## Metcalfe, Megan MEM:EX

**From:** Bouffard, Maryann J MEM:EX
**Sent:** Monday, August 12, 2013 10:16 AM
**To:** Taje, Eddy MEM:EX
**Subject:** FW: Chemical Composition of PRB coal
**Attachments:** Generic PRB 2.jpg; Sample Coal Chemical Analysis PRB_Page_1.jpg; Sample Coal Chemical Analysis PRB_Page_2.jpg

Ed, did you forward this to Tanya?


MARYANN J. BOUFFARD

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Maryann.Bouffard@gov.bc.ca


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**From:** Lincoln Kyne [mailto:lincoln.kyne@lafarge.com]
**Sent:** Friday, July 26, 2013 5:59 PM
**To:** Taje, Eddy MEM:EX
**Cc:** Bouffard, Maryann J MEM:EX; Brad Kohl
**Subject:** Chemical Composition of PRB coal

Ed,

Please find attached two generic samples of the chemical compositions of PRB Coal as requested.

Unfortunately I do not have Tanya's contact details in which to pass this on to. Maryanne, perhaps in Ed's absence you would be able to assist in forwarding this on?

Again, please do not hesitate to contact me if there are any issues with the information provided.

Regards,


**Lincoln Kyne**
Project Manager

Lafarge Canada Inc. - ***Building Better Cities™***
#200 7455 132 Street, Surrey, BC, V3W 1J8
Telephone: (604) 502-5207 | Mobile: (604) 789-3006 | Email: lincoln.kyne@lafarge.com
www.lafarge-na.com

## Proximate Analysis % (As Received)

| | |
|---|---|
| Moisture | 27.08 |
| Ash | 5.45 |
| Sulfur | 0.32 |
| BTU | 8,813 |
| MAF BTU | 13,062 |
| Pounds SO2/MM BTU | 0.73 |
| Pounds Ash/MM BTU | 6.18 |
| Ash to Sulfur Ratio | 17.03 |
| % Volatile Matter | 33.15 |
| % Fixed Carbon | 34.32 |

## Ultimate Analysis % (Dry Basis)

| | |
|---|---|
| Moisture | NA |
| Ash | 7.47 |
| Hydrogen | 4.93 |
| Carbon | 69.56 |
| Nitrogen | 1.01 |
| Sulfur | 0.44 |
| Oxygen | 16.59 |
| Chlorine | 0.0007 |

## Ash Mineral Analysis - % Ignited Basis

| | |
|---|---|
| Silicon Dioxide | 37.49 |
| Aluminum Oxide | 18.46 |
| Titanium Dioxide | 1.40 |
| Sulfur Trioxide | 9.45 |
| Calcium Oxide | 18.87 |
| Potassium Oxide | 0.54 |
| Magnesium Oxide | 4.01 |
| Sodium Oxide | 1.28 |
| Iron Oxide | 6.11 |
| Phosphorus Pentoxide | 0.81 |
| Manganese Dioxide | 0.04 |

## Sulfur Forms % (Dry Basis)

| | |
|---|---|
| Pyritic | 0.07 |
| Sulfate | 0.00 |
| Organic | 0.37 |
| Total | 0.44 |

## Water Soluble Alkalies - % As Determined

| | |
|---|---|
| Potassium Oxide | 0.009 |
| Sodium Oxide | 0.083 |

## Ash Fusion Temperatures (Deg F)

| | |
|---|---|
| Reducing | |
| Initial | 2146 |
| Softening | 2169 |
| Hemispherical | 2181 |
| Fluid | 2218 |
| Oxidizing | |
| Initial | 2228 |
| Softening | 2238 |
| Hemispherical | 2251 |
| Fluid | 2331 |

## Other Information

| | |
|---|---|
| Hardgrove Grindability Index | 57 |
| Free Swelling Index | 0.5 |
| % Equilibrium Moisture | 25.63 |
| T250 | 2284 |
| Base - Acid Ratio | 0.55 |
| % Acidic | 57.35 |
| % Basic | 31.62 |
| SI/AL Ratio | 2.03 |

## Trace Elements - PPM, Dry Basis

| | | | |
|---|---|---|---|
| Antimony | 0.15 | Manganese | 16.81 |
| Arsenic | 1.32 | Mercury | 0.09 |
| Barium | 347.00 | Molybdenum | 0.78 |
| Beryllium | 0.21 | Nickel | 4.25 |
| Boron | 38.60 | Selenium | 0.81 |
| Bromine | 16.90 | Silver | 0.03 |
| Cadmium | 0.08 | Strontium | 179.00 |
| Chromium | 4.63 | Thallium | 0.09 |
| Cobalt | 1.48 | Tin | 0.30 |
| Copper | 9.78 | Uranium | 0.55 |
| Fluorine | 69.19 | Vanadium | 14.80 |
| Lead | 2.37 | Zinc | 8.75 |
| Lithium | 3.07 | Zirconium | 13.37 |

# QUALITY SPECIFICATIONS

| QUALITY PARAMETER | TYPICAL (MEAN VALUE) | STANDARD DEVIATION | TYPICAL 95% RANGE -2 STD DEV | +2 STD DEV | TYPICAL DRY VALUE | TYPICAL MOISTURE-ASH FREE VALUE |
|---|---|---|---|---|---|---|
| **PROXIMATE** | | | | | | |
| % Moisture | 25.40 | 0.56 | 24.28 | 26.52 | | |
| % Ash | 4.12 | 0.33 | 3.46 | 4.78 | 5.52 | |
| % Volatile | 31.26 | 0.81 | 29.64 | 32.88 | 41.90 | 44.35 |
| % Fixed Carbon | 39.23 | 0.80 | 37.63 | 40.83 | 52.59 | 55.66 |
| BTU/lb | 9350 | 103 | 9132 | 9544 | 12517 | 13249 |
| MAFBTU | 13249 | 80.08 | 13089 | 13409 | | |
| Dry BTU | 12517 | 93.71 | 12330 | 12705 | | |
| % Sulfur | 0.38 | 0.07 | 0.20 | 0.48 | 0.46 | 0.48 |
| **ULTIMATE** | | | | | | |
| % Moisture | 25.40 | 0.56 | 24.28 | 26.52 | | |
| % Carbon | 54.14 | 3.28 | 47.58 | 60.70 | 72.57 | 76.82 |
| % Hydrogen | 3.80 | 0.23 | 3.34 | 4.26 | 5.09 | 5.39 |
| % Nitrogen | 0.71 | 0.09 | 0.53 | 0.89 | 0.95 | 1.01 |
| % Chlorine | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 |
| % Sulfur | 0.34 | 0.07 | 0.20 | 0.48 | 0.46 | 0.48 |
| % Ash | 4.12 | 0.33 | 3.46 | 4.78 | | |
| % Oxygen | 11.50 | 0.70 | 10.10 | 12.90 | 15.42 | 16.32 |
| **SULFUR FORMS** | | | | | | |
| Pyritic Sulfur (%) | 0.05 | 0.03 | 0.00 | 0.11 | 0.07 | 0.07 |
| Sulfate Sulfur (%) | 0.01 | 0.015 | 0.00 | 0.04 | 0.01 | 0.01 |
| Organic Sulfur (%) | 0.28 | 0.06 | 0.16 | 0.40 | 0.38 | 0.40 |
| Total Sulfur (%) | 0.34 | 0.07 | 0.20 | 0.48 | 0.46 | 0.48 |
| **MINERAL ANALYSIS OF ASH** | | | | | | |
| % Silicon Dioxide (Silica, $SiO_2$) | 32.52 | 2.78 | 26.96 | 38.08 | | |
| % Aluminum Oxide (Alumina, $Al_2O_3$) | 17.69 | 1.09 | 15.51 | 19.87 | | |
| % Titanium Dioxide (Titania, $TiO_2$) | 1.13 | 0.10 | 0.93 | 1.33 | | |
| % Iron Oxide (Ferric Oxide, $Fe_2O_3$) | 4.76 | 0.47 | 3.82 | 5.70 | | |
| % Calcium Oxide (Lime, CaO) | 15.36 | 1.41 | 12.54 | 18.18 | | |
| % Magnesium Oxide (Magnesia, MgO) | 3.69 | 0.85 | 1.99 | 5.39 | | |
| % Potassium Oxide ($K_2O$) | 0.63 | 0.14 | 0.35 | 0.91 | | |
| % Sodium Oxide ($Na_2O$) | 8.24 | 1.00 | 6.24 | 10.24 | | |
| % Sulfur Trioxide ($SO_3$) | 14.07 | 2.50 | 9.07 | 19.07 | | |
| % Phosphorous Pentoxide ($P_2O_5$) | 0.35 | 0.06 | 0.23 | 0.47 | | |
| % Strontium Oxide (SrO) | 0.37 | 0.22 | 0.00 | 0.81 | | |
| % Barium Oxide (BaO) | 1.19 | 0.31 | 0.57 | 1.81 | | |
| % Undetermined | 0.00 | 1.00 | 0.00 | 2.00 | | |
| Base/Acid Ratio | 0.64 | 0.08 | 0.48 | 0.80 | | |
| Base Value | 32.68 | 2.20 | 28.28 | 37.08 | | |
| Acid Value | 51.34 | 3.00 | 45.34 | 57.34 | | |
| **ASH FUSION TEMPERATURES** | | | | | | |
| **Reducing ($^oF$)** | | | | | | |
| Initial | 2106 | 37 | 2031 | 2181 | | |
| Softening (H=W) | 2129 | 36 | 2056 | 2202 | | |
| Hemispherical (H=1/2W) | 2141 | 39 | 2062 | 2220 | | |
| Fluid | 2164 | 51 | 2062 | 2266 | | |
| Fluid-Initial Temp. Difference | 58 | 40 | 0 | 138 | | |
| **Oxidizing ($^oF$)** | | | | | | |
| Initial | 2351 | 98 | 2156 | 2546 | | |
| Softening (H=W) | 2366 | 81 | 2204 | 2528 | | |
| Hemispherical (H=1/2W) | 2391 | 73 | 2245 | 2537 | | |
| Fluid | 2423 | 77 | 2268 | 2578 | | |
| Fluid-Initial Temp. Difference | 72 | 60 | 0 | 192 | | |

# QUALITY SPECIFICATIONS (Continued)

| QUALITY PARAMETER | TYPICAL (MEAN VALUE) | STANDARD DEVIATION | TYPICAL 95% RANGE -2 STD DEV | +2 STD DEV |
|---|---|---|---|---|
| **ADDITIONAL ANALYSES AND CALCULATED VALUES** | | | | |
| T250 Temperature (°F) | 2153 | 91.88 | 1969 | 2337 |
| HGI (at as-received moisture) | 60.6 | 5.6 | 49 | 72 |
| HGI % Moisture | 24.13 | 3.88 | 16 | 32 |
| Critical Viscosity Temperature (°F) | 0 | 0 | 0 | 0 |
| Critical Viscosity (Poises) | 0 | 0 | 0 | 0 |
| % Equilibrium Moisture | 23.93 | 0.56 | 22.81 | 25.05 |
| Specific Gravity | 1.10 | 0.015 | 1.07 | 1.13 |
| %Alkalies NA2O Dry (Total Alkali Content on Coal) | 0.478 | 0.070 | 0.34 | 0.62 |
| %Water Soluble Alk - Na2O | 0.000 | 0.000 | 0.00 | 0.00 |
| %Water Soluble Alk - K2O | 0.000 | 0.000 | 0.00 | 0.00 |
| %Na2O - Dry Coal | 0.46 | 0.03 | 0.40 | 0.52 |
| %Na2O As-received Coal | 0.34 | 0.02 | 0.30 | 0.38 |
| Silica Value (Silica Ratio) | 57.73 | | | |
| Slag Factor | 0.28 | 0.14 | 0.00 | 0.56 |
| Slag factor per Fusion Temperature | 2163 | 85 | 1993 | 2333 |
| Dolomite Ratio | 58.29 | 3.25 | 51.79 | 64.79 |
| Ash Precipitation Index | 3.97 | 10.1 | 0.00 | 24.17 |
| Silica to Alumina Ratio | 1.84 | 0.14 | 1.56 | 2.12 |
| Calcium to Silica Ratio | 0.47 | 0.34 | 0.00 | 1.15 |
| Iron to Calcium Ratio | 0.31 | 0.07 | 0.17 | 0.45 |
| Fouling Factor (Fouling Index) | 5.25 | 1.41 | 2.43 | 8.07 |
| SO2/MMBTU | 0.80 | 0.075 | 0.58 | 0.88 |
| lbs S/MMBTU | 0.36 | 0.075 | 0.21 | 0.51 |
| lbs Sodium/MMBTU | 0.364 | 0.023 | 0.32 | 0.41 |
| lbs Ash/MMBTU | 4.41 | 0.5 | 3.41 | 5.41 |

**TYPICAL COAL SIZE** 2 inch

| Size Fraction | Wt. Percent | Cumulative Wt. Percent | Wt. Percent Passing Top |
|---|---|---|---|
| +3" RD. | 0% | 0% | 100% |
| 3" RD. x 2" RD. | 4% | 4% | 100% |
| 2" RD. x 1" RD. | 20% | 24% | 96% |
| 1" RD. x 1/2" RD. | 28% | 52% | 76% |
| 1/2" RD. x 4 M | 20% | 71% | 48% |
| 4 M x 60 M | 13% | 84% | 29% |
| 60 M x 0 | 16% | 100% | 16% |

**TRACE ELEMENT SUMMARY**

| Parts Per Million Whole Coal, Dry Basis | TYPICAL (MEAN VALUE) | STANDARD DEVIATION | TYPICAL 95% RANGE -2 STD DEV | +2 STD DEV |
|---|---|---|---|---|
| ANTIMONY (Sb) | n/a | n/a | n/a | n/a |
| ARSENIC (As) | 1.50 | 1.00 | 0.00 | 3.50 |
| BARIUM (Ba) | n/a | n/a | n/a | n/a |
| BERYLLIUM (Be) | 0.21 | 0.08 | 0.06 | 0.36 |
| BORON (B) | n/a | n/a | n/a | n/a |
| BROMINE (Br) | n/a | n/a | n/a | n/a |
| CADMIUM (Cd) | 0.18 | 0.02 | 0.14 | 0.22 |
| CHLORINE (Cl) | 9.15 | 3.75 | 1.65 | 16.65 |
| CHROMIUM (Cr) | 2.40 | 0.75 | 0.90 | 3.90 |
| COBALT (Co) | n/a | n/a | n/a | n/a |
| COPPER (Cu) | n/a | n/a | n/a | n/a |
| FLUORINE (F) | 41.90 | 11.00 | 19.90 | 63.90 |
| LITHIUM (Li) | n/a | n/a | n/a | n/a |
| MANGANESE Mn) | 16.20 | 7.90 | 0.40 | 32.00 |
| MERCURY (Hg) | 0.07 | 0.03 | 0.01 | 0.13 |
| MOLYBDNEUM (Mo) | n/a | n/a | n/a | n/a |
| NICKEL (Ni) | 1.53 | 1.00 | 0.00 | 3.53 |
| LEAD (Pb) | 2.60 | 1.00 | 0.60 | 4.60 |
| SELENUIM (Se) | 1.20 | 0.90 | 0.00 | 3.00 |
| SILVER (Ag) | n/a | n/a | n/a | n/a |
| STRONTIUM (Sr) | n/a | n/a | n/a | n/a |
| THALLIUM (Tl) | n/a | n/a | n/a | n/a |
| THORIUM (Th) | n/a | n/a | n/a | n/a |
| TIN (Sn) | n/a | n/a | n/a | n/a |
| URANIUM (U) | n/a | n/a | n/a | n/a |
| VANADIUM (V) | n/a | n/a | n/a | n/a |
| ZIRCONIUM (Zr) | n/a | n/a | n/a | n/a |
| ZINC (Zn) | n/a | n/a | n/a | n/a |

