (4) | 10.00 | 0.42 | 0.00 | 0.00 | 0.05 | 0.01 | 0.04 | 0.00 | 6.11 |
| | Shore Operations | AH3 | Crane (Large) | 500.00 | 0.30 | 0.07 | 0.07 | 0.35 | 0.08 | 1.39 | 0.00 | 207.16 |
| | | AH4 | Crane (Small) | 240.00 | 0.34 | 0.04 | 0.04 | 0.13 | 0.05 | 0.59 | 0.00 | 119.52 |
| | | AH5 | Loader | 269.00 | 0.45 | 0.06 | 0.06 | 0.25 | 0.07 | 0.75 | 0.00 | 160.41 |
| | | AH6 | Stationary Generator - 150kw | 201.15 | 0.33 | 0.04 | 0.04 | 0.19 | 0.05 | 0.61 | 0.00 | 68.15 |
| GTP -- Process Modules Interconnect (SL1 8/17-12/2017, SL2 8/18-5/2019 , SL3&4 8/19-5/2020 | | E1 | Air Compressors (1600 CFM) | 550.00 | 0.31 | 0.09 | 0.08 | 0.46 | 0.11 | 1.60 | 0.00 | 214.85 |
| | | E2 | Portable Generator (2-150Kw) | 201.15 | 0.33 | 0.04 | 0.04 | 0.19 | 0.05 | 0.61 | 0.00 | 68.15 |
| | | E3 | Bobcat | 75.00 | 0.49 | 0.03 | 0.03 | 0.21 | 0.02 | 0.30 | 0.00 | 47.77 |
| | | E4 | Welding Machine | 33.00 | 0.17 | 0.01 | 0.01 | 0.08 | 0.02 | 0.08 | 0.00 | 10.57 |
| | | E5 | Tioga Heaters | 235.60 | 1.00 | 0.02 | 0.02 | 0.03 | 0.00 | 0.11 | 0.00 | 125.31 |
| | | E6 | Backhoe | 125.00 | 0.18 | 0.04 | 0.04 | 0.25 | 0.04 | 0.20 | 0.00 | 27.96 |
| | | E7 | Crane (Small) | 240.00 | 0.34 | 0.04 | 0.04 | 0.13 | 0.05 | 0.59 | 0.00 | 119.52 |
| | | E8 | Crane (Large) | 500.00 | 0.30 | 0.07 | 0.07 | 0.35 | 0.08 | 1.39 | 0.00 | 207.16 |
| | | E10 | Cat 988H Loader | 501.00 | 0.41 | 0.13 | 0.12 | 0.73 | 0.11 | 1.81 | 0.00 | 292.51 |

**TABLE 9A-15 ON-SITE FUGITIVE DUST EMISSIONS**

Table 9A-15

**On-site Fugitive Dust Emissions**

**Emission Factor Equation:**

**(1) Primary Brakewear/Tirewear Particulate, blast fugitive emissions, and portable concrete batch plant fugitive emissions.**

The emissions factors for Primary Brakewear and Tirewear Particulate are from EPA MOVES model results.
The fugitve emissions factors for blast and portable concrete batch plant from the calculations showing on the tables down below.

**(2) Travel on unpaved surfaces**

$E = k * (s/12)^a * (W/3)^b * [(365 - P)/365]$

Source: EPA AP-42 Section 13.2.2 Unpaved Roads Equations 1a and 2
E = size-specific emission factor (lb/VMT)
k, a, b = empirical constants
0.56 s = surface material silt content (%) — Construction sites - Scraper routes (smallest)
W = mean vehicle weight (tons)
67 P = Mean number of days per year with at least 0.01 inches of precipitation (from WRCC PRUDHOE BAY, ALASKA 1986-1999 data)

constants — Industrial Roads

| | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|
| k | 1.5 | 0.15 |
| a | 0.9 | 0.9 |
| b | 0.45 | 0.45 |

**(3) Bulldozing & grading**

Source: EPA AP-42 Section 11.9

$E = p * 1 * s^{1.5} / M^{1.4}$

PM10 Emissions from bulldozing (lb/hr); Table 11.9-1 EMISSION FACTOR EQUATIONS FOR UNCONTROLLED OPEN DUST SOURCES AT WESTERN SURFACE COAL MINES (Overburden)
0.75 p = particle size multiplier for PM10
6.9 s = Silt content (%) (from Table 11.9-3 for bulldozers overburden)
7.9 M = Moisture content of surface material (%) (from Table 11.9-3 for bulldozers overburden)
0.75 lb/hr of PM10

$E = p * 5.7 * s^{1.2} / M^{1.3}$

PM2.5 Emissions from bulldozing (lb/hr); Table 11.9-1 EMISSION FACTOR EQUATIONS FOR UNCONTROLLED OPEN DUST SOURCES AT WESTERN SURFACE COAL MINES (Overburden)
0.105 p = particle size multiplier for PM2.5
6.9 s = Silt content (%) (from Table 11.9-3 for bulldozers overburden)
7.9 M = Moisture content of surface material (%) (from Table 11.9-3 for bulldozers overburden)
0.41 lb/hr of PM2.5

$E = p * 0.051 * S^{2.0}$

PM10 Emissions from grading (lb/VMT); Table 11.9-1 EMISSION FACTOR EQUATIONS FOR UNCONTROLLED OPEN DUST SOURCES AT WESTERN SURFACE COAL MINES (Overburden)
0.6 p = particle size multiplier for PM10
7.1 S = mean vehicle speed (mph) (from Table 11.9-3 for grader)
1.54 lb/VMT of PM10

$E = p * 0.040 * S^{2.5}$

PM2.5 Emissions from grading (lb/VMT); Table 11.9-1 EMISSION FACTOR EQUATIONS FOR UNCONTROLLED OPEN DUST SOURCES AT WESTERN SURFACE COAL MINES (Overburden)
0.031 p = particle size multiplier for PM2.5
7.1 S = mean vehicle speed (mph) (from Table 11.9-3 for grader)
0.17 lb/VMT of PM2.5
14.5 months of earth work
depends — total construction hours per work day
31 construction days per month

**(4) Dirt Piling or Material Handling in pipeline construction**

Source: PM10 Emissions from Material Handling (lb/ton) from EPA AP-42 Chapter 13.2.4 Eq. 1

$E = k * 0.0032 * (U/5)^{1.3} / (M/2)^{1.4}$

E = Emission factor (lb/ton material handled)
10.89 U = Mean Wind speed (mph) (PAD-A station, 1998-8 and 2006-8)
12 M = Moisture content of surface material (%) (from Table 13.2.4-1 for cover at municipal landfill)

constants

| | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|
| k | 0.35 | 0.053 |

0.00004 lb/ton of PM2.5
0.00025 lb/ton of PM10
Assume 100% soil movement from loaders

Total amount of material handling calculation

8 yd3/day — 26 ton/day
3,743 yd3/project — 11,669 tons/project — 6236 density of soil (lb/yd3)
(The range of surficial soil density (total unit weight) is from about sigma low 115 to sigma high 135 lb/cf. Use the highest as the most conservative value.)

project for pipeline construction

3 pipeline construction
0.966616 total acres disturbed as described in RR#9 Appendix 10.10 and only 80% of this soil is picked up and moved via the equipment above
0.7732928 acres = — 3,743 cubic yds, assume depth of soils moved is — 1 depth of disturbance (yards)

Table 9A-15

**On-site Fugitive Dust Emissions**

**Dirt Piling or Material Handling in GTP site construction (gravel paving)**

Source: PM10 Emissions from Material Handling (lb/ton) from EPA AP-42 Chapter 13.2.4 Eq. 1

$E = k * 0.0032 * (U/5)^{1.3} / (M/2)^{1.4}$

E = Emission factor (lb/ton material handled)
10.89 U = Mean Wind speed (mph) (PAD-A station, 1998-8 and 2006-8)
12 M = Moisture content of surface material (%) (from Table 13.2.4-1 for cover at municipal landfill)

constants

| | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|
| k | 0.35 | 0.053 |

0.00004 lb/ton of PM2.5
0.00025 lb/ton of PM10
Assume 100% soil movement from loaders

Total amount of material handling calculation

2 yd3/day (assumption 6 ton/day 6236 density of soil (lb/yd3)

**(5) Cover Storage Pile during pipeline construction**

$E = 1.7 * G/1.5 * (365-H)/235 * I/15 * J$

Source: SCAQMD Table A9-9-E
PM10 Emission factor from wind erosion of storage piles per day per acre
9 G = Silt content (%) (from EPA AP-42 Table 13.2.4-1 for cover at municipal landfill)
67 H = number of days per year with at least 0.01 inches of precipitation (from WRCC PRUDHOE BAY, ALASKA 1986-1999 data)
37 I = Percentage of time that the unobstructed wind speed exceeds 12 mph at mean pile height (PAD-A station, 1998-8 and 2006-8)
0.5 J = Fraction of TSP that is PM10 = 0.5
15.953 lb/acre/day
2 piles (assumptions)
0.1 Size of Pile (acre) (assumptions)
8 months (Feb-2017 through Sep-2017) total for piles present due to earth moving. But it is assumed from September through May the pile will be covered by snow.

**Cover Storage Pile during gravel pavement**

$E = 1.7 * G/1.5 * (365-H)/235 * I/15 * J$

Source: SCAQMD Table A9-9-E
PM10 Emission factor from wind erosion of storage piles per day per acre
1.6 G = Silt content (%) (from EPA AP-42 Table 13.2.4-1 for Crushed limestone)
67 H = number of days per year with at least 0.01 inches of precipitation (from WRCC PRUDHOE BAY, ALASKA 1986-1999 data)
37 I = Percentage of time that the unobstructed wind speed exceeds 12 mph at mean pile height (PAD-A station, 1998-8 and 2006-8)
0.5 J = Fraction of TSP that is PM10 = 0.5
2.836 lb/acre/day
4 piles (assumptions)
0.1 Size of Pile (acre) (assumptions)
9 months (Jan-2015 through Sep-2015) total for piles present due to earth moving. But it is assumed from September through May the pile will be covered by snow.