*** All negative numbers were converted to 0.00**

# QUALITY SPECIFICATIONS

| QUALITY PARAMETER | TYPICAL (MEAN VALUE) | STANDARD DEVIATION | TYPICAL 95% RANGE -2 STD DEV | TYPICAL 95% RANGE +2 STD DEV | TYPICAL DRY VALUE | TYPICAL MOISTURE-ASH FREE VALUE |
|---|---|---|---|---|---|---|
| **PROXIMATE** | | | | | | |
| % Moisture | 25.40 | 0.56 | 24.28 | 26.52 | | |
| % Ash | 4.12 | 0.33 | 3.46 | 4.78 | 5.52 | |
| % Volatile | 31.26 | 0.81 | 29.64 | 32.88 | 41.90 | 44.35 |
| % Fixed Carbon | 39.23 | 0.80 | 37.63 | 40.83 | 52.59 | 55.66 |
| BTU/lb | 9350 | 103 | 9132 | 9544 | 12517 | 13249 |
| MAFBTU | 13249 | 80.08 | 13089 | 13409 | | |
| Dry BTU | 12517 | 93.71 | 12330 | 12705 | | |
| % Sulfur | 0.38 | 0.07 | 0.20 | 0.48 | 0.46 | 0.48 |
| **ULTIMATE** | | | | | | |
| % Moisture | 25.40 | 0.56 | 24.28 | 26.52 | | |
| % Carbon | 54.14 | 3.28 | 47.58 | 60.70 | 72.57 | 76.82 |
| % Hydrogen | 3.80 | 0.23 | 3.34 | 4.26 | 5.09 | 5.39 |
| % Nitrogen | 0.71 | 0.09 | 0.53 | 0.89 | 0.95 | 1.01 |
| % Chlorine | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 |
| % Sulfur | 0.34 | 0.07 | 0.20 | 0.48 | 0.46 | 0.48 |
| % Ash | 4.12 | 0.33 | 3.46 | 4.78 | | |
| % Oxygen | 11.50 | 0.70 | 10.10 | 12.90 | 15.42 | 16.32 |
| **SULFUR FORMS** | | | | | | |
| Pyritic Sulfur (%) | 0.05 | 0.03 | 0.00 | 0.11 | 0.07 | 0.07 |
| Sulfate Sulfur (%) | 0.01 | 0.015 | 0.00 | 0.04 | 0.01 | 0.01 |
| Organic Sulfur (%) | 0.28 | 0.06 | 0.16 | 0.40 | 0.38 | 0.40 |
| Total Sulfur (%) | 0.34 | 0.07 | 0.20 | 0.48 | 0.46 | 0.48 |
| **MINERAL ANALYSIS OF ASH** | | | | | | |
| % Silicon Dioxide (Silica, SiO2) | 32.52 | 2.78 | 26.96 | 38.08 | | |
| % Aluminum Oxide (Alumina, Al2O3) | 17.69 | 1.09 | 15.51 | 19.87 | | |
| % Titanium Dioxide (Titania, TiO2) | 1.13 | 0.10 | 0.93 | 1.33 | | |
| % Iron Oxide (Ferric Oxide, Fe2O3) | 4.76 | 0.47 | 3.82 | 5.70 | | |
| % Calcium Oxide (Lime, CaO) | 15.36 | 1.41 | 12.54 | 18.18 | | |
| % Magnesium Oxide (Magnesia, MgO) | 3.69 | 0.85 | 1.99 | 5.39 | | |
| % Potassium Oxide (K2O) | 0.63 | 0.14 | 0.35 | 0.91 | | |
| % Sodium Oxide (Na2O) | 8.24 | 1.00 | 6.24 | 10.24 | | |
| % Sulfur Trioxide (SO3) | 14.07 | 2.50 | 9.07 | 19.07 | | |
| % Phosphorous Pentoxide (P2O5) | 0.35 | 0.06 | 0.23 | 0.47 | | |
| % Strontium Oxide (SrO) | 0.37 | 0.22 | 0.00 | 0.81 | | |
| % Barium Oxide (BaO) | 1.19 | 0.31 | 0.57 | 1.81 | | |
| % Undetermined | 0.00 | 1.00 | 0.00 | 2.00 | | |
| Base/Acid Ratio | 0.64 | 0.08 | 0.48 | 0.80 | | |
| Base Value | 32.68 | 2.20 | 28.28 | 37.08 | | |
| Acid Value | 51.34 | 3.00 | 45.34 | 57.34 | | |
| **ASH FUSION TEMPERATURES** | | | | | | |
| **Reducing ($^{o}$F)** | | | | | | |
| Initial | 2106 | 37 | 2031 | 2181 | | |
| Softening (H=W) | 2129 | 36 | 2056 | 2202 | | |
| Hemispherical (H=1/2W) | 2141 | 39 | 2062 | 2220 | | |
| Fluid | 2164 | 51 | 2062 | 2266 | | |
| Fluid-Initial Temp. Difference | 58 | 40 | 0 | 138 | | |
| **Oxidizing ($^{o}$F)** | | | | | | |
| Initial | 2351 | 98 | 2156 | 2546 | | |
| Softening (H=W) | 2366 | 81 | 2204 | 2528 | | |
| Hemispherical (H=1/2W) | 2391 | 73 | 2245 | 2537 | | |
| Fluid | 2423 | 77 | 2268 | 2578 | | |
| Fluid-Initial Temp. Difference | 72 | 60 | 0 | 192 | | |

# QUALITY SPECIFICATIONS (Continued)

| QUALITY PARAMETER | TYPICAL (MEAN VALUE) | STANDARD DEVIATION | TYPICAL 95% RANGE -2 STD DEV | +2 STD DEV |
|---|---|---|---|---|
| **ADDITIONAL ANALYSES AND CALCULATED VALUES** | | | | |
| T250 Temperature (°F) | 2153 | 91.88 | 1969 | 2337 |
| HGI (at as-received moisture) | 60.6 | 5.6 | 49 | 72 |
| HGI % Moisture | 24.13 | 3.88 | 16 | 32 |
| Critical Viscosity Temperature (°F) | 0 | 0 | 0 | 0 |
| Critical Viscosity (Poises) | 0 | 0 | 0 | 0 |
| % Equilibrium Moisture | 23.93 | 0.56 | 22.81 | 25.05 |
| Specific Gravity | 1.10 | 0.015 | 1.07 | 1.13 |
| %Alkalies NA2O Dry (Total Alkali Content on Coal) | 0.478 | 0.070 | 0.34 | 0.62 |
| %Water Soluble Alk - Na2O | 0.000 | 0.000 | 0.00 | 0.00 |
| %Water Soluble Alk - K2O | 0.000 | 0.000 | 0.00 | 0.00 |
| %Na2O - Dry Coal | 0.46 | 0.03 | 0.40 | 0.52 |
| %Na2O As-received Coal | 0.34 | 0.02 | 0.30 | 0.38 |
| Silica Value (Silica Ratio) | 57.73 | | | |
| Slag Factor | 0.28 | 0.14 | 0.00 | 0.56 |
| Slag factor per Fusion Temperature | 2163 | 85 | 1993 | 2333 |
| Dolomite Ratio | 58.29 | 3.25 | 51.79 | 64.79 |
| Ash Precipitation Index | 3.97 | 10.1 | 0.00 | 24.17 |
| Silica to Alumina Ratio | 1.84 | 0.14 | 1.56 | 2.12 |
| Calcium to Silica Ratio | 0.47 | 0.34 | 0.00 | 1.15 |
| Iron to Calcium Ratio | 0.31 | 0.07 | 0.17 | 0.45 |
| Fouling Factor (Fouling Index) | 5.25 | 1.41 | 2.43 | 8.07 |
| SO2/MMBTU | 0.80 | 0.075 | 0.58 | 0.88 |
| lbs S/MMBTU | 0.36 | 0.075 | 0.21 | 0.51 |
| lbs Sodium/MMBTU | 0.364 | 0.023 | 0.32 | 0.41 |
| lbs Ash/MMBTU | 4.41 | 0.5 | 3.41 | 5.41 |

**TYPICAL COAL SIZE** 2 inch

| Size Fraction | Wt. Percent | Cumulative Wt. Percent | Wt. Percent Passing Top |
|---|---|---|---|
| +3" RD. | 0% | 0% | 100% |
| 3" RD. x 2" RD. | 4% | 4% | 100% |
| 2" RD. x 1" RD. | 20% | 24% | 96% |
| 1" RD. x 1/2" RD. | 28% | 52% | 76% |
| 1/2" RD. x 4 M | 20% | 71% | 48% |
| 4 M x 60 M | 13% | 84% | 29% |
| 60 M x 0 | 16% | 100% | 16% |

**TRACE ELEMENT SUMMARY**

| Parts Per Million Whole Coal, Dry Basis | TYPICAL (MEAN VALUE) | STANDARD DEVIATION | TYPICAL 95% RANGE -2 STD DEV | +2 STD DEV |
|---|---|---|---|---|
| ANTIMONY (Sb) | n/a | n/a | n/a | n/a |
| ARSENIC (As) | 1.50 | 1.00 | 0.00 | 3.50 |
| BARIUM (Ba) | n/a | n/a | n/a | n/a |
| BERYLLIUM (Be) | 0.21 | 0.08 | 0.06 | 0.36 |
| BORON (B) | n/a | n/a | n/a | n/a |
| BROMINE (Br) | n/a | n/a | n/a | n/a |
| CADMIUM (Cd) | 0.18 | 0.02 | 0.14 | 0.22 |
| CHLORINE (Cl) | 9.15 | 3.75 | 1.65 | 16.65 |
| CHROMIUM (Cr) | 2.40 | 0.75 | 0.90 | 3.90 |
| COBALT (Co) | n/a | n/a | n/a | n/a |
| COPPER (Cu) | n/a | n/a | n/a | n/a |
| FLUORINE (F) | 41.90 | 11.00 | 19.90 | 63.90 |
| LITHIUM (Li) | n/a | n/a | n/a | n/a |
| MANGANESE Mn) | 16.20 | 7.90 | 0.40 | 32.00 |
| MERCURY (Hg) | 0.07 | 0.03 | 0.01 | 0.13 |
| MOLYBDNEUM (Mo) | n/a | n/a | n/a | n/a |
| NICKEL (Ni) | 1.53 | 1.00 | 0.00 | 3.53 |
| LEAD (Pb) | 2.60 | 1.00 | 0.60 | 4.60 |
| SELENUIM (Se) | 1.20 | 0.90 | 0.00 | 3.00 |
| SILVER (Ag) | n/a | n/a | n/a | n/a |
| STRONTIUM (Sr) | n/a | n/a | n/a | n/a |
| THALLIUM (Tl) | n/a | n/a | n/a | n/a |
| THORIUM (Th) | n/a | n/a | n/a | n/a |
| TIN (Sn) | n/a | n/a | n/a | n/a |
| URANIUM (U) | n/a | n/a | n/a | n/a |
| VANADIUM (V) | n/a | n/a | n/a | n/a |
| ZIRCONIUM (Zr) | n/a | n/a | n/a | n/a |
| ZINC (Zn) | n/a | n/a | n/a | n/a |

* All negative numbers were converted to 0.00

## Metcalfe, Megan MEM:EX

**From:** Demchuk, Tania MEM:EX
**Sent:** Wednesday, August 14, 2013 1:45 PM
**To:** Taje, Eddy MEM:EX
**Cc:** 'Lincoln Kyne'; 'Brad Kohl'; Pope, Rue MEM:EX
**Subject:** RE: Base/Acid Ratio and US Coal Logistics Chain
**Attachments:** RE: Chemical Composition of PRB coal

Eddy,

Further to my previous email (attached), Lafarge has provided information about the base acid ratio. This number is related to coal quality, and is not indicative of anything to do with metal leaching or acid rock drainage potential.

We do not have traditional acid base accounting (ABA) data that would provide this information so I cannot say if the coal is potentially acid generating. However, as noted in the email below the time at between mining and shipping (including stockpile time on Texada) is less than 30 days so it is unlikely that there would be an issue with either metal leaching or acid generation. My previous email noted that selenium was slightly elevated above crustal averages but given the short time that coal will be in the stockpile, this should not be an issue. In addition, the coal is treated with an anti-oxidant, which would also help prevent/slow oxidation, which is the process that can lead to leaching or ARD.

I suggest that there be a couple of permit conditions related to periodic sampling of coal for ABA and total metals (maybe a monthly composite) so that there is a record of what was passing through the site. I would also suggest that there be a condition stating the maximum length of time that coal may be in a stockpile (suggest 90 days), and that there be a system in place to ensure that stockpiles turn over completely, so that there is not a build up of materials at the bottom of the pile over time.

Please let me know if you require further information. I would be happy to provide wording for the recommended conditions as required.

Tania

Tania Demchuk, MSc, GIT
*Senior Environmental Geoscientist,*
*BC Ministry of Energy and Mines and Natural Gas*
P.O. Box 9320, Stn Prov Gov't, Victoria BC V8W 9N3
Phone: (250) 952-0417 Fax: (250) 952-0481

---

**From:** Lincoln Kyne [mailto:lincoln.kyne@lafarge.com]
**Sent:** Tuesday, August 13, 2013 10:45 AM
**To:** Demchuk, Tania MEM:EX; Taje, Eddy MEM:EX; Brad Kohl
**Subject:** Base/Acid Ratio and US Coal Logistics Chain

Tania,

further to you request for information on both the base acid ratio calculations and logistics chain, please find below the following responses.