| | | | (1) Primary Brakewear and Tirewear Particulate | | (2) Travel on unpaved surfaces | | | (3) Bulldozing & grading | | | (4) Dirt Piling or Material Handling | | | (5) Cover Storage Pile | | | Total Onsite fugitive dust EF | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Equipment/Vehicle Type | $PM_{10}$ EF (lbs/hr) | $PM_{2.5}$ EF (lbs/hr) | $PM_{10}$ EF (lbs/hr) | $PM_{2.5}$ EF (lbs/hr) | Mitigation Efficiency | $PM_{10}$ EF (lbs/hr) | $PM_{2.5}$ EF (lbs/hr) | Mitigation Efficiency | $PM_{10}$ EF (lbs/hr) | $PM_{2.5}$ EF (lbs/hr) | Mitigation Efficiency | $PM_{10}$ EF (lbs/hr) | $PM_{2.5}$ EF (lbs/hr) | Mitigation Efficiency | $PM_{10}$ EF (lbs/hr) | $PM_{2.5}$ EF (lbs/hr) |
| **Nonroad Equipment** | | | | | | | | | | | | | | | | | | |
| GTP - - Non-Phase-Specific Rolling Stock, Passenger,and Equipment (November 2014 - August 2020) | N4 | Power Generation - 200 Main Pioneer Camp | | | - | - | 83% | | | | | | | | | | - | - |
| | N5 | Power Generation - 700 Main Pioneer Camp | | | - | - | 83% | | | | | | | | | | - | - |
| | N6 | Power Generation - 335 Main Pioneer Camp | | | - | - | 83% | | | | | | | | | | - | - |
| | N7 | Site CNST Power Generation - 1 MW | | | - | - | 83% | | | | | | | | | | - | - |
| | N8 | Heat - 10,000 sq. ft. Pioneer Camp | | | - | - | 83% | | | | | | | | | | - | - |
| | N9 | Heat - 46,550 sq. ft. Temp CNSRT Camp | | | - | - | 83% | | | | | | | | | | - | - |
| | N10 | Heat - 44,555 sq. ft. Perm Ops and Cnst Camp | | | - | - | 83% | | | | | | | | | | - | - |
| | N11 | Heat - 64,000 sq. ft. Perm Warehouse | | | - | - | 83% | | | | | | | | | | - | - |
| | N12 | Heat - 43,000 sq. ft. Perm Maintenance Facil | | | - | - | 83% | | | | | | | | | | - | - |
| | N13 | Heat - 84,000 sq. ft. Perm Ops Cnst and Dining | | | - | - | 83% | | | | | | | | | | - | - |
| | N18 | Snow Blower (150-600 hp) / Loader Mount (501hp) | | | 0.05 | 0.00 | 83% | | | | | | | | | | 0.01 | 0.00 |
| | N19 | Light Plant | | | - | - | 83% | | | | | | | | | | - | - |
| | N20 | Tioga Heaters | | | - | - | 83% | | | | | | | | | | - | - |
| Gravel Site Construction and Site Conditioning, North Access and Ice Road to PUT 23 (11/27/14 - May 10, 2016) | G2 | CAT 16G/H Motor Grader | | | | | | 0.46 | 0.05 | 83% | | | | | | | 0.08 | 0.01 |
| | G3 | CAT 345 Large Excavator | | | - | - | 83% | | | | | | | | | | - | - |
| | G4 | Cat 740 Rock Truck | | | - | - | 83% | | | | | | | | | | - | - |
| | G5 | CAT 966 Loader | | | - | - | 83% | | | | | | | | | | - | - |
| | G6 | Cat 988B Loader | | | - | - | 83% | | | | | | | | | | - | - |
| | G7 | Cat 988H Loader | | | - | - | 83% | | | | | | | | | | - | - |
| | G8 | Cat CS563E Roller | | | | | | 0.46 | 0.05 | 83% | | | | | | | 0.08 | 0.01 |
| | G9 | Cat D-10 Dozer | | | - | - | 83% | | | | | | | | | | - | - |
| | G10 | CAT D-8 Dozer | | | | | | 0.75 | 0.41 | 83% | | | | | | | 0.13 | 0.07 |
| | G11 | CAT D-9 Dozer | | | | | | 0.75 | 0.41 | 83% | | | | | | | 0.13 | 0.07 |
| | G15 | Heater | | | - | - | 83% | | | | | | | | | | - | - |
| | G16 | IR CM 2000 Drill and 1600 Compressor | | | - | - | 83% | | | | | | | | | | - | - |
| | G17 | Blasting equipment | | | - | - | 83% | | | | | | | | | | - | - |
| | G18 | Pumps/equipment de-watering | | | - | - | 83% | | | | | | | | | | - | - |
| | G19 | Light Plant | | | - | - | 83% | | | | | | | | | | - | - |
| | G20 | Portable generators | | | - | - | 83% | | | | | | | | | | - | - |