**BASE ACID RATIO**

$$BAR = \frac{Fe_2O_3+CaO+MgO+K_2O+Na_2O}{SiO_2+Al_2O_3+TiO_2}$$

$Fe_2O_3$= Ferric Oxide
CaO= Calcium Oxide
MgO= Magnesium Oxide
$K_2O$= Potassium Oxide
$Na_2O$= Sodium Oxide

$SiO_2$= Silicon Dioxide
$Al_2O_3$= Aluminum Oxide
$TiO_2$= Titanium Oxide

**LOGISTICS CHAIN**

The typical time that the coal is in the logistics chain is as follows:

Mine Site: 1<2 days
Transit by Rail: 4<5 days
Barging: .05>1 day
Stockpile on Texada: 20 days (Average)

So to be safe, from mine extraction to loading on a ship, you could be looking at around 25>30 days.

Importantly, I would note that the coal coming from the US is treated with both an anti-oxidant and a dust suppressant. The effective coverage of this agent is 99.999% with a life span well exceeding the likely supply chain scenario *including* the transit and off-load to the end customer in Asia.

Regards,

Lincoln Kyne

Project Manager

Lafarge Canada Inc. - Building Better Cities™

#200 7455 132 Street, Surrey, BC, V3W 1J8

Telephone: (604) 502-5207 | Mobile: (604) 789-3006 | Email: lincoln.kyne@lafarge.com

www.lafarge-na.com

## Metcalfe, Megan MEM:EX

**From:** Demchuk, Tania MEM:EX
**Sent:** Saturday, August 3, 2013 6:39 PM
**To:** Taje, Eddy MEM:EX; Bouffard, Maryann J MEM:EX
**Cc:** lincoln.kyne@lafarge.com
**Subject:** RE: Chemical Composition of PRB coal

Hi Eddy,

I have taken a look at the information provided by Lincoln. I gather that the data he provided represent 2 samples. The information is presented differently from what we are used to seeing from BC-based labs so I have asked Lincoln to provide some further information about what a couple of the results mean, specifically for the Base/Acid ratio, and % base, % acid values. We are waiting for this clarification. If these are similar to acid base accounting results, the information is important for us to understand.

The samples have relatively low total sulphur content and very low pyritic sulphur, which is the form I would be most concerned about from an ARD perspective. Of the trace metals presented, selenium is slightly elevated compared to average crustal composition.

Tania

_____

From: Demchuk, Tania MEM:EX
Sent: August 3, 2013 3:54 PM
To: Demchuk, Tania MEM:EX
Subject: FW: Chemical Composition of PRB coal

From: Lincoln Kyne [mailto:lincoln.kyne@lafarge.com]
Sent: Monday, July 29, 2013 4:40 PM
To: Demchuk, Tania MEM:EX
Cc: Bouffard, Maryann J MEM:EX; Taje, Eddy MEM:EX
Subject: Re: Chemical Composition of PRB coal

Is this better? The data is for two mines. The reattached sample is for a single mine (2 pages) in 11x8 page size. The third page previously sent is additionally for one mine and all information is on a single page.

I am sorry but I do not have the full understanding of the testing procedures contained therein as I believe they are done to ASTM standards of which I am not familiar with for coal.

I understood the trace element figures were of most important concern. We previously have had these figures run against BC Working sediment quality guidelines - (marine) which as we understand show the values to be significantly lower than the standards and if settled in a marine environment would not pose a threat to aquatic life.

I will investigate regarding your enquiry on acid base ratios and revert back to you when I have the information.

Regards,

Lincoln Kyne

Project Manager

Lafarge Canada Inc. - Building Better Cities™

#200 7455 132 Street, Surrey, BC, V3W 1J8

Telephone: (604) 502-5207 | Mobile: (604) 789-3006 | Email: lincoln.kyne@lafarge.com<mailto:lincoln.kyne@lafarge.com>

www.lafarge-na.com<http://www.lafarge-na.com>

On Mon, Jul 29, 2013 at 4:05 PM, Demchuk, Tania MEM:EX <Tania.Demchuk@gov.bc.ca<mailto:Tania.Demchuk@gov.bc.ca>> wrote:
Hi Lincoln,

Thank-you for passing along that data to Eddy. I'm wondering if you are able to attach the image files to your emails differently? The 2 bottom files (quality specifications?) are very small and when I copy them and expand or zoom in on them they are no longer legible.

Also, is this data all for a single coal sample or a composite sample? And, there is a line called acid-base ratio, can you tell me what analysis was done to obtain this ratio and what the % acidic and % basic numbers mean?

Thanks,
Tania

Tania Demchuk, MSc, GIT
Senior Environmental Geoscientist,
BC Ministry of Energy and Mines
P.O. Box 9320, Stn Prov Gov't, Victoria BC V8W 9N3
Phone: (250) 952-0417<tel:%28250%29%20952-0417> Fax: (250) 952-0481<tel:%28250%29%20952-0481>

From: Taje, Eddy MEM:EX
Sent: Sunday, July 28, 2013 7:29 AM
To: Demchuk, Tania MEM:EX
Cc: Bouffard, Maryann J MEM:EX
Subject: Fwd: Chemical Composition of PRB coal

Can you look at this and if something is missing let Lincoln know thanks. Please cc me. We can discuss next week on return Sent from my iPhone

Begin forwarded message:

From: Lincoln Kyne <lincoln.kyne@lafarge.com<mailto:lincoln.kyne@lafarge.com>>
Date: 26 July, 2013 5:59:10 PM PDT
To: "Taje, Eddy MEM:EX" <Eddy.Taje@gov.bc.ca<mailto:Eddy.Taje@gov.bc.ca>>
Cc: "Bouffard, Maryann J MEM:EX"
<Maryann.Bouffard@gov.bc.ca<mailto:Maryann.Bouffard@gov.bc.ca>>, Brad Kohl
<brad.kohl@lafarge.com<mailto:brad.kohl@lafarge.com>>
Subject: Chemical Composition of PRB coal Ed,

Please find attached two generic samples of the chemical compositions of PRB Coal as requested.

Unfortunately I do not have Tanya's contact details in which to pass this on to. Maryanne, perhaps in Ed's absence you would be able to assist in forwarding this on?

Again, please do not hesitate to contact me if there are any issues with the information provided.

Regards,

Lincoln Kyne

Project Manager

Lafarge Canada Inc. - Building Better Cities™

#200 7455 132 Street, Surrey, BC, V3W 1J8

Telephone: (604) 502-5207<tel:%28604%29%20502-5207> | Mobile: (604) 789-3006<tel:%28604%29%20789-3006> | Email: lincoln.kyne@lafarge.com<mailto:lincoln.kyne@lafarge.com>

www.lafarge-na.com<http://www.lafarge-na.com>

[cid:image001.jpg@01CE8C75.7E66ED60]
[cid:image002.jpg@01CE8C75.7E66ED60]
[cid:image003.jpg@01CE8C75.7E66ED60]

## Metcalfe, Megan MEM:EX

**From:** Taje, Eddy MEM:EX
**Sent:** Thursday, August 15, 2013 2:40 PM
**To:** 'Terry Robertson'
**Cc:** Pope, Rue MEM:EX
**Subject:** RE: Equity assistance.
**Attachments:** Coal Chemical Analysis Example PRB.pdf; FW: Chemical Composition of PRB coal; RE: Chemical Composition of PRB coal; RE: Base/Acid Ratio and US Coal Logistics Chain; RE: Chemical Composition of PRB coal

Hello Terry: some light reading.

You were on my list for tomorrow as Tanya just put the last piece into it today and I just received it today. Hope the attachments make sense. We still have a lot of work to do on this and will continue as things move ahead in the process. This project will likely need a permit from MOE for under the Waste Management act, ( Ithink that is the correct legal name. In any event Lafarge has been directed to meet them and meet their requirements. Not sure of the process yet, Also Lafarge has been directed to DFO and must meet their requirements as well. So lots going on.

As you can tell once you go over this stuff there is still work to do. So far it appears that this project is ok from a chemistry and water point of view. As it is still early in the process and if the waste management permit is required still more chemistry to come.

Have a nice day.

**From:** Terry Robertson [mailto s.22
**Sent:** Thursday, August 15, 2013 1:47 PM
**To:** Taje, Eddy MEM:EX
**Subject:** Re: Equity assistance.

Hi Eddy,

Have you managed to put togtehr the other info as requested as wellas respond to below. Lafarghe has asked us to provide support at a meeting on the 19th. We cant really do that until I can package all info to Council.

If you could provide info and at least confirm ECDA negotiations this may allow us to progress.

Cheers,
Terry

**From:** Terry Robertson [mailto: s.22
**Sent:** Wednesday, August 07, 2013 10:05 AM
**To:** 'Hall, Sam D FLNR:EX'
**Cc:** 'Taje, Eddy MEM:EX'
**Subject:** RE: Equity assistance.

Hi Sam and Eddy,

s.16

s.16

Lets work on this, and then I will circle back with Laurel when she returns on the other.

Cheers,
Terry

---

**From:** Hall, Sam D FLNR:EX [mailto:Sam.D.Hall@gov.bc.ca]
**Sent:** Wednesday, August 07, 2013 9:08 AM
**To:** 'Terry Robertson'
**Cc:** Taje, Eddy MEM:EX
**Subject:** Equity assistance.

Terry,

s.16

Sam

D. Sam Hall,
Consultations
Ministry of Forests, Land and Natural Resource Operations
South Coast Region

2500 Cliffe Avenue
Courtenay BC V9N 5M6
Phone (250) 897 7566
Fax (250) 334 1410

## Pope, Rue MEM:EX

0800863

**From:** Taje, Eddy MEM:EX
**Sent:** Friday, November 15, 2013 2:39 PM
**To:** Pope, Rue MEM:EX
**Subject:** FW: Lafarge dust control measures for coal facility on Texada Island

---

**From:** Chor, Alan K ENV:EX
**Sent:** Friday, November 15, 2013 2:21 PM
**To:** Taje, Eddy MEM:EX
**Cc:** Veale, J Graham ENV:EX; McCullough, Sarah ENV:EX; Metcalfe, Shelley ENV:EX
**Subject:** RE: Lafarge dust control measures for coal facility on Texada Island

Hi Eddy,

Thank you for forwarding Lafarge Canada's letter of November 8, 2013 which summarizes their dust mitigation strategy. Sarah McCullough and I met with Lafarge Canada (Lincoln Kyne & Darren Brown) yesterday to discuss this issue.

Regards,

Alan Chor
Senior Environmental Protection Officer
BC Ministry of Environment (South Coast)| #200 - 10470 152 St., Surrey BC V3R 0Y3
Tel: 604 582-5271 (direct)/ 604 582-5200 (front desk)| Fax: 604 584-9751 www.gov.bc.ca/env

---

**From:** Taje, Eddy MEM:EX
**Sent:** Friday, November 15, 2013 9:19 AM
**To:** Chor, Alan K ENV:EX
**Subject:** Lafarge dust control
**Attach:** File:\\I:\EP\Share1\Other\Lafarge Texada Coal Terminal\Summary of CTP Dust Mitigation Strategy 081113.pdf

Attached is a stand alone paper outlining the dust control measures for the coal load out and area We are reviewing it for some finer points which would if necessary lead to conditions. We will require monitoring. It takes the parts that are identified in various parts of the original submission and makes one paper which is easier to follow. If an questions please call. << File: Summary of CTP Dust Mitigation Strategy 081113.pdf >> we are also reviewing a health risk assment and will not release that until we have reviewed it.

**Pope, Rue MEM:EX** 0800863

**From:** Taje, Eddy MEM:EX
**Sent:** Friday, November 8, 2013 9:21 AM
**To:** Grace, David H EAO:EX
**Cc:** Howe, Diane J MEM:EX; Pope, Rue MEM:EX
**Subject:** RE: Texada Island?

Good morning David.

Hope I cover all of this. I have to go to Nanaimo today so likely will not able to respond until Tuesday next week

- Lafarge ( Texada Quarry) has three permits on this site. A "Q" permit issued by us under the Mines Act, an "M" permit issued under the Mines Act, and a permit for a marine facility ( Federal) All permits are in good standing.
- To the best of my knowledge the Marine Facility has had a permit since the 1950's It last was updated around 2006 when they installed new foreshore and surface infrastructure. Ie: ship loader, conveyors and related infrastructure. This facility is one of three in the coast area that has a marine terminal permited on a mine site.
-In 1990 They received an authorization to stockpile and ship coal from the facility. They have been shipping coal for a touch over 20 years. At present coal being shipped is from the Quinsam Mine and some from the coal mine at Coalmount near Princeton. The existing authorization under Mines Act Permit "M-66" does not specify or limit the source of the coal or the volume to be handled. When issued under the mentioned permit it met the standards of the day, both in terms of process , and environmental issues. Due to a limited market of coal producers looking for a shipping terminal the major customer has been Quinsam. The largest single stockpile of coal to date has been in the order of 500,000 Tonnes.
-On completion of our review and process the end result if successful would be an amendment to the existing Mines Act Permit "M-66". To the best of my knowledge and based on information provided by them there is no amendment required to the permit or authorization related to the marine facility.
- MOE is involved, because of the potential for the requirement for a permit ( effluent discharge) This is not clearly established as of yet as the proposal is such that it intends to not discharge water ( effluent) into the receiving environment. There are some technical details being cleared up that will define this requirement for a EMA permit or establish that it is not required. In any event this if required would be a stand alone permit and Lafarge would be required to comply with that requirement.

I hope this helps and as I said I likely will not be able to reply until Tuesday, when I return. I will in the office here until about 10:30 this morning.

Ed Taje

MEM
Regional Manager, Coast Area
Health and Safety/UG Coal Specialist
Phone: Office: 250 952 0732
Cell: s.17
Res: s.22
Fax: 250 952 0491

-----Original Message-----
From: Grace, David H EAO:EX
Sent: Friday, November 8, 2013 8:08 AM
To: Taje, Eddy MEM:EX
Subject: Re: Texada Island?

Hi Eddy,

I am being asked the following:

What kind of permit and under what authority is it being issued? (I assume the Mines Act but you also mention MOE?)

Is it new or an amendment? If existing do they take coal from VI? (My understanding is that it is an amendment to an existing permit - but do they currently handle coal?)

Thanks again for helping me get this info to my MO.

David

----- Original Message -----
From: Taje, Eddy MEM:EX
Sent: Thursday, November 07, 2013 04:30 PM
To: Grace, David H EAO:EX
Subject: RE: Texada Island?

We are still in the review process and I do not anticipate any decision for minimum 2 more weeks, likely a bit more.
Components under review or waiting for more information.
_ the application has been reviewed by MOE ( more on them later) Local Government ( Powel River Regional District, Powel Rive, and sunshine coast Regional district), and Vancouver Health.
- First Nations consultation in ongoing and not complete, Only one FN as there are no overlaps on this site -Application was advertised as per our Act, and the plan was made available to the public. We have had a significant response from the public, including some letters of support.
-A public meeting, (Open House) was held on Texada island with perhaps 150 persons attending.
-We are still waiting for comments from the Sunshine coast Regional District, actually just today I agreed to a short extension on the referral period with them.
-Lafarge has been request to provide addition information on possible health effects which may be associated with the proposal. This is limited to the potential area of influence -MOE is still working with Lafarge in relation to the waste management act ( hope i have that right) on airshed, and potential water discharge issues. This is not completed.
-We have a call with Vancouver coastal Health next Thursday to clear some issues related to potential health risks.
-Lafarge has been directed to provide a stand alone document of dust control measures as the measures included in the submitted application are not understood by some in the referral process. In short we have asked for a Dust Control on The coal loadout on Texada for Dummies." I expect this early next week.
-Our Professionals have reviewed the proposal from a coal chemistry point of view and the potential for acid generation, and metal leaching. We have some basic conditions established but this is not finalized yet. Associated with this is the important consideration regarding possible spontaneous combustion. We believe we have this worked out are just double checking our information. All of the items noted in this section are under very detailed technical review as you can appreciate.

-Our Industrial Hygienist has done a preliminary review of human issues associate with dust and will ensure mitigation measures and limits are clearly defined.
-once a decision is made and the permit amendment is issued (if) there will be significant monitoring requirements both for air and water.

All of the above is on the assumption the amendment will be issued. There is always the possibility that these very detailed reviews can lead to a rejection, although at this point I would be surprised if that happened.

Please note this application is stand alone from other applications for coal handling. Hope this helps

Ed Taje

MEMPR
Regional Manager, Coast Area
Health and Safety/UG Coal Specialist
Phone: Office: 250 952 0732
Cell: s.17
Res: s.22
Fax: 250 952 0491

-----Original Message-----
From: Grace, David H EAO:EX
Sent: Thursday, November 7, 2013 3:57 PM
To: Hamilton, Chris EAO:EX; Taje, Eddy MEM:EX
Subject: RE: Texada Island?

Hi Eddy,

I hope you are well.

We are being asked to describe the permit amendment process for Lefarge by our Minister's office.

The what, how, when etc.

I have the letter from Lefarge confirming that the proposed changes are below our Reviewable Projects Reg.

We need a paragraph explaining how MEM conducted the permit amendment and the things that you considered if possible.

Thanks in advance for your assistance with this.

Regards,
David

-----Original Message-----
From: Hamilton, Chris EAO:EX
Sent: Thursday, November 7, 2013 3:20 PM
To: Taje, Eddy MEM:EX
Cc: Grace, David H EAO:EX
Subject: Texada Island?

Hi Eddy. My colleague Karen Christie gave me your name. As you might know, EAO is getting significant pressure to complete an EA for the Fraser Surrey Docks proposal, and we are trying to get a better idea about how coal is handled and permitted on Texada. Are you the person to help or could you suggest someone? Thanks Chris

Sent from my mobile

## Bouffard, Maryann J EMNG:EX

0800863

**From:** Taje, Eddy EMNG:EX
**Sent:** Tuesday, July 9, 2013 9:42 AM
**To:** Veale, J Graham ENV:EX
**Cc:** Bouffard, Maryann J EMNG:EX
**Subject:** RE: LaFarge (Texada Quarrying Ltd)
**Attachments:** texada amendment.pdf

As discussed here is the referral package on the Texada proposal, As I noted the storm water plan based on a 5 year event will not fly form our end and will have to be upgraded. The normal referral period is 30 day however as S22 S22 any comments by the first week of August will be appreciated.

**From:** Veale, J Graham ENV:EX
**Sent:** Monday, July 8, 2013 3:27 PM
**To:** Taje, Eddy EMNG:EX
**Subject:** LaFarge (Texada Quarrying Ltd)

Hi Eddy:
Our office has been discussing the above facility related to current coal storage practices and the potential for expansion as part of the Fraser Surrey Docks proposal. As you may be aware the Fraser Surrey Docks proposal is receiving considerable public and media attention and staff in our office are trying to determine regulatory requirements for the Texada portion of the FSD proposal.

According to an article in the Powell River Peak
http://prpeak.com/articles/2013/06/26/news/doc51ca362fe45be344560120.txt it appears that Lafarge (or Texada Quarrying Ltd) has a permit from Energy and Mines allowing stockpiling/shipping of coal from a Vancouver Island company (Hillsborough Resources Ltd) and possibly another company (Coalmont). They have applied for an amendment to their permit to increase coal storage capacity (see link at end of article) and have submitted a stormwater management plan in support of the application.

I'd appreciate it if you could provide a copy of the company's permit. I believe the permit reference number is M-66.

Thanks, Graham

Graham Veale
Air Quality Meteorologist
South Coast Region
Ministry of Environment
Suite 200 - 10470-152nd Street
Surrey BC V3R 0Y3
Phone: (604) 582-5286
Fax: (604) 930-7119
Email: j.graham.veale@gov.bc.ca

Want to know more about air quality in BC ? Check out BC Air Quality - Home

## Pope, Rue MEM:EX

**From:** Taje, Eddy MEM:EX
**Sent:** Monday, August 12, 2013 8:43 AM
**To:** Pope, Rue MEM:EX
**Subject:** FW: Lafarge Permit Amendment (M-66, File 14745-20) Texada Island

---

**From:** Metcalfe, Shelley ENV:EX
**Sent:** Friday, August 9, 2013 5:02 PM
**To:** Taje, Eddy MEM:EX
**Cc:** Veale, J Graham ENV:EX; Hebert, David ENV:EX; Chor, Alan K ENV:EX; Braman, Jonn ENV:EX
**Subject:** Lafarge Permit Amendment (M-66, File 14745-20) Texada Island

Dear Ed,

Thank you for referring Lafarge Canada's permit amendment application (Permit M-66, File 14745-20) to the Ministry of Environment to review. As you and I discussed earlier this week, the ministry believes an effluent permit (and possibly an air permit) will be required under the *Environmental Management Act* and we have communicated this to Lafarge's project manager, Lincoln Kyne, as of today, August 9, 2013.

We are pleased, however, to provide the following comments on the proposed permit amendment application, primarily from an air perspective. We do have questions regarding the storm water management at the site, although these can be addressed via our ministry's permit application process. We should consider, however, how our respective authorizations may overlap and address these areas if and when they occur. (Would you please send me a copy of their current permit?)

Air Quality Comments:

It is not clear if the current authorization (Permit M-66 ?) contains any measures or requirements for the control and management of fugitive dust from the existing coal handling and storage facilities. The referral package includes correspondence dating back to 1990 from the then Ministry of Energy, Mines and Petroleum Resources and the federal Department of Fisheries and Oceans commenting on an application for the storage and handling of coal at the site and recommending that dust suppression systems "be available". However, the actual facility authorization (Permit M-66 ?) is not included in the referral package and it cannot be determined if any dust suppression systems were required and are actually operating.

There is no information provided in the amendment application regarding assessment of the potential for generation of fugitive particulate (dust) from the expanded handling and storage facilities and no explicit discussion of management and mitigation actions (e.g. dust management plan) that may be required. The Stormwater Management Plan (Appendix B, Section 01 11 00, sub-section 2.13) makes brief reference to dust control measures such as a water misting system but it appears to be related to management of dust generated during the construction of the Stormwater Management facility rather than the overall coal handling and storage facilities. In correspondence from Kreator Equipment and Services Inc. (included in the referral package) regarding the construction of loading facilities, dust mitigation actions (enclosing of transfer points, dust suppression systems) are mentioned but little detail is provided.

In summary, there is insufficient detail provided by the proponent to determine the potential impacts to air quality from the expanded coal handling and storage project. I would recommend that an air quality assessment is required for the project, including identification of potential emission sources, especially fugitive

dust emissions, and detailing mitigation/control options and monitoring (if necessary) to demonstrate that there will not be unacceptable impacts to ambient air quality in the area. It is likely that the identified dust mitigation/control activities and any monitoring will be incorporated into an overall dust management plan which should form part of any authorization issued.

If you require clarification or more information regarding our specific comments above, please contact our Air Quality Meteorologist, Graham Veale, at 604-582-5286. For any other questions, please feel free to contact me.

Sincerely,

**Shelley Metcalfe, P.Ag.**
**Section Head, Business & Standards Unit**
BC Ministry of Environment - South Coast Region
200- 10470 152nd St., Surrey BC V3R 0Y3
p. 604-582-5332 | f. 604-930-7119 | e. shelley.metcalfe@gov.bc.ca

BRITISH COLUMBIA

January 13, 2014

File: PE-15728

**Sent via email to: Darren.Brown@Lafarge.com**

**LAFARGE CANADA INC.**
2300 Roger Avenue
Coquitlam BC V3K 5X6

Dear Darren Brown, M.Sc., R.P.Bio., EP, Manager, Environment & Public Affairs

**Re: Stormwater Management Plan for Lafarge Canada Coal Facility at the Limestone Quarry on Texada Island BC**

This is in response to your correspondence with respect to the coal facility at the limestone quarry on Texada Island BC and the proposal by Lafarge Canada Inc. for an expansion project at the coal facility. Lafarge Canada Inc. has submitted documents, letters and reports including:

1) "Stormwater Management Plan Coal Stockpile Area Texada Island Ship Loading Area Revision B", dated September 23, 2013 by Norwest Corporation,

2) PLAN SHOWING AGGREGATE PLANT, COAL HANDLING SYSTEM AND STORM WATER MANAGEMENT, Project Date: April 16, 2013 by Lafarge Canada Inc.,

3) Letter dated October 25, 2013 by Norwest Corporation entitled: "Stormwater Management Plan for Lafarge Texada Island Expansion",

4) Letter dated December 13, 2013 by Norwest Corporation entitled: "Stormwater Management Plan for Lafarge Texada Island Expansion",

5) Letter dated December 13, 2013 by Lafarge Canada Inc. entitled: "Stormwater Management Plan for Lafarge's Coal Transloading Project, Texada Island - Qualified Professional Statements".

Qualified Professionals employed by or retained by Lafarge Canada Inc. have advised the following through discussions, meetings, correspondence, reports and/or other documents:

1) The Qualified Professionals meet the definition of "qualified professional" specified in the *Environmental Management Act Municipal Wastewater Regulation* (www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/87_2012),

**Ministry of Environment**
Environmental Protection Division
Regional Operations
South Coast
#200, 10470 - 152 Street
Surrey BC V3R 0Y3
Telephone: 604 582-5200
Facsimile: 604 584-9751
Website: www.gov.bc.ca/env

2) Except during an extremely heavy storm event (with an amount of rainfall exceeding a storm event with a return frequency of 1-in-100 years and a duration of 24 hours), no effluent, as defined in the *Environmental Management Act*, will be discharged to the environment.

3) Measures to prevent the discharge of effluent and prevent pollution include:

   a) A stormwater infiltration/management system designed by a Qualified Professional, including an infiltration pond and ditches, to filter out contaminants including coal particulates/suspended solids in a manner that will only allow clean stormwater to seep into the ground. The stormwater facilities have been designed such that, for a prolonged storm event, "The probability that rainfall over a one month period will exceed this design criterion is approximately once every 8 years." To further reduce the risk of overflow from the stormwater infiltration system, "The designs of both the infiltration pond and infiltration ditch include factors of safety (0.3 m freeboard) over and above the retention volumes calculated" for each of the rainfall design criteria used;

   b) A regular inspection and maintenance program including the cleaning out of the stormwater infiltration/management system and replacement, as necessary, of the engineered/specified grain-size filter/liner material of the infiltration pond, and ditches to ensure optimal infiltration/filtration performance and prevent overflow and direct discharge of effluent to surface receiving waters/ocean;

   c) A monitoring program including groundwater monitoring for parameters of concern (such as pH, PAHs, metals, etc.) to ascertain that pollution is not being caused; and

   d) Regular environmental audits with the intention of establishing and maintaining an EMS (Environmental Management System), implementing continuous improvements with respect to environmental protection and achieving ISO 14001 certification.

Therefore, based on the above, we do not object to the fact that Lafarge Canada Inc. has not applied for a permit to discharge effluent from the site. Please note that the provisions of the *Environmental Management Act* (www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/03053_00) remain in full force and effect and that it is the responsibility of Lafarge Canada Inc. to:

1) Prevent pollution,

2) If there is any intention to discharge effluent in the future, apply for and obtain the necessary authorization or permit under the *Environmental Management Act*,

3) Immediately report any spills in accordance with the *Spill Reporting Regulation* (www.bclaws.ca/Recon/document/ID/freeside/46_263_90) by calling 1 800 663-3456 (Emergency Management BC/Provincial Emergency Program) and

4) Comply with all applicable legislation including the requirements of other agencies/authorities.

Our understandings with respect to the coal facility and the proposed expansion project, as mentioned above, are based on information provided by Lafarge Canada Inc. and their qualified professionals. Please advise us immediately if any of the above is not correct.

Sincerely,

Regional Director, South Coast
Environmental Protection Division

cc: Gordon Johnson, P.Eng., Norwest Corporation, Suite 2700, 411 – 1st Street, S.E.
Calgary, Alberta T2G 4Y5 (GJohnson@norwestcorp.com)

Eddy Taje, Ministry of Energy, Mines and Petroleum Resources
6th Floor - 1810 Blanshard Street, Victoria BC V8W 9R1 (Eddy.Taje@gov.bc.ca)

## Metcalfe, Megan MEM:EX

**From:** Lincoln Kyne [lincoln.kyne@lafarge.com]
**Sent:** Wednesday, August 7, 2013 10:02 AM
**To:** Demchuk, Tania MEM:EX
**Cc:** Taje, Eddy MEM:EX; Bouffard, Maryann J MEM:EX
**Subject:** Re: Chemical Composition of PRB coal

Tania,

as an update, I have asked for the appropriate definitions for the Acid/Base tests as you discussed. Due to travel, the Quality Assurance Technician will get back to me next week with the information.

I am not sure if you are aware but the source mines for what we have submitted are currently shipping through a combination of Westshore, Ridley and Neptune as we speak so the coal is not new to B.C.

Please contact me if there are any issues with the timeline provided.

Kind regards,

Regards,

**Lincoln Kyne**
Project Manager

Lafarge Canada Inc. - ***Building Better Cities***™
#200 7455 132 Street, Surrey, BC, V3W 1J8
Telephone: (604) 502-5207 | Mobile: (604) 789-3006 | Email: lincoln.kyne@lafarge.com
www.lafarge-na.com

On Sat, Aug 3, 2013 at 9:04 PM, Lincoln Kyne <lincoln.kyne@lafarge.com> wrote:
Thanks Tania. We are loading a coal ship next week and have a workshop with the mining team from powder river basin. This issue is on the agenda for this meeting. I will feed back accordingly.