Table 9A-15

**On-site Fugitive Dust Emissions**

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Piles and VSM Installation ( SL1 11/16-1/2017, SL 2 12/17-2/2018, SL 3 12/18-3/19) | | P4 | Crane Hyd 80 Ton | | | 0.05 | 0.00 | 83% | | | | | | | | | | 0.01 | 0.00 |
| | | P5 | Drill Watson 3000 | | | 0.04 | 0.00 | 83% | | | | | | | | | | 0.01 | 0.00 |
| | | P6 | Drill Texoma | | | 0.04 | 0.00 | 83% | | | | | | | | | | 0.01 | 0.00 |
| | | P7 | Envirorac field office | | | - | - | 83% | | | | | | | | | | - | - |
| | | P10 | Generator 8kw | | | - | - | 83% | | | | | | | | | | - | - |
| | | P11 | Generator 50KW | | | - | - | 83% | | | | | | | | | | - | - |
| | | P12 | Generator 150kw | | | - | - | 83% | | | | | | | | | | - | - |
| | | P13 | Indirect Heater | | | - | - | 83% | | | | | | | | | | - | - |
| | | P14 | Light Plant | | | - | - | 83% | | | | | | | | | | - | - |
| | | P15 | Loader L150 | | | 0.05 | 0.00 | 83% | | | | | | | | | | 0.01 | 0.00 |
| | | P16 | Manlifts | | | 0.04 | 0.00 | 83% | | | | | | | | | | 0.01 | 0.00 |
| | | P20 | Slurry Truck 10 yrds | | | 0.05 | 0.00 | 83% | | | | | | | | | | 0.01 | 0.00 |
| | | P21 | Snow Blower | | | 0.04 | 0.00 | 83% | | | | | | | | | | 0.01 | 0.00 |
| | | P25 | Welding Machine | | | - | - | 83% | | | | | | | | | | - | - |
| | | P26 | Maxihaul 30 yard | | | 0.07 | 0.01 | 83% | | | | | | | | | | 0.01 | 0.00 |
| | | P28 | Sideboom 583 | | | 0.04 | 0.00 | 83% | | | | | | | | | | 0.01 | 0.00 |
| GTP -- Infra - CC 5-10/2016, WMaint 6-11/2016, V Maint 7-12/2016, WSTor 8/16-1/2017, Fstor 10/16-3/2017 | Construction Camp | IC1 | Light plants with generators | | | - | - | 83% | | | | | | | | | | - | - |
| | | IC2 | 966 w Bucket and Forks | | | 0.01 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IC4 | 150 tonne crane | | | 0.03 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IC5 | 25-35 ton crane, 50% shift at 12 hrs/day | | | 0.02 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IC6 | 60' JLG 50% at 12 hrs/day/bldg. | | | 0.01 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IC7 | 8,000 lb Lull RT Forklift, 12 hrs/day per bldg | | | 0.01 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IC8 | Welding Machines, 20% Utilization, 12 hr shift | | | - | - | 83% | | | | | | | | | | - | - |
| | Warehouse / Maintenance | IW1 | Light plants with generators | | | - | - | 83% | | | | | | | | | | - | - |
| | | IW2 | 966 w Bucket and Forks | | | 0.00 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IW4 | Propane powered scissor lifts, 12 hr shifts | | | 0.01 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IW5 | 34ft. RT Scissor Lift | | | 0.01 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IW6 | 25-35 ton crane, 50% shift at 12 hrs/day | | | 0.02 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IW7 | 60' JLG 50% at 12 hrs/day/bldg. | | | 0.01 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IW8 | 8,000 lb Lull RT Forklift, 12 hrs/day per bldg | | | 0.01 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IW9 | Welding Machines, 20% Utilization, 12 hr shift | | | - | - | 83% | | | | | | | | | | - | - |
| | | IW10 | Portable Concrete Batch Plant | 0.94 | 0.23 | - | - | 83% | | | | | | | | | | 0.94 | 0.23 |
| | | IW12 | Rotary Drill for Thermo-syphons | | | 0.02 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | Vehicle Maintenance | IV1 | Light plants with generators | | | - | - | 83% | | | | | | | | | | - | - |
| | | IV2 | 966 w Bucket and Forks | | | 0.01 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IV4 | Propane powered scissor lifts, 12 hr shifts | | | 0.01 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IV5 | 34ft. RT Scissor Lift | | | 0.01 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IV6 | 25-35 ton crane, 50% shift at 12 hrs/day | | | 0.02 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IV7 | 60' JLG 50% at 12 hrs/day/bldg. | | | 0.01 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IV8 | 8,000 lb Lull RT Forklift, 12 hrs/day per bldg | | | 0.01 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IV9 | Welding Machines, 20% Utilization, 12 hr shift | | | - | - | 83% | | | | | | | | | | - | - |
| | | IV10 | Portable Concrete Batch Plant | 0.94 | 0.23 | - | - | 83% | | | | | | | | | | 0.94 | 0.23 |
| | | IV12 | Rotary Drill for Thermo-syphons | | | 0.02 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | Waste Storage Bldg | IS1 | Light plants with generators | | | - | - | 83% | | | | | | | | | | - | - |
| | | IS2 | 966 w Bucket and Forks | | | 0.01 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IS4 | Propane powered scissor lifts, 12 hr shifts | | | 0.01 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IS5 | 25-35 ton crane, 50% shift at 12 hrs/day | | | 0.02 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IS6 | 60' JLG 50% at 12 hrs/day/bldg. | | | 0.01 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IS7 | 8,000 lb Lull RT Forklift, 12 hrs/day per bldg | | | 0.01 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IS8 | Welding Machines, 20% Utilization, 12 hr shift | | | - | - | 83% | | | | | | | | | | - | - |
| | | IS9 | Portable Concrete Batch Plant | 0.94 | 0.23 | - | - | 83% | | | | | | | | | | 0.94 | 0.23 |
| | Fuel Storage Bldg | IF1 | Light plants with generators | | | - | - | 83% | | | | | | | | | | - | - |
| | | IF2 | 966 w Bucket and Forks | | | 0.01 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IF4 | Propane powered scissor lifts, 12 hr shifts | | | 0.01 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IF5 | 25-35 ton crane, 50% shift at 12 hrs/day | | | 0.02 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IF6 | 60' JLG 50% at 12 hrs/day/bldg. | | | 0.01 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IF7 | 8,000 lb Lull RT Forklift, 12 hrs/day per bldg | | | 0.01 | 0.00 | 83% | | | | | | | | | | 0.00 | 0.00 |
| | | IF8 | Welding Machines, 20% Utilization, 12 hr shift | | | - | - | 83% | | | | | | | | | | - | - |
| | | IF9 | Portable Concrete Batch Plant | 0.94 | 0.23 | - | - | 83% | | | | | | | | | | 0.94 | 0.23 |
| GTP -- DH2 Upgrade (May 2016 - August 2016) | | D1 | Cat 740 Rock Truck | | | - | - | 83% | | | | | | | | | | - | - |
| | | D2 | Cat 966G Loader | | | - | - | 83% | | | | | | | | | | - | - |
| | | D3 | Cat 988B Loader | | | - | - | 83% | | | | | | | | | | - | - |
| | | D4 | Cat D-9 Dozer | | | - | - | 83% | | | | | | | | | | - | - |
| | | D5 | Cat 345 Excavator | | | - | - | 83% | | | | | | | | | | - | - |
| | | D9 | APE 200-6 Vibratory Hammer (or MKT Model V-20) | | | - | - | 83% | | | | | | | | | | - | - |
| | | D10 | Link Belt 418 Crane | | | - | - | 83% | | | | | | | | | | - | - |