Regards,

**Lincoln Kyne**
Project Manager

Lafarge Canada Inc. - ***Building Better Cities***™
#200 7455 132 Street, Surrey, BC, V3W 1J8
Telephone: (604) 502-5207 | Mobile:(604) 789-3006 | Email:lincoln.kyne@lafarge.com
www.lafarge-na.com

On 2013-08-03, at 6:39 PM, "Demchuk, Tania MEM:EX" <Tania.Demchuk@gov.bc.ca> wrote:

Hi Eddy,

I have taken a look at the information provided by Lincoln. I gather that the data he provided represent 2 samples. The information is presented differently from what we are used to seeing from BC-based labs so I have asked Lincoln to provide some further information about what a couple of the results mean, specifically for the Base/Acid ratio, and % base, % acid values. We are waiting for this clarification. If these are similar to acid base accounting results, the information is important for us to understand.

The samples have relatively low total sulphur content and very low pyritic sulphur, which is the form I would be most concerned about from an ARD perspective. Of the trace metals presented, selenium is slightly elevated compared to average crustal composition.

Tania

---

From: Demchuk, Tania MEM:EX
Sent: August 3, 2013 3:54 PM
To: Demchuk, Tania MEM:EX
Subject: FW: Chemical Composition of PRB coal

From: Lincoln Kyne [mailto:lincoln.kyne@lafarge.com]
Sent: Monday, July 29, 2013 4:40 PM
To: Demchuk, Tania MEM:EX
Cc: Bouffard, Maryann J MEM:EX; Taje, Eddy MEM:EX
Subject: Re: Chemical Composition of PRB coal

Is this better? The data is for two mines. The reattached sample is for a single mine (2 pages) in 11x8 page size. The third page previously sent is additionally for one mine and all information is on a single page.

I am sorry but I do not have the full understanding of the testing procedures contained therein as I believe they are done to ASTM standards of which I am not familiar with for coal.

I understood the trace element figures were of most important concern. We previously have had these figures run against BC Working sediment quality guidelines - (marine) which as we understand show the values to be significantly lower than the standards and if settled in a marine environment would not pose a threat to aquatic life.

I will investigate regarding your enquiry on acid base ratios and revert back to you when I have the information.

Regards,

Lincoln Kyne

Project Manager

Lafarge Canada Inc. - Building Better Cities™

#200 7455 132 Street, Surrey, BC, V3W 1J8

Telephone: (604) 502-5207 | Mobile: (604) 789-3006 | Email:
lincoln.kyne@lafarge.com<mailto:lincoln.kyne@lafarge.com>

www.lafarge-na.com<http://www.lafarge-na.com>

On Mon, Jul 29, 2013 at 4:05 PM, Demchuk, Tania MEM:EX
<Tania.Demchuk@gov.bc.ca<mailto:Tania.Demchuk@gov.bc.ca>> wrote:
Hi Lincoln,

Thank-you for passing along that data to Eddy. I'm wondering if you are able to attach the image files to your emails differently? The 2 bottom files (quality specifications?) are very small and when I copy them and expand or zoom in on them they are no longer legible.

Also, is this data all for a single coal sample or a composite sample? And, there is a line called acid-base ratio, can you tell me what analysis was done to obtain this ratio and what the % acidic and % basic numbers mean?

Thanks,
Tania

Tania Demchuk, MSc, GIT
Senior Environmental Geoscientist,
BC Ministry of Energy and Mines
P.O. Box 9320, Stn Prov Gov't, Victoria BC V8W 9N3
Phone: (250) 952-0417<tel:%28250%29%20952-0417> Fax: (250) 952-0481<tel:%28250%29%20952-0481>

From: Taje, Eddy MEM:EX
Sent: Sunday, July 28, 2013 7:29 AM
To: Demchuk, Tania MEM:EX
Cc: Bouffard, Maryann J MEM:EX
Subject: Fwd: Chemical Composition of PRB coal

Can you look at this and if something is missing let Lincoln know thanks. Please cc me. We can discuss next week on return

Sent from my iPhone

Begin forwarded message:
From: Lincoln Kyne <lincoln.kyne@lafarge.com<mailto:lincoln.kyne@lafarge.com>>
Date: 26 July, 2013 5:59:10 PM PDT
To: "Taje, Eddy MEM:EX" <Eddy.Taje@gov.bc.ca<mailto:Eddy.Taje@gov.bc.ca>>
Cc: "Bouffard, Maryann J MEM:EX"
<Maryann.Bouffard@gov.bc.ca<mailto:Maryann.Bouffard@gov.bc.ca>>, Brad Kohl
<brad.kohl@lafarge.com<mailto:brad.kohl@lafarge.com>>
Subject: Chemical Composition of PRB coal
Ed,

Please find attached two generic samples of the chemical compositions of PRB Coal as requested.

Unfortunately I do not have Tanya's contact details in which to pass this on to. Maryanne, perhaps in Ed's absence you would be able to assist in forwarding this on?

Again, please do not hesitate to contact me if there are any issues with the information provided.

Regards,

Lincoln Kyne

Project Manager

Lafarge Canada Inc. - Building Better Cities™

#200 7455 132 Street, Surrey, BC, V3W 1J8

Telephone: (604) 502-5207<tel:%28604%29%20502-5207> | Mobile: (604) 789-3006<tel:%28604%29%20789-3006> | Email:
lincoln.kyne@lafarge.com<mailto:lincoln.kyne@lafarge.com>

www.lafarge-na.com<http://www.lafarge-na.com>

[cid:image001.jpg@01CE8C75.7E66ED60]
[cid:image002.jpg@01CE8C75.7E66ED60]
[cid:image003.jpg@01CE8C75.7E66ED60]

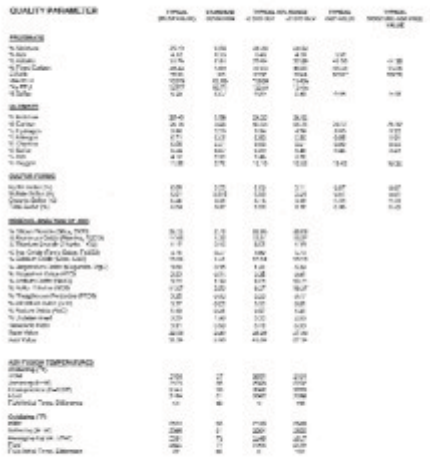
## Proximate Analysis % (As Received)

| | |
|---|---|
| Moisture | 27.08 |
| Ash | 5.45 |
| Sulfur | 0.32 |
| BTU | 8,813 |
| MAF BTU | 13,062 |

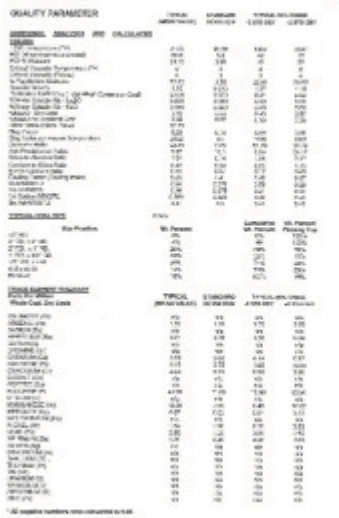
| | |
|---|---|
| Pounds SO2/MM BTU | 0.73 |
| Pounds Ash/MM BTU | 6.18 |
| Ash to Sulfur Ratio | 17.03 |
| % Volatile Matter | 33.15 |
| % Fixed Carbon | 34.32 |

## Ultimate Analysis % (Dry Basis)

## QUALITY SPECIFICATIONS



## QUALITY SPECIFICATIONS (Continued)



# QUALITY SPECIFICATIONS

| QUALITY PARAMETER | TYPICAL (MEAN VALUE) | STANDARD DEVIATION | TYPICAL 95% RANGE -2 STD DEV | TYPICAL 95% RANGE +2 STD DEV | TYPICAL DRY VALUE | TYPICAL MOISTURE-ASH FREE VALUE |
|---|---|---|---|---|---|---|
| **PROXIMATE** | | | | | | |
| % Moisture | 25.40 | 0.56 | 24.28 | 26.52 | | |
| % Ash | 4.12 | 0.33 | 3.46 | 4.78 | 5.52 | |
| % Volatile | 31.26 | 0.81 | 29.64 | 32.88 | 41.90 | 44.35 |
| % Fixed Carbon | 39.23 | 0.80 | 37.63 | 40.83 | 52.59 | 55.66 |
| BTU/lb | 9350 | 103 | 9132 | 9544 | 12517 | 13249 |
| MAFBTU | 13249 | 80.08 | 13089 | 13409 | | |
| Dry BTU | 12517 | 93.71 | 12330 | 12705 | | |
| % Sulfur | 0.38 | 0.07 | 0.20 | 0.48 | 0.46 | 0.48 |
| **ULTIMATE** | | | | | | |
| % Moisture | 25.40 | 0.56 | 24.28 | 26.52 | | |
| % Carbon | 54.14 | 3.28 | 47.58 | 60.70 | 72.57 | 76.82 |
| % Hydrogen | 3.80 | 0.23 | 3.34 | 4.26 | 5.09 | 5.39 |
| % Nitrogen | 0.71 | 0.09 | 0.53 | 0.89 | 0.95 | 1.01 |
| % Chlorine | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 |
| % Sulfur | 0.34 | 0.07 | 0.20 | 0.48 | 0.46 | 0.48 |
| % Ash | 4.12 | 0.33 | 3.46 | 4.78 | | |
| % Oxygen | 11.50 | 0.70 | 10.10 | 12.90 | 15.42 | 16.32 |
| **SULFUR FORMS** | | | | | | |
| Pyritic Sulfur (%) | 0.05 | 0.03 | 0.00 | 0.11 | 0.07 | 0.07 |
| Sulfate Sulfur (%) | 0.01 | 0.015 | 0.00 | 0.04 | 0.01 | 0.01 |
| Organic Sulfur (%) | 0.28 | 0.06 | 0.16 | 0.40 | 0.38 | 0.40 |
| Total Sulfur (%) | 0.34 | 0.07 | 0.20 | 0.48 | 0.46 | 0.48 |
| **MINERAL ANALYSIS OF ASH** | | | | | | |
| % Silicon Dioxide (Silica, SiO2) | 32.52 | 2.78 | 26.96 | 38.08 | | |
| % Aluminum Oxide (Alumina, Al2O3) | 17.69 | 1.09 | 15.51 | 19.87 | | |
| % Titanium Dioxide (Titania, TiO2) | 1.13 | 0.10 | 0.93 | 1.33 | | |
| % Iron Oxide (Ferric Oxide, Fe2O3) | 4.76 | 0.47 | 3.82 | 5.70 | | |
| % Calcium Oxide (Lime, CaO) | 15.36 | 1.41 | 12.54 | 18.18 | | |
| % Magnesium Oxide (Magnesia, MgO) | 3.69 | 0.85 | 1.99 | 5.39 | | |
| % Potassium Oxide (K2O) | 0.63 | 0.14 | 0.35 | 0.91 | | |
| % Sodium Oxide (Na2O) | 8.24 | 1.00 | 6.24 | 10.24 | | |
| % Sulfur Trioxide (SO3) | 14.07 | 2.50 | 9.07 | 19.07 | | |
| % Phosphorous Pentoxide (P2O5) | 0.35 | 0.06 | 0.23 | 0.47 | | |
| % Strontium Oxide (SrO) | 0.37 | 0.22 | 0.00 | 0.81 | | |
| % Barium Oxide (BaO) | 1.19 | 0.31 | 0.57 | 1.81 | | |
| % Undetermined | 0.00 | 1.00 | 0.00 | 2.00 | | |
| Base/Acid Ratio | 0.64 | 0.08 | 0.48 | 0.80 | | |
| Base Value | 32.68 | 2.20 | 28.28 | 37.08 | | |
| Acid Value | 51.34 | 3.00 | 45.34 | 57.34 | | |
| **ASH FUSION TEMPERATURES** | | | | | | |
| **Reducing ($^{o}$F)** | | | | | | |
| Initial | 2106 | 37 | 2031 | 2181 | | |
| Softening (H=W) | 2129 | 36 | 2056 | 2202 | | |
| Hemispherical (H=1/2W) | 2141 | 39 | 2062 | 2220 | | |
| Fluid | 2164 | 51 | 2062 | 2266 | | |
| Fluid-Initial Temp. Difference | 58 | 40 | 0 | 138 | | |
| **Oxidizing ($^{o}$F)** | | | | | | |
| Initial | 2351 | 98 | 2156 | 2546 | | |
| Softening (H=W) | 2366 | 81 | 2204 | 2528 | | |
| Hemispherical (H=1/2W) | 2391 | 73 | 2245 | 2537 | | |
| Fluid | 2423 | 77 | 2268 | 2578 | | |
| Fluid-Initial Temp. Difference | 72 | 60 | 0 | 192 | | |

# QUALITY SPECIFICATIONS (Continued)

| QUALITY PARAMETER | TYPICAL (MEAN VALUE) | STANDARD DEVIATION | TYPICAL 95% RANGE -2 STD DEV | +2 STD DEV |
|---|---|---|---|---|
| **ADDITIONAL ANALYSES AND CALCULATED VALUES** | | | | |
| T250 Temperature (°F) | 2153 | 91.88 | 1969 | 2337 |
| HGI (at as-received moisture) | 60.6 | 5.6 | 49 | 72 |
| HGI % Moisture | 24.13 | 3.88 | 16 | 32 |
| Critical Viscosity Temperature (°F) | 0 | 0 | 0 | 0 |
| Critical Viscosity (Poises) | 0 | 0 | 0 | 0 |
| % Equilibrium Moisture | 23.93 | 0.56 | 22.81 | 25.05 |
| Specific Gravity | 1.10 | 0.015 | 1.07 | 1.13 |
| %Alkalies NA2O Dry (Total Alkali Content on Coal) | 0.478 | 0.070 | 0.34 | 0.62 |
| %Water Soluble Alk - Na2O | 0.000 | 0.000 | 0.00 | 0.00 |
| %Water Soluble Alk - K2O | 0.000 | 0.000 | 0.00 | 0.00 |
| %Na2O - Dry Coal | 0.46 | 0.03 | 0.40 | 0.52 |
| %Na2O As-received Coal | 0.34 | 0.02 | 0.30 | 0.38 |
| Silica Value (Silica Ratio) | 57.73 | | | |
| Slag Factor | 0.28 | 0.14 | 0.00 | 0.56 |
| Slag factor per Fusion Temperature | 2163 | 85 | 1993 | 2333 |
| Dolomite Ratio | 58.29 | 3.25 | 51.79 | 64.79 |
| Ash Precipitation Index | 3.97 | 10.1 | 0.00 | 24.17 |
| Silica to Alumina Ratio | 1.84 | 0.14 | 1.56 | 2.12 |
| Calcium to Silica Ratio | 0.47 | 0.34 | 0.00 | 1.15 |
| Iron to Calcium Ratio | 0.31 | 0.07 | 0.17 | 0.45 |
| Fouling Factor (Fouling Index) | 5.25 | 1.41 | 2.43 | 8.07 |
| SO2/MMBTU | 0.80 | 0.075 | 0.58 | 0.88 |
| lbs S/MMBTU | 0.36 | 0.075 | 0.21 | 0.51 |
| lbs Sodium/MMBTU | 0.364 | 0.023 | 0.32 | 0.41 |
| lbs Ash/MMBTU | 4.41 | 0.5 | 3.41 | 5.41 |