**TABLE 9A-16 OFF-SITE FUGITIVE DUST EMISSIONS**

Table 9A-16

**Off-site Fugitive Dust Emissions**

**Emission Factor Equation:**

**(1) Primary Brakewear/Tirewear Particulate, blast fugitive emissions, and portable concrete batch plant fugitive emissions.**

The emissions factors for Primary Brakewear and Tirewear Particulate are from EPA MOVES model results.
The fugitve emissions factors for blast and portable concrete batch plant from the calculations showing on the tables down below.

**(2) Travel on unpaved surfaces**

$E = k * (s/12)^a * (W/3)^b * [(365 - P)/365]$

Source: EPA AP-42 Section 13.2.2 Unpaved Roads Equations 1a and 2
E = size-specific emission factor (lb/VMT)
k, a, b = empirical constants
0.56 s = surface material silt content (%) — Construction sites - Scraper routes (smallest)
W = mean vehicle weight (tons)
67 P = Mean number of days per year with at least 0.01 inches of precipitation (from WRCC PRUDHOE BAY, ALASKA 1986-1999 data)

constants

| | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|
| k | 1.5 | 0.15 |
| a | 0.9 | 0.9 |
| b | 0.45 | 0.45 |

Industrial Roads

**(3) Bulldozing & grading (all area)**

Source: EPA AP-42 Section 11.9

$E = p * 1 * s^{1.5} / M^{1.4}$

PM10 Emissions from bulldozing (lb/hr); Table 11.9-1 EMISSION FACTOR EQUATIONS FOR UNCONTROLLED OPEN DUST SOURCES AT WESTERN SURFACE COAL MINES (Overburden)
0.75 p = particle size multiplier for PM10
6.9 s = Silt content (%) (from Table 11.9-3 for bulldozers overburden)
7.9 M = Moisture content of surface material (%) (from Table 11.9-3 for bulldozers overburden)
0.75 lb/hr of PM10

$E = p * 5.7 * s^{1.2} / M^{1.3}$

PM2.5 Emissions from bulldozing (lb/hr); Table 11.9-1 EMISSION FACTOR EQUATIONS FOR UNCONTROLLED OPEN DUST SOURCES AT WESTERN SURFACE COAL MINES (Overburden)
0.105 p = particle size multiplier for PM2.5
6.9 s = Silt content (%) (from Table 11.9-3 for bulldozers overburden)
7.9 M = Moisture content of surface material (%) (from Table 11.9-3 for bulldozers overburden)
0.41 lb/hr of PM2.5

$E = p * 0.051 * S^{2.0}$

PM10 Emissions from grading (lb/VMT); Table 11.9-1 EMISSION FACTOR EQUATIONS FOR UNCONTROLLED OPEN DUST SOURCES AT WESTERN SURFACE COAL MINES (Overburden)
0.6 p = particle size multiplier for PM10
7.1 S = mean vehicle speed (mph) (from Table 11.9-3 for grader)
1.54 lb/VMT of PM10

$E = p * 0.040 * S^{2.5}$

PM2.5 Emissions from grading (lb/VMT); Table 11.9-1 EMISSION FACTOR EQUATIONS FOR UNCONTROLLED OPEN DUST SOURCES AT WESTERN SURFACE COAL MINES (Overburden)
0.031 p = particle size multiplier for PM2.5
7.1 S = mean vehicle speed (mph) (from Table 11.9-3 for grader)
0.17 lb/VMT of PM2.5
25 months of earth work
0 total construction hours per work day
31 construction days per month

**(4) Dirt Piling or Material Handling in pipeline construction**

Source: PM10 Emissions from Material Handling (lb/ton) from EPA AP-42 Chapter 13.2.4 Eq. 1

$E = k * 0.0032 * (U/5)^{1.3} / (M/2)^{1.4}$

E = Emission factor (lb/ton material handled)
10.89 U = Mean Wind speed (mph) (PAD-A station, 1998-8 and 2006-8)
12 M = Moisture content of surface material (%) (from Table 13.2.4-1 for cover at municipal landfill)

constants

| | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|
| k | 0.35 | 0.053 |

0.00004 lb/ton of PM2.5
0.00025 lb/ton of PM10
Assume 100% soil movement from loaders

Total amount of material handling calculation

5 yd3/day (assumption — 16 ton/day
3,743 yd3/project — 11,669 tons/project — 6236 density of soil (lb/yd3)
(The range of surficial soil density (total unit weight) is from about sigma low 115 to sigma high 135 lb/cf. Use the highest as the most conservative value.)

project for pipeline construction

3 pipeline construction
0.966616 total acres disturbed as described in RR#9 Appendix 10.10 and only 80% of this soil is picked up and moved via the equipment above
0.7732928 acres = — 3,743 cubic yds, assume depth of soils moved is — 1 depth of disturbance (yards)

Table 9A-16

**Off-site Fugitive Dust Emissions**

**Dirt Piling or Material Handling in DH2 upgrade construction (gravel paving)**

Source: PM10 Emissions from Material Handling (lb/ton) from EPA AP-42 Chapter 13.2.4 Eq. 1

$E = k * 0.0032 * (U/5)^{1.3} / (M/2)^{1.4}$

E = Emission factor (lb/ton material handled)
10.89 U = Mean Wind speed (mph) (PAD-A station, 1998-8 and 2006-8)
12 M = Moisture content of surface material (%) (from Table 13.2.4-1 for cover at municipal landfill)

constants

| | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|
| k | 0.35 | 0.053 |

0.00004 lb/ton of PM2.5
0.00025 lb/ton of PM10
Assume 100% soil movement from loaders

Total amount of material handling calculation

2 yd3/day 6 ton/day 6236 density of soil (lb/yd3)

**Dirt Piling or Material Handling in PUT23 mining construction (gravel taking) and ice road GTP north access road construction (gravel paving)**

Source: PM10 Emissions from Material Handling (lb/ton) from EPA AP-42 Chapter 13.2.4 Eq. 1

$E = k * 0.0032 * (U/5)^{1.3} / (M/2)^{1.4}$

E = Emission factor (lb/ton material handled)
10.89 U = Mean Wind speed (mph) (PAD-A station, 1998-8 and 2006-8)
12 M = Moisture content of surface material (%) (from Table 13.2.4-1 for cover at municipal landfill)

constants

| | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|
| k | 0.35 | 0.053 |

0.00004 lb/ton of PM2.5
0.00025 lb/ton of PM10
Assume 100% soil movement from loaders

Total amount of material handling calculation

22 yd3/day (assumptior 70 ton/day 6236 density of soil (lb/yd3)

**(5) Cover Storage Pile (all)**

$E = 1.7 * G/1.5 * (365-H)/235 * I/15 * J$

Source: SCAQMD Table A9-9-E
PM10 Emission factor from wind erosion of storage piles per day per acre
9 G = Silt content (%) (from EPA AP-42 Table 13.2.4-1 for cover at municipal landfill)
67 H = number of days per year with at least 0.01 inches of precipitation (from WRCC PRUDHOE BAY, ALASKA 1986-1999 data)
37 I = Percentage of time that the unobstructed wind speed exceeds 12 mph at mean pile height (PAD-A station, 1998-8 and 2006-8)
0.5 J = Fraction of TSP that is PM10 = 0.5
15.953 lb/acre/day
20 piles (assumptions)
0.1 Size of Pile (acre) (assumptions)

assume from Jan. 2015 through Sep. 2017 months total for piles present due to earth moving. But it is assumed from September through May the pile will be covered by snow.

| | | | (1) Primary Brakewear and Tirewear Particulate | | (2) Travel on unpaved surfaces | | | (3) Bulldozing & grading | | | (4) Dirt Piling or Material Handling | | | (5) Cover Storage Pile | | | Total Onsite fugitive dust EF | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Equipment/Vehicle Type | $PM_{10}$ EF (lbs/hr) | $PM_{2.5}$ EF (lbs/hr) | $PM_{10}$ EF (lbs/hr) | $PM_{2.5}$ EF (lbs/hr) | Mitigation Efficiency | $PM_{10}$ EF (lbs/hr) | $PM_{2.5}$ EF (lbs/hr) | Mitigation Efficiency | $PM_{10}$ EF (lbs/hr) | $PM_{2.5}$ EF (lbs/hr) | Mitigation Efficiency | $PM_{10}$ EF (lbs/hr) | $PM_{2.5}$ EF (lbs/hr) | Mitigation Efficiency | $PM_{10}$ EF (lbs/hr) | $PM_{2.5}$ EF (lbs/hr) |
| **Nonroad Equipment** | | | | | | | | | | | | | | | | | | |
| GTP -- Non-Phase-Specific Rolling Stock, Post-Primer and Equipment (November 2014 - August 2020) | N4 | Power Generation - 200 Main Pioneer Camp | - | - | - | - | 0% | | | | | | | | | | - | - |
| | N5 | Power Generation - 700 Main Pioneer Camp | - | - | - | - | 0% | | | | | | | | | | - | - |
| | N6 | Power Generation - 335 Main Pioneer Camp | - | - | - | - | 0% | | | | | | | | | | - | - |
| | N7 | Site CNST Power Generation - 1 MW | - | - | - | - | 0% | | | | | | | | | | - | - |
| | N8 | Heat - 10,000 sq. ft. Pioneer Camp | - | - | - | - | 0% | | | | | | | | | | - | - |
| | N9 | Heat - 46,550 sq. ft. Temp CNSRT Camp | - | - | - | - | 0% | | | | | | | | | | - | - |
| | N10 | Heat - 44,555 sq. ft. Perm Ops and Cnst Camp | - | - | - | - | 0% | | | | | | | | | | - | - |
| | N11 | Heat - 64,000 sq. ft. Perm Warehouse | - | - | - | - | 0% | | | | | | | | | | - | - |
| | N12 | Heat - 43,000 sq. ft. Perm Maintenance Facil | - | - | - | - | 0% | | | | | | | | | | - | - |
| | N13 | Heat - 84,000 sq. ft. Perm Ops Cnst and Dining | - | - | - | - | 0% | | | | | | | | | | - | - |
| | N18 | Snow Blower (150-600 hp) / Loader Mount (501hp) | - | - | - | - | 0% | | | | | | | | | | - | - |
| | N19 | Light Plant | - | - | - | - | 0% | | | | | | | | | | - | - |
| | N20 | Tioga Heaters | - | - | - | - | 0% | | | | | | | | | | - | - |
| Gravel Site Construction and Site Conditioning, North Access and Ice Road to PUT 23 (1/27/14 - May 10, 2016) | G2 | CAT 16G/H Motor Grader | - | - | | | | 0.51 | 0.06 | 0% | | | | | | | 0.51 | 0.06 |
| | G3 | CAT 345 Large Excavator | - | - | 0.03 | 0.00 | 0% | | | | | | | | | | 0.03 | 0.00 |
| | G4 | Cat 740 Rock Truck | - | - | 0.04 | 0.00 | 0% | | | | | | | | | | 0.04 | 0.00 |
| | G5 | CAT 966 Loader | - | - | | | | | | | 0.00 | 0.00 | 0% | | | | 0.00 | 0.00 |
| | G6 | Cat 988B Loader | - | - | | | | | | | 0.00 | 0.00 | 0% | | | | 0.00 | 0.00 |
| | G7 | Cat 988H Loader | - | - | | | | | | | 0.00 | 0.00 | 0% | | | | 0.00 | 0.00 |
| | G8 | Cat CS563E Roller | - | - | | | | 0.51 | 0.06 | 0% | | | | | | | 0.51 | 0.06 |
| | G9 | Cat D-10 Dozer | - | - | | | | 0.75 | 0.41 | 0% | | | | | | | 0.75 | 0.41 |
| | G10 | CAT D-8 Dozer | - | - | - | - | 0% | | | | | | | | | | - | - |
| | G11 | CAT D-9 Dozer | - | - | | | | 0.75 | 0.41 | 0% | | | | | | | 0.75 | 0.41 |
| | G15 | Heater | - | - | - | - | 0% | | | | | | | | | | - | - |
| | G16 | IR CM 2000 Drill and 1600 Compressor | - | - | 0.01 | 0.00 | 0% | | | | | | | | | | 0.01 | 0.00 |
| | G17 | Blasting equipment | 0.22 | 0.01 | 0.01 | 0.00 | 0% | | | | | | | | | | 0.22 | 0.01 |
| | G18 | Pumps/equipment de-watering | - | - | - | - | 0% | | | | | | | | | | - | - |
| | G19 | Light Plant | - | - | - | - | 0% | | | | | | | | | | - | - |
| | G20 | Portable generators | - | - | - | - | 0% | | | | | | | | | | - | - |