**TYPICAL COAL SIZE** 2 inch

| Size Fraction | Wt. Percent | Cumulative Wt. Percent | Wt. Percent Passing Top |
|---|---|---|---|
| +3" RD. | 0% | 0% | 100% |
| 3" RD. x 2" RD. | 4% | 4% | 100% |
| 2" RD. x 1" RD. | 20% | 24% | 96% |
| 1" RD. x 1/2" RD. | 28% | 52% | 76% |
| 1/2" RD. x 4 M | 20% | 71% | 48% |
| 4 M x 60 M | 13% | 84% | 29% |
| 60 M x 0 | 16% | 100% | 16% |

**TRACE ELEMENT SUMMARY**

| Parts Per Million Whole Coal, Dry Basis | TYPICAL (MEAN VALUE) | STANDARD DEVIATION | TYPICAL 95% RANGE -2 STD DEV | +2 STD DEV |
|---|---|---|---|---|
| ANTIMONY (Sb) | n/a | n/a | n/a | n/a |
| ARSENIC (As) | 1.50 | 1.00 | 0.00 | 3.50 |
| BARIUM (Ba) | n/a | n/a | n/a | n/a |
| BERYLLIUM (Be) | 0.21 | 0.08 | 0.06 | 0.36 |
| BORON (B) | n/a | n/a | n/a | n/a |
| BROMINE (Br) | n/a | n/a | n/a | n/a |
| CADMIUM (Cd) | 0.18 | 0.02 | 0.14 | 0.22 |
| CHLORINE (Cl) | 9.15 | 3.75 | 1.65 | 16.65 |
| CHROMIUM (Cr) | 2.40 | 0.75 | 0.90 | 3.90 |
| COBALT (Co) | n/a | n/a | n/a | n/a |
| COPPER (Cu) | n/a | n/a | n/a | n/a |
| FLUORINE (F) | 41.90 | 11.00 | 19.90 | 63.90 |
| LITHIUM (Li) | n/a | n/a | n/a | n/a |
| MANGANESE Mn) | 16.20 | 7.90 | 0.40 | 32.00 |
| MERCURY (Hg) | 0.07 | 0.03 | 0.01 | 0.13 |
| MOLYBDNEUM (Mo) | n/a | n/a | n/a | n/a |
| NICKEL (Ni) | 1.53 | 1.00 | 0.00 | 3.53 |
| LEAD (Pb) | 2.60 | 1.00 | 0.60 | 4.60 |
| SELENUIM (Se) | 1.20 | 0.90 | 0.00 | 3.00 |
| SILVER (Ag) | n/a | n/a | n/a | n/a |
| STRONTIUM (Sr) | n/a | n/a | n/a | n/a |
| THALLIUM (Tl) | n/a | n/a | n/a | n/a |
| THORIUM (Th) | n/a | n/a | n/a | n/a |
| TIN (Sn) | n/a | n/a | n/a | n/a |
| URANIUM (U) | n/a | n/a | n/a | n/a |
| VANADIUM (V) | n/a | n/a | n/a | n/a |
| ZIRCONIUM (Zr) | n/a | n/a | n/a | n/a |
| ZINC (Zn) | n/a | n/a | n/a | n/a |

* All negative numbers were converted to 0.00

## Metcalfe, Megan MEM:EX

**From:** Kuppers, Haley MEM:EX
**Sent:** Monday, March 3, 2014 8:48 AM
**To:** Metcalfe, Megan MEM:EX
**Subject:** FW: Dust Mitigation/Health.

Texada_DustMitigation.docx

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**From:** Taje, Eddy MEM:EX
**Sent:** Monday, December 9, 2013 4:46 PM
**To:** XT:HLTH Martiquet, Paul; 'Lincoln Kyne'; XT:HLTH Hasselback, Paul
**Cc:** Kuppers, Haley MEM:EX; Chor, Alan K ENV:EX
**Subject:** Dust Mitigation/Health.

Attached please find the summary of the dust mitigation measures as reviewed by Haley Kuppers M.Sc, one of our Industrial Hygienists . You will note in the letter references to work procedures, and information on the effects of the bonding agent once the material has been handled .

All of the concerns will be reflected in permit conditions, that require compliance, and prior to any final decision, information on wind effects should be provided such that the required conditions can properly address this concern.

Monitoring requirements and records are mandatory, and Our hygienists will work with the proponent to ensure standards established meet current standards with the provision for updating should the referenced standards be modified during the life of the operation. This principle is already a normal component of our Legislation and it will be re enforced through the conditions in the permit.

The Mines Act Permit amendment only applies to the components covered in the amendment application, and we cannot based on case law make decisions on other compartment.

With the terms of the proposal, and the conditions that we would have to establish in order to approve this proposal I believe the environment risk, and the risk to public health is low to nonexistent. Of particular concern is the risk of exposure to workmen. Our ministry has a long history of working with coal dust as it related to the health effects on workmen, and it follows that by ensuring the protection of those immediately exposed , the potential problems migrating into the receiving environment will be minimized and in some cases eliminated. Prevention of such air borne contaminants is the object. Should you have any questions or concerns, including suggestions please forward such correspondence directly to me.

Texada_DustMitigation.docx

December 9, 2013

Lafarge Canada Inc.
19633 98A Avenue
Langley, BC
V1M 3G5

Attention: Lincoln Kyne

Dear Sir:

Re: Summary of Dust Mitigation Strategies for the Expanded Coal Storage on Texada Quarries; Supplementary Project Risk Statement for the Expanded Coal Storage on Texada Quarries; Ministry of Energy and Mines Reclamation Permit M-66, File 14745-20.

A review was conducted on the supplementary documents provided by Lafarge Canada regarding dust mitigation strategies and project risk statement for the expanded coal storage on Texada Quarries. We acknowledge that a number of positive changes have been proposed with respect to dust mitigations:

- The addition of a dust suppressing and binding agent is reported to have an effective life that exceeds the life cycle for the coal moving through Texada Quarry. It is unclear how efficient these sealants will act during the process of unloading, stockpiling, conveying, and loading onto barges, therefore caution should be taken in regards to their effectiveness and limitations.
- The expanded coal storage area is reported to be comparable in principle to the existing Texada Quarry coal handing operations. The proposed expanded coal storage area will include control methods used to minimize fugitive coal dust potential. The dust mitigation summary outlines the controls taken during stages of product movement and stockpiling.
- During the process of unloading coal from barges, it is unclear how "safe operational level" is defined in regards to wind level, this needs to be better defined and the process for monitoring wind conditions need to be provided.
- There is no indication of water spreading or spraying during the unloading process. Dust may be emitted from the movement of equipment or during barge cleaning, and should be monitored to ensure dust is controlled using the appropriate controls.
- Purpose designed 60" conveyor system, enclosed transfer points and adjustable stacker heights are good controls for dust emission.

Ministry of Energy and Mines
Health, Safety and Permitting Branch
Mailing Address:
PO Box 9320
Stn Prov Got
Victoria, BC
V8W 9N3
Phone: 250 387 4808
Fax: 250 952 0491

- Water sprays are noted to be located at strategic points on the ship loader conveyor line, it is recommended that additional water sprays are located strategically along the entire conveyor system if observations are made of visible or potential dust emission points.
- Surface wetting/static spreading of water is listed as a control during the management of stockpiles. It is unclear what method of application will be used (ie. Water truck, sprinklers), and what the indicator is for "if required". The method and pattern of water application needs to be defined in a standard operating procedure that should be familiar with involved workers and supervisors.
- It is a good idea to have the coal area subjected to periodic environmental air monitoring. Further information should be provided to ensure the air monitoring procedure meets the approval of the Ministry of Energy and Mines. The environmental air quality procedure should include, but not be limited to, information including:
    - Equipment used for monitoring, including equipment used for calibration
    - Sampling method, particle size measured, length of sample, flow rate, filter type
    - Analysis method, and name of accredited laboratory
    - Monitoring schedule, sample location, collection of supplementary information ie. Process information, weather conditions
    - Method of analyzing results and verifying effectiveness of controls
    - Method of communicating results with mine employees, Ministry of Energy and Mines, and community

The proposed dust mitigation strategies must be managed effectively on-site to ensure health, safety and environmental risks are adequately controlled. This process requires competent personnel who actively promote the continuous improvement of operating procedures and systems at Texada Quarry.

Sincerely,

Haley Kuppers
Provincial Inspector of Mines, Health and Safety Specialist

Cc:
Eddy Taje
Rolly Thorpe

## Metcalfe, Megan MEM:EX

**From:** Kuppers, Haley MEM:EX
**Sent:** Monday, March 3, 2014 8:49 AM
**To:** Metcalfe, Megan MEM:EX
**Subject:** FW: Dust Mitigation/Health.

---

**From:** Martiquet, Paul [SC] [mailto:Paul.Martiquet@vch.ca]
**Sent:** Wednesday, December 11, 2013 11:26 AM
**To:** XT:HLTH Hasselback, Paul; Taje, Eddy MEM:EX
**Cc:** Kuppers, Haley MEM:EX; Chor, Alan K ENV:EX; 'Lincoln Kyne'
**Subject:** RE: Dust Mitigation/Health.

Hi Ed, just to reiterate, I have asked for a HIA to be conducted to address public concerns over the health impacts of the increase in shipping, storage and transport of coal at the Lafarge operation on Texada, thanks

---

**From:** Hasselback, Paul [mailto:Paul.Hasselback@viha.ca]
**Sent:** Wednesday, December 11, 2013 7:58 AM
**To:** Martiquet, Paul [SC]; 'Taje, Eddy MEM:EX'
**Cc:** 'Kuppers, Haley MEM:EX'; 'Chor, Alan K ENV:EX'; 'Lincoln Kyne'
**Subject:** RE: Dust Mitigation/Health.

Paul and Ed – I have had an opportunity to review the permit, only from the perspective of impact on Island Health residents (not including Texada). As you are aware Texada falls under the Health Authorities Act to VIHA but has operationally and funcationally been linked by agreement to VCH.

My comments hence are very limited. I have appreciated the Occupational Hygienist Haley Kuppers' report and recommendations on dust at the Lafarge site. I have also reviewed the PM studies submitted with the applications.

Recommendations have been made relative to on-site air monitoring proposed. These would be enhanced with clear direction on minimal frequency and would be of particular interest to residents in the area and adjacent islands.

The submitted air quality information is expressed as mg/m3. Notable is that BC Air Quality objectives for PM are expressed as µg/m3. The lower detection limit of 40 µg/m3 reported is well above the BC air quality objective of 25 µg/m3. PM10 levels would be expected to be below the 50-60 µg/m3 level depending on guidelines utilized. These levels for general public exposure. Worksafe BC has silica exposure limits of 25 µg/m3 for an 8 hour shift and has a coal dust exposure limit also of 400 µg/m3 for an 8 hour shift anthracite and 900 for bituminous. Notable in this statement is that other operations at the existing quarry site are likely more problematic than the coal unloading, storage and loading for both workers and residents.

We are provided information on dust suppression on open water being achieved through application of the binding agent again at the Fraser Surrey docks. Personally I have not reviewed the effectiveness of this practice or concerns that might be associated with the material and take the submission at face value.

I have also not received information on the expected increase in shipping on increasing the potential for a catastrophic event. I would appreciate documentation that speaks to the volume of outgoing sea traveling vessels and their proposed route. With increases in the oil and gas sector exportations including LNG, concern is being expressed relative to pressures on the Boundary Pass near Saturna and Pender islands (and on US islands). We have not yet explored potential impacts on Discovery Pass/Johnson Straight.

Thanks for the opportunity of commenting.

Paul

**Paul Hasselback MD MSc FRCPC**
**Medical Health Officer - Central Vancouver Island**
**3rd floor 6475 Metral Dr.**
**Nanaimo, BC**
**250-755-7944**

---

**From:** Taje, Eddy MEM:EX [mailto:Eddy.Taje@gov.bc.ca]
**Sent:** December-09-13 4:46 PM
**To:** XT:HLTH Martiquet, Paul; 'Lincoln Kyne'; Hasselback, Paul
**Cc:** Kuppers, Haley MEM:EX; Chor, Alan K ENV:EX
**Subject:** Dust Mitigation/Health.

Attached please find the summary of the dust mitigation measures as reviewed by Haley Kuppers M.Sc, one of our Industrial Hygienists . You will note in the letter references to work procedures, and information on the effects of the bonding agent once the material has been handled .

All of the concerns will be reflected in permit conditions, that require compliance, and prior to any final decision, information on wind effects should be provided such that the required conditions can properly address this concern.

Monitoring requirements and records are mandatory, and Our hygienists will work with the proponent to ensure standards established meet current standards with the provision for updating should the referenced standards be modified during the life of the operation. This principle is already a normal component of our Legislation and it will be re enforced through the conditions in the permit.

The Mines Act Permit amendment only applies to the components covered in the amendment application, and we cannot based on case law make decisions on other compartment.

With the terms of the proposal, and the conditions that we would have to establish in order to approve this proposal I believe the environment risk, and the risk to public health is low to nonexistent. Of particular concern is the risk of exposure to workmen. Our ministry has a long history of working with coal dust as it related to the health effects on workmen, and it follows that by ensuring the protection of those immediately exposed , the potential problems migrating into the receiving environment will be minimized and in some cases eliminated. Prevention of such air borne contaminants is the object. Should you have any questions or concerns, including suggestions please forward such correspondence directly to me.

## Metcalfe, Megan MEM:EX

**From:** Kuppers, Haley MEM:EX
**Sent:** Monday, March 3, 2014 8:49 AM
**To:** Metcalfe, Megan MEM:EX
**Subject:** FW: Submission of requested information: Supplemtary Air Mitigation and Risk Assessment
**Attachments:** Summary of CTP Dust Mitigation Strategy 081113.pdf; Supplementary CTP Project Risk Statement 081113.pdf

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**From:** Taje, Eddy MEM:EX
**Sent:** Thursday, November 14, 2013 4:42 PM
**To:** Kuppers, Haley MEM:EX
**Subject:** FW: Submission of requested information: Supplemtary Air Mitigation and Risk Assessment

Here are Larfarge reports.

---

**From:** Lincoln Kyne [mailto:lincoln.kyne@lafarge.com]
**Sent:** Thursday, November 14, 2013 9:23 AM
**To:** Taje, Eddy MEM:EX
**Cc:** Howe, Diane J MEM:EX; Brad Kohl; Darren Brown; Jonathan Moser; Andre Balfe
**Subject:** Submission of requested information: Supplemtary Air Mitigation and Risk Assessment

Ed,

Please find attached the supplementary information requested by the MoEM for the consideration of the mines permit M66 Amendment.

As always, please call me at any stage if there are any questions or issues with the attached documents.