Table 9A-16

**Off-site Fugitive Dust Emissions**

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Piles and VSM Installation ( SL1 11/16-12/2017, SL2 12/17-2/2018, SL3 12/18-3/19) | | P4 | Crane Hyd 80 Ton | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | P5 | Drill Watson 3000 | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | P6 | Drill Texoma | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | P7 | Envirorac field office | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | P10 | Generator 8kw | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | P11 | Generator 50KW | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | P12 | Generator 150kw | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | P13 | Indirect Heater | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | P14 | Light Plant | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | P15 | Loader L150 | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | P16 | Manlifts | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | P20 | Slurry Truck 10 yrds | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | P21 | Snow Blower | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | P25 | Welding Machine | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | P26 | Maxihaul 30 yard | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | P28 | Sideboom 583 | - | - | - | - | 0% | | | | | | | | | | - | - |
| GTP – Infra - CC 5-10/2016, WMaint 6-11/2016, V Maint 7-12/2016, WSTor 8/16-1/2017, Fstor 10/16-3/2017 | Construction Camp | IC1 | Light plants with generators | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IC2 | 966 w Bucket and Forks | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IC4 | 150 tonne crane | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IC5 | 25-35 ton crane, 50% shift at 12 hrs/day | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IC6 | 60' JLG 50% at 12 hrs/day/bldg. | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IC7 | 8,000 lb Lull RT Forklift, 12 hrs/day per bldg | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IC8 | Welding Machines, 20% Utilization, 12 hr shift | - | - | - | - | 0% | | | | | | | | | | - | - |
| | Warehouse / Maintenance | IW1 | Light plants with generators | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IW2 | 966 w Bucket and Forks | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IW4 | Propane powered scissor lifts, 12 hr shifts | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IW5 | 34ft. RT Scissor Lift | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IW6 | 25-35 ton crane, 50% shift at 12 hrs/day | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IW7 | 60' JLG 50% at 12 hrs/day/bldg. | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IW8 | 8,000 lb Lull RT Forklift, 12 hrs/day per bldg | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IW9 | Welding Machines, 20% Utilization, 12 hr shift | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IW10 | Portable Concrete Batch Plant | 0.94 | 0.23 | - | - | 0% | | | | | | | | | | 0.94 | 0.23 |
| | | IW12 | Rotary Drill for Thermo-syphons | - | - | - | - | 0% | | | | | | | | | | - | - |
| | Vehicle Maintenance | IV1 | Light plants with generators | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IV2 | 966 w Bucket and Forks | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IV4 | Propane powered scissor lifts, 12 hr shifts | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IV5 | 34ft. RT Scissor Lift | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IV6 | 25-35 ton crane, 50% shift at 12 hrs/day | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IV7 | 60' JLG 50% at 12 hrs/day/bldg. | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IV8 | 8,000 lb Lull RT Forklift, 12 hrs/day per bldg | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IV9 | Welding Machines, 20% Utilization, 12 hr shift | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IV10 | Portable Concrete Batch Plant | 0.94 | 0.23 | - | - | 0% | | | | | | | | | | 0.94 | 0.23 |
| | | IV12 | Rotary Drill for Thermo-syphons | - | - | - | - | 0% | | | | | | | | | | - | - |
| | Waste Storage Bldg | IS1 | Light plants with generators | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IS2 | 966 w Bucket and Forks | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IS4 | Propane powered scissor lifts, 12 hr shifts | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IS5 | 25-35 ton crane, 50% shift at 12 hrs/day | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IS6 | 60' JLG 50% at 12 hrs/day/bldg. | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IS7 | 8,000 lb Lull RT Forklift, 12 hrs/day per bldg | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IS8 | Welding Machines, 20% Utilization, 12 hr shift | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IS9 | Portable Concrete Batch Plant | 0.94 | 0.23 | - | - | 0% | | | | | | | | | | 0.94 | 0.23 |
| | Fuel Storage Bldg | IF1 | Light plants with generators | - | - | - | - | 0% | | | | | | | | | | - | - |
| | | IF2 | 966 w Bucket and Forks | - | - | - | - | 0% | | | | | | | | | | - | - |