Regards,

**Lincoln Kyne**
Project Manager

Lafarge Canada Inc. - ***Building Better Cities™***
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8 November 2013

Ministry of Energy and Mines
Mining & Minerals Division
6th Floor, 1810 Blanshard Street
Victoria, BC
V8W 9M9

Attention: Ed Taje

Dear Sir:

**Re: Summary of Dust Mitigation Strategies for the Expanded Coal Storage on Texada Quarries; Ministry of Energy and Mines Reclamation Permit M-66, File 14745-20.**

Texada Quarries has made an application to the Ministry of Energy and Mines (MoEM) to expand the existing stockpile area. This is intended to make the handling of additional coal volumes more efficient and effective. As part of the Amendment application a dust mitigation strategy was provided. The following summary document provides additional context to the dust mitigation strategies previously submitted during the Amendment application.

## Coal Supply Chain Life Cycle

Texada Quarries has safely transshipped coal for over 20 years. With the additional stockpile area requested in the Amendment application, Lafarge will diversify the source mines and in particular the supply chain activity will encompass coal mined in the United States. The life cycle for the coal moving through Texada Quarry from the United States will be on average between 25 and 30 days, comprising:

| | |
|---|---|
| Mine site | 1<2 days |
| Transit by rail | 4<5 days |
| Barging | >1 day |
| Stockpile on Texada | 20 days (Average) |
| Ship loading | 2 day |

## Dust Suppressing Agents and Surfactants

Dust suppressing and binding agents are applied at the mine site prior to train loading. In addition, the coal will again be treated with an environmentally benign binding agent and surfactant during the barge loading at Fraser Surrey Docks (FSD). Consistent

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with the application design at the coal mines, the barge loading system at FSD is designed to promote full coverage of the binding agent and surfactant on the coal. It is important to note that the application of dust binding agents and surfactants twice during the United States coal life cycle exceeds existing fugitive coal dust treatment at all existing BC coal terminals.

The effective life of the binding agent and surfactant exceeds the expected supply chain life cycle as detailed in this document.

**Product Movement and Stockpiling**

Lafarge currently barges, unloads, stockpiles and reloads on ships and barges a variety of bulk commodities to and from Texada Quarry. This operation uses existing facilities that have been approved and inspected by the relevant government authorities and are covered by the existing mine permit. The management of each commodity, including the potential for fugitive dust, has a variety of considerations that include equipment, supervision, processes and operating conditions. Lafarge has a proven history of balancing these factors on Texada in order to mitigate the risk of elevated fugitive dust.

Appendix One contains an overview of the dust mitigation activities pertaining to the expanded coal storage area. These are comparable in principle to existing coal handling operations.

**Air Quality Monitoring**

Lafarge recognizes that Texada Quarry is an active mine site that undertakes blasting, crushing, screening and handling of a range of commodities. Considerations of these factors are made in developing appropriate environmental management processes. Lafarge has an Environmental Management System (EMS) adopted for Canada which has been reviewed during inspections by the MoEM and Ministry of Environment (MoE). Notwithstanding this, Texada Quarry maintains a continuous improvement approach as it pertains to the implementation of operational standards. Texada Quarry currently undertakes air quality monitoring which is centered around the measurement of PM 10, PM 2.5 and silica. PM 10 is ambient particulate and PM 2.5 and silica represents respirable dust. Texada Quarry does not have a point source for coal dust emissions.

Attached at Appendix Two are the latest results for worker exposure for the months of August and September 2013. As indicated in the results, the 8 hour exposure limit for PM 10, PM 2.5 and silica are within legislated tolerances for air quality. Lafarge's approach, with the MoEM, is to monitor the health and safety of our employees who work within the existing operation, which includes coal handling. The results at Appendix 2 also reflect the level of fugitive dust within the property at the location of highest concentration. Given dispersion and fall characteristics, this does not reflect any concentrated level of fugitive dust outside of the property.

As it pertains to Air Quality impact from coal activities, it is important to recognize that it is not possible to definitively differentiate coal particulate from other particulate matter generated from coastal conditions and other mining activities. Notwithstanding this, Lafarge remains committed to minimizing coal dust exposure for our workforce and ensuring fugitive dust emissions remain within relevant guidelines.

Air Quality monitoring is conducted by trained Environmental Managers who are regularly audited by Lafarge's Environmental Management Team which comprises environmental specialists and certified Environmental Professionals. Additionally, Texada Quarry operates under legislation administered by multiple government authorities, including the MoEM, the MoE and Vancouver Coastal Health. Air quality results are tested by independent environmental laboratories certified by Environment Canada, Health Canada and the Canadian Association for Laboratory Accreditation.

**Personnel**

Texada Quarry has trained environmental assessment personnel that are overseen by certified Environment Professionals and a team of environmental specialists. Importantly, Lafarge recognizes the value of empowering personnel in monitoring and rectifying operational issues as they are identified. Lafarge, through consequential on-site training, actively promotes the identification, reporting and response to environmental issues including fugitive dust potential.

**Conclusion**

Lafarge has worked with the MoEM, together with other consulting government agencies, to safely handle coal on Texada for over 20 years. Lafarge has a proven history of taking proactive steps to manage health, safety and environmental risks and where necessary working with authorities to improve our systems.

The dust mitigation strategy defined in this document reflects the practicality of managing coal within the active mine site environment, and recognizes the dust suppressing measures taken prior to the coal arriving at Texada. The strategy is structured on continued operational monitoring in conjunction with regulatory oversight.

Please contact me at any stage to discuss the content of this document accordingly.

Regards,

Lincoln Kyne
Project Manager
Lafarge Canada Inc.

# Appendix One: Dust Mitigation Summary Table for PRB Coal

| # | Category | Mitigation Strategy Description | Where applicable |
|---|---|---|---|
| 1 | ***Coal barge transit to Texada Island from Fraser Surrey Docks*** | | |
| | (a) Dust | Coal is treated with dust binding agents and surfactant at the mine site | All coal barges used between FSD and Texada Island |
| | (b) Dust | Coal is retreated with additional dust suppressing agents during the barge loading process | All coal barges used between FSD and Texada Island |
| | (c) Dust | Coal barge may be sprayed with water prior to departure from FSD, depending on weather conditions | All coal barges used between FSD and Texada Island |
| | (d) Dust | Barge sidewalls will be used to partially protect coal from airflow | All coal barges used between FSD and Texada Island |
| | (e) Dust | Two of the six re-circulated barges will be subjected to a dust monitoring programme. Potential fugitive dust emissions from the loaded barges at berth side and during river transits will be monitored the first year of operations via two Met-one air quality measurement stations. After the first year of operations, the monitoring strategy will be assessed and possibly modified depending on initial results. | Loaded and loading coal barges at the berth face |
| | (f) Dust | When possible, coal load will be profiled to remove jagged surfaces that could cause dust | All coal barges used between FSD and Texada Island |
| | (g) Dust | Coal barges will not operate in high wind conditions | All coal barges used between FSD and Texada Island |

| | | | |
|---|---|---|---|
| **2** | **Unloading Coal from Barges** | | |
| | (a) Dust | Specified coal handling buckets will be used to unload coal | Barges during unloading operation |
| | (b) Dust | Side walls on the barge will be used to reduce air flow during unload process. | Barges during unloading operation |
| | (c) Dust | Unloading will be done from a floating platform that minimises height disparity from tidal movement between barge and unloading platform | Barges during unloading operation |
| | (d) Dust | Unloading activities will only be conducted when winds are within safe operational levels. | Barges during unloading operation |
| | (e) Dust | Two of the six re-circulated barges will be subjected to a dust monitoring programme. | Loaded and loading coal barges at the berth face |
| | (f) Dust | Purpose designed 60” conveyor systems designed to profile coal so it does not exceed belt height to limit exposure to air flow. | Coal Conveying |
| | (g) Dust | All transfer points are enclosed and fitted with conveyor skirting to contain any fugitive dust | Coal Conveying |
| | (h) Dust | Adjustable stacker heights will minimise the drop height of coal in the conveying system and thus fugitive dust creation | Coal Conveying |
| | (i) Dust | Barge cleaning is undertaken to scrape barges clean to ensure mitigation of residue dust and materials. | Inside the unloading barge |
| | (j) Dust | All equipment is operated by qualified and trained operators | All equipment |

| | | | |
|---|---|---|---|
| **3** | ***Management of Stockpiles*** | | |
| | (a) Dust | Surface wetting/static spreading of water if required | In the area of the coal stock piles |
| | (b) Dust | Compaction by specified coal handling equipment to reduce oxygen. | In the area of the coal stock piles |
| | (c) Dust | Pile profiled with limited height. | In the area of the coal stock piles |
| | (d) Dust | Short drop heights from stacker conveyors to hopper to reduce turbulence. | In the area of the coal stock piles |
| | (e) Dust | The coal area will be subjected to periodic environmental air monitoring. | In the area of the coal stock piles |
| | (f) Dust | Implemented speed limit and restricted access to the operational site to reduce dust agitation. | In the area of the coal stock piles |
| | (g) Dust/Leachate | Texada will integrate water sampling around the coal storage area and through existing water monitoring stations to detect any leachate or dust in the open water. | In the area of the coal stock piles |
| | (h) Leachate | Drainage ditches and settlement ponds around the storage platform perimeter have been designed to mitigate cumulative effects of natural events and prevent material leaching into the open waterways. This is designed to 1-100 years 24 hour rainfall events. | In the area of the coal stock piles |
| **4** | **Loading Ships** | | |
| | (a) Dust | Ships have contained holds which protect coal from airflow | All ships loaded at Texada |
| | (b) Dust | Purpose designed 60” conveyor systems designed to profile coal so it does not exceed belt height to limit exposure to air flow. | Coal Conveying |
| | (c) Dust | Water sprays are located at strategic points on the ship loader conveyor line | Coal Conveying |

| | | | |
|---|---|---|---|
| | (d) Dust | All transfer points are enclosed and fitted with conveyor skirting to contain any fugitive dust | Coal Conveying |
| | (e) Dust | Adjustable stackers and ship loader will minimise the drop height of coal in the conveying system | Coal Conveying |
| | (f) Dust | Specified load plans ensure balanced loading of material and minimise potential for material loss | All Ships loaded at Texada |
| | (g) Dust | All equipment is operated by qualified and trained operators | All equipment |
| | (h) Dust | Loading of coal ships will only be done within safe operational conditions | All Ships loaded at Texada |
| | (i) Dust | All facilities are compliant with the requirements of Marine Regulations and Mines Regulations | All Ships loaded at Texada |
| | (j) Dust | Operational assessment and emergency response procedures have been assured through an environmental emergency response contract | All Ships loaded at Texada |
| **5** | **General Management** | | |
| | (a) Dust | Regular inspection by government agencies that include monitoring for impacts of environmental issues, including potential fugitive dust | Coal Handling Systems |
| | (b) Dust | Third party validation of project implementation to ensure operating parameters minimize potential fugitive dust | Coal Handling Systems |
| | (c) Dust | Monthly environmental management inspections on coal handling systems | Coal Handling Systems |
| | (d) Dust | Routine inspections by Environmental Specialists to identify potential for fugitive coal dust and assess effectiveness of controls | Coal Handling Systems |
| | (e) Dust | Training and empowered workforce to identify, communicate and rectify circumstances that could have potential for fugitive dust | Coal Handling Systems |

# Appendix Two: Air Quality Monitoring Results for August and September 2013

The following air quality sampling results are provided for measuring activity specific to the existing coal storage and operations area.

Reportable detection limits for PM 2.5 and PM 10 are 0.04 mg/m3.

It is important to note that the results below are considered an overestimate of 8-hour occupational exposure limits. Extrapolation of these results would indicate 8-hour occupational exposure limits lower than those measured below. In addition, particulate matter encompasses all constituents and these results do not reflect coal dust concentrations only. Additional ambient particulate emanating from quarry and sea sources are also captured and are not differentiated.

| **Locn** | Beach west of coal pad, ground dry | Beach west of coal pad, ground dry | Beach west of coal pad, roads dry | Ship Loader Sampler | Beach west of coal pad | Beach east of coal pad | Ship Loader Coal Sampler | Ship Loader Cab | Ship Loader Sampler | Ship Loader Sampler |
|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | Coal barge offload | Coalmont coal barge offload | No activity, dry roads | Loading Coal | Barge hot load onto ship | no activity, roads dry | Loading Coal | Loading Coal | Loading Coal | Loading Coal |
| **Date** | 8/12/2013 | 7/29/2013 | 7/31/2013 | 8/8/2013 | 8/7/2013 | 8/9/2013 | 8/6/2013 | 9/3/2013 | 9/3/2013 | 9/4/2013 |
| **Unit** | P107285 | P107193 | P107194 | P107289 | P107190 | P107290 | P107189 | P107282 | P107292 | P107284 |
| **Condition** | Overcast | Sunny | Sunny | Sunny | Sunny | Sunny | Sunny | Lite Rain | Lite Rain | Sunny |
| **Wind** | SE 10-15 | SE 10 | SE 5 | SW 5 | NE 10 | NW 5-10 | NW 5 | SW 5-15 | SW 5-15 | NW 15 |
| **PM 2.5** | <0.040 | <0.040 | <0.040 | | | | <0.040 | | 0.053 | <0.040 |
| **PM 10** | | | | 0.090 | <0.040 | <0.040 | | <0.040 | | |

8 November 2013

Ministry of Energy and Mines
Mining & Minerals Division
6th Floor, 1810 Blanshard Street
Victoria, BC
V8W 9M9

Attention: Ed Taje

Dear Sir:

**Re: Supplementary Project Risk Statement for the Expanded Coal Storage on Texada Quarries; Ministry of Energy and Mines Reclamation Permit M-66, File 14745-20.**

Texada Quarries has made an application to the Ministry of Energy and Mines (MoEM) to expand the existing stockpile area. This is intended to make the handling of additional coal volumes more efficient and effective. As part of the Amendment application review, the MoEM has requested a supplementary project risk statement by Lafarge as it pertains to:

a. Community exposure to fugitive dust, and
b. Marine exposure to coal dust.

The proposed amendment does not constitute a reviewable project under Part 8, Table 14, Section 4 of The Reviewable Projects Regulations. To this end, this statement is not intended to comply with any BC or Federal legislation for the provision of extensive health or environmental impact assessments. This report does however have parallels with the screening assessment framework as a desktop study drawing together qualitative assessments, historical data and supporting literature.

**Structure of Assessment**

Lafarge has compiled this statement on a risk based approach, reflecting current operating activities and experience, monitoring results, known project design characteristics and existing external documentation on standards and impact studies.