**TABLE 9A-17 FUGITIVE DUST EMISSION FACTORS FOR PORTABLE CONCRETE BATCH PLANT**

Table 9A-16

**Off-site Fugitive Dust Emissions**

Table 9A-17

**Fugitive Dust Emission Factors For Portable Concrete Batch Plant**

Source: USEPA AP42 Emission Factor 11.12 - Concrete Batching

**Concrete Batch Plant Emission Factors: (for truck mixed concrete product)**

| | Uncontrolled (lbs/ton) | | Mitigation | Controlled (lbs/ton) | | |
|---|---|---|---|---|---|---|
| **Equipment/Activity** | **PM10** | **PM2.5** | **Efficiency** | **PM10** | **PM2.5** | Notes |
| Aggregate transfer at ready mix plant | 0.0033 | 0.0010 | - | 0.0033 | 0.0010 | lb/ton concrete produced |
| Sand transfer at ready mix plant | 0.00099 | 0.0003 | - | 0.00099 | 0.0003 | lb/ton concrete produced |
| Cement unloading to silo at ready mix plant | 0.46 | 0.1380 | - | 0.00034 | 0.00010 | lb/ton concrete produced |
| Supplement unloading to silo at ready mix plant | 1.10 | 0.3300 | - | 0.0049 | 0.0015 | lb/ton concrete produced |
| Weight hopper loading at ready mix plant | 0.0024 | 0.0007 | - | 0.0024 | 0.0007 | lb/ton of aggregate and sand |
| Truck loading (truck mixed) at ready mix plant | 0.278 | 0.0550 | - | 0.0160 | 0.0037 | lb/ton of cement and cement supplement |

Batch plant production rate (assumption):

| | |
|---|---|
| 30 | cubic meter per hour production rate (ref: ELKON mobile master-30 eagle, mobile concrete batching plant) |
| 275 | cubic yard per day production (operationg 7 hours a day) |
| 2.012 | ton per cubic yard concrete (AP-42, Table 11.12-2, footnote "a") |
| 256 | Aggregate, tons per day (scaled from AP-42, Table 11.12-2, footnote "a") |
| 196 | Sand, tons per day (scaled from AP-42, Table 11.12-2, footnote "a") |
| 68 | Cement, tons per day (scaled from AP-42, Table 11.12-2, footnote "a") |
| 10 | Cement supplement, tons per day (scaled from AP-42, Table 11.12-2, footnote "a") |
| 530 | Total dry (aggregate, sand, cement, supplement) tons per day |
| 5,500 | gal water per day (AP-42, Table 11.12-2, footnote "a") |
| 23 | tons water per day (AP-42, Table 11.12-2, footnote "a") |
| 553 | Total (Total dry + water) (tons per day) |

ND: no data available.
PM2.5/PM10 ratio for central mixer loading is from Table 11.12-4 in AP-42.
PM2.5/PM10 ratios for other activities are from SCAQMD CEQA Appendix A – Updated CEIDARS List with PM2.5 Fractions
PM10 and PM2.5 controlled EFs assumed to be the same as uncontrolled ones for aggregate transfer, sand transfer, and weight hopper loading activities.

| | Uncontrolled (lbs/day) | | Mitigation | Controlled (lbs/day) | |
|---|---|---|---|---|---|
| **Equipment/Activity** | **PM10 EF** | **PM2.5 EF** | **Efficiency** | **PM10 EF** | **PM2.5 EF** |
| Aggregate transfer at ready mix plant | 0.85 | 0.25 | - | 0.85 | 0.25 |
| Sand transfer at ready mix plant | 0.19 | 0.06 | - | 0.19 | 0.06 |
| Cement unloading to silo at ready mix plant | 31.06 | 9.32 | - | 0.02 | 0.01 |
| Supplement unloading to silo at ready mix plant | 11.04 | 3.31 | - | 0.05 | 0.01 |
| Weight hopper loading at ready mix plant | 1.27 | 0.38 | - | 1.27 | 0.38 |
| Truck loading (truck mixed) at ready mix plant | 153.81 | 30.44 | - | 8.85 | 2.04 |
| **Total Emissions Pounds Per Day** | **198.22** | **43.76** | - | **11.24** | **2.76** |

**Table 9A-C-2E. Fugitive Dust Emission Factors For Blasting Activity**

Source: USEPA AP42 Emission Factor 11.9 - Western Surface Coal Mining (Table 11.9-1)

**EMISSION FACTOR EQUATIONS FOR UNCONTROLLED OPEN DUST SOURCES**

| | Uncontrolled (lbs/blast) | |
|---|---|---|
| **Equipment/Activity** | **PM10** | **PM2.5** |
| Blasting (Coal or overburden) | 0.5200 | 0.0300 |

10 blast per day (assumptions)

| | Uncontrolled (lbs/day) | |
|---|---|---|
| **Equipment/Activity** | **PM10** | **PM2.5** |
| Blasting (Coal or overburden) | 5.2000 | 0.3000 |