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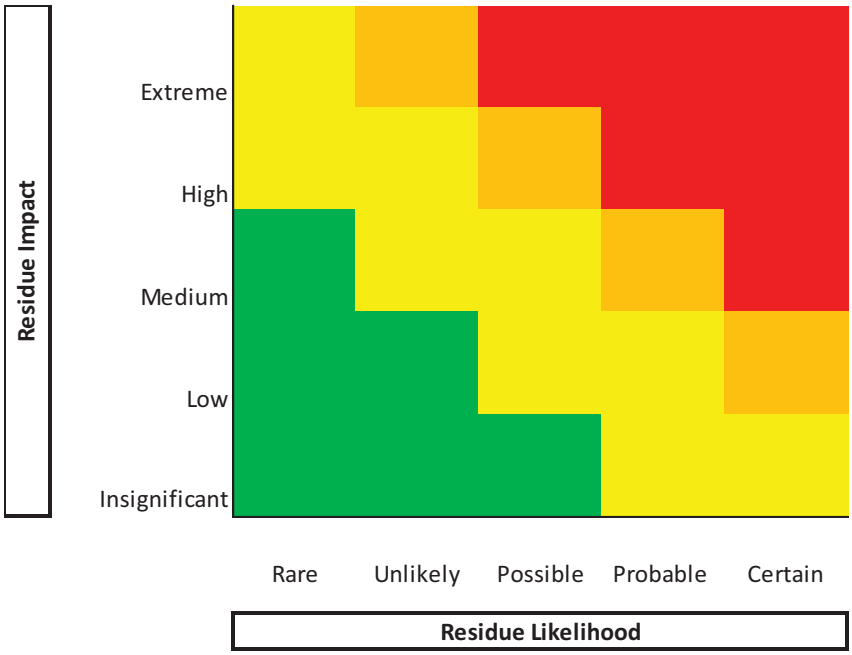
Each risk statement requiring further comment, as identified by the MoEM, has been structured and documented as follows:

a. Problem formulation,
b. Control methods,
c. Residue likelihood of event,
d. Residue consequence of event,
e. Residue risk rating, and
f. Monitoring of risk.

The residue risk is ascertained through the intersection of the residue likelihood (probability) of an event occurring and the residue impact (consequence) of the event should it occur. To this end, a qualitative assessment has been undertaken for each risk identified by the MoEM and the residue risk has been plotted on a risk matrix structured like that below.




The resulting risk score then allows stakeholders to ensure appropriate monitoring and control methods are in place to manage the residue risk. For Texada Quarry, this includes incorporation into operational processes, regulatory oversight and environmental monitoring and auditing.

## Limitations

This supplementary risk assessment statement has been made at the request of MoEM. Importantly, health, safety and environmental risk assessments are undertaken as part of Lafarge's core operating activities. The management of daily risks pertaining to Texada Quarry, including transshipment of coal, is reflected in the operational processes and environmental management system employed on the site. This supplementary risk statement therefore does not consider all operations and nor does it replace any element of these existing processes.

This supplementary risk assessment statement has been compiled as a desktop study drawing together qualitative assessments, historical data observations and supporting literature. It is not intended to constitute a comprehensive health impact assessment as detailed in BC and Federal legislation.

## Conclusion

Lafarge believes that it has a proven history of operating safely on Texada Island and manages the risk environment in accordance with issued permits and the legislative environment. Lafarge is a heavily regulated mine site that is regularly inspected by the MoEM and Ministry of Environment. Lafarge undertakes monitoring of residue risks through an environmental management system that also influences equipment and process improvement.

When considering the residue risk profile of the expanded coal operation after all controls have been implemented, together with comparative and historical information on the product and site, there is no evidence to suggest that the expanded coal storage area will pose an increased threat to the health of Lafarge employees, Texada communities or the marine environment.

Notwithstanding this assessment, Lafarge will continue to monitor health, safety and environmental risks within the guidelines prescribed by appropriate legislation. These monitoring activities will continue to feed into the continuous improvement of operating procedures and systems at Texada Quarry. Additionally, Lafarge recognizes that in accordance with the *BC Mines Act 1996 s15*, the MoEM undertakes regular assessments of our mining and port operations on Texada, including for verification of plan implementation. There is a legislated process (*BC Mines Act 1996 s35 and s37*) for addressing any observations highlighted during these visits.

Please contact me at any stage to discuss the content of this assessment accordingly.

Lincoln Kyne
Project Manager
Lafarge Canada Inc.

## Risk Assessment: Community Exposure to Fugitive Dust

### Problem Formulation

The proposed expanded coal storage area lies 5 km from the nearest potential receptor community of Gillies Bay. Gillies Bay lies EWE of the proposed coal storage area and behind ~200ft of steep terrain. Van Anda community lies 6.5 km N of the expanded coal storage area behind an elevation of over ~1000ft.

Communities may express concern that a concentrated level of respirable dust would resonate from the expanded coal storage pile causing chronic community health issues. The most likely concern is from the residents of Gillies Bay.

### Control Methods

Engineering control methods used to minimize fugitive coal dust potential include:

a. Short drop heights from stacker conveyors to hopper to reduce turbulence.
b. The coal area will be subjected to periodic environmental air monitoring.
c. Ships have contained holds which protect coal from airflow.
d. Purpose designed 60” conveyor systems designed to profile coal so it does not exceed belt height to limit exposure to air flow.
e. Water sprays are located at strategic points on the ship loader conveyor line.
f. All transfer points are enclosed and fitted with conveyor skirting to contain any fugitive dust.
g. Adjustable stackers and ship loader will minimise the drop height of coal in the conveying system.

In addition, process control methods for the handling of coal include:

a. Coal will be treated with an environmentally benign dust binding agent and surfactant twice in the preceding 6-8 days before arriving at Texada.
b. Surface wetting/static spreading of water if required.
c. Compaction by a specified coal handling equipment to reduce oxygen.
d. Implemented speed limit and restricted access to the operational site to reduce dust agitation.
e. Pile profiled with limited height.
f. All equipment is operated by authorized and trained employees.
g. Specified load plans for each Ship will ensure balanced loading of material and minimise potential for material loss.

**Residue Likelihood of Event**

Prevailing winds vary on Texada Island with dominant winds being either ESE or NWN. Stronger winds are realized in the winter/spring months, being ESE generating winds and away from any developed communities. Occasionally wind elevation can be observed in late fall. Normally any periods of increased wind generate from a change in weather system (low pressure to high pressure or vice versa), being either after a period of wet weather (in which the coal stockpile will be significantly wet) or moving into a wet period (in which case the rain will damper and potential fugitive dust).

Air quality monitoring on Texada Quarry has demonstrated that the existing methods employed to manage fugitive coal dust is effective and contained within the property. Texada Quarry has been handling coal for over 20 years and the MoEM have verified there is no documented complaint from the public to any government authority regarding fugitive dust from these operations in this period.

In comparison to existing operations it is important to note the Amendment application includes operational improvements that will further reduce likelihood of fugitive dust. The dispersion of fugitive dust is also mitigated by a dust suppressing application regime that exceeds all current handling methods for PRB coal terminals in BC.

Results from coal terminals studies within BC have identified that the level of fugitive dust from PRB coal is below airshed air quality targets for total particulate matter where handling methods are implemented comparative to those implemented by Lafarge. This includes for stockpiles over 10 times greater than that currently proposed in the Amendment and an annual material handling capacity over eight times greater than the 4m tonnes of coal expected with Texada Quarry.

It is assessed that the residue likelihood of resiprable dust concentrations, generating from the extended coal storage area, exceeding permissible standards for air shed quality and contaminating community receptors is **rare**.

**Residue Consequence of Event**

Section 5.48 of the BC *Occupational Health and Safety Regulation* provides established standards to protect worker's health by limiting exposure to chemical substances. Generally, these occupational exposure limits (OELs) are adopted from the American Conference of Governmental Industrial Hygienists (ACGIH). In accordance with ACGIH, and adopted by WorkSafe BC, the 8-hr time weighted average (TWA) for respirable bituminous coal is 0.9 $mg/m^3$.

Sampling and analysis of particulate matter (PM10) is used as a surrogate to determine the ambient respirable fraction of coal. According to *insitu* sampling at the coal transloading operation for August and September of 2013 PM10 was detected in only one of four samples taken. The detectable sample was recovered from a location in direct contact with coal transloading activities (coal ship loader). Despite the direct

proximity to the coal transloading activities, the PM10 result was 0.09 mg/m$^3$, an order of magnitude below the OEL for respirable bituminous coal.

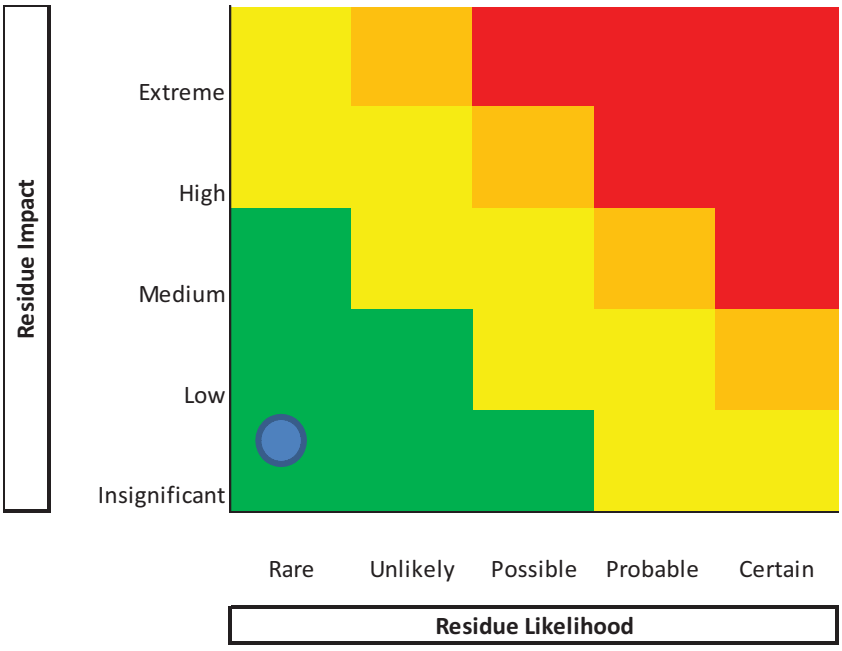
Health conditions associated with coal dust inhalation are generally attributable to multi-year chronic exposure of the coal dust at concentrations in excess of prescribed OELs. This scenario is often typified by an underground coal mine worker who is exposed to additional risk factors beyond coal dust. At Lafarge's Texada above ground coal transloading operation, which handles screened and treated coal, the potential for a similar chronic exposure with concentrations above the OEL is very low. Given the already low measured concentrations, and the receptor distance from the coal transloading operation, the potential risk to the surrounding community is likely insignificant.

Coal from PRB has been handled by other facilities within BC for a number of years. There is no evidence to suggest that handling PRB coal in BC has resulted in adverse health effects for the workforce.

If this risk was realized after all control methods have been implemented, it would likely be a one-off, temporary and localized event, still unlikely to affect the communities of Gillies Bay and Van Anda and highly unlikely to result in chronic public health issues. The impact of a one-off temporary and localized event would be **low-insignificant**.

### Residue Risk Rating

The residue risk rating for community exposure to fugitive dust is considered extremely low.



## Monitoring of Risk

Environmental monitoring remains the most practical and real-time indicator for highlighting a change in risk profile. Lafarge proposes to continue undertaking monitoring for fugitive coal dust. This will involve the following steps:

1. Validating a monitoring schedule with the MoEM for air quality monitoring,
2. Utilising calibrated equipment and pre-weighed sample disks,
3. Utilising a third party accredited laboratory to measure and report results,
4. Reviewing the results to identify any change to the risk profile, and
5. Making any changes necessary to improve the handling process and lower the residue risks associated with fugitive coal dust.

## Risk Assessment: Marine Exposure to Fugitive Dust

### Problem Formulation

The proposed expanded coal storage area lies up to 9m above sea level on the shore front area of Texada Quarry, set back up to 100 meters from the shore front and behind a ~2 meter natural rock berm. The expanded storage area is also behind existing stockpiles and abuts a steep hill that protects the pile from prevailing winds. Water management infrastructure will collect any dust within the stockpile area to mitigate the risk of dust entering the marine environment through water run-off. This has been assessed independently y the MoE and MoEM.

Prevailing winds vary on Texada Island with dominant winds being either ESE or NWN. Stronger winds are realized in the winter/spring months with occasional wind gusts observed in late fall. Normally any periods of increased wind generate from a change in weather system (low pressure to high pressure or vice versa), being either after a period of wet weather (in which the coal stockpile will be significantly wet) or moving into a wet period (in which case the rain will damper and potential fugitive dust).

Lafarge has been asked to provide a risk statement on the likelihood and consequence of fugitive dust reaching the marine environment.

### Control Methods

Engineering control methods used to minimize fugitive coal dust potential include:

a. Short drop heights from stacker conveyors to hopper to reduce turbulence.
b. Specialized coal material handlers will be used,
c. The coal area will be subjected to periodic environmental air monitoring.
d. Ships have contained holds which protect coal from airflow.
e. Purpose designed 60” conveyor systems designed to profile coal so it does not exceed belt height to limit exposure to air flow.
f. Water sprays are located at strategic points on the ship loader conveyor line.
g. All transfer points are enclosed and fitted with conveyor skirting to contain any fugitive dust.
h. Adjustable stackers and ship loader will minimise the drop height of coal in the conveying system.

In addition, process control methods for the handling of coal include:

a. Coal will be treated with an environmentally benign dust binding agent and surfactant twice in the preceding 6-8 days before arriving at Texada.
b. Surface wetting/static spreading of water if required.
c. Compaction by a specified coal handling equipment to reduce oxygen.
d. Implemented speed limit and restricted access to the operational site to reduce dust agitation.

e. Pile profiled with limited height.
f. All equipment is operated by authorized and trained employees.
g. Specified load plans for each Ship will ensure balanced loading of material and minimise potential for material loss.

**Residue Likelihood of Event**

Air quality monitoring on Texada Quarry has demonstrated that the existing methods employed to manage fugitive coal dust is effective and contained within the property. Texada Quarry has been handling coal for over 20 years and the MoEM has verified there is no documented complaint from the public regarding fugitive dust from these operations in this period.

Additionally, it is of note that with the Amendment application, there will be improvements to the operations that will further reduce the likelihood of fugitive dust migration beyond the property further. The dispersion of fugitive dust is also mitigated by a dust suppressing application regime that exceeds all current handling methods for PRB coal terminals in BC.

Results from coal terminals studies within BC have identified that the level of fugitive dust from PRB coal is below airshed air quality targets for total particulate matter where handling methods are implemented comparative to those implemented by Lafarge. This includes for stockpiles over 10 times greater than that currently proposed in the Amendment and an annual material handling capacity over eight times greater than the 4m tonnes of coal expected with Texada Quarry.

It is assessed that the residue likelihood of reportable levels of fugitive dust entering the marine environment, generated from the extended coal storage area, is **unlikely**.

**Residue Consequence of Event**

Triton Environment conducted a study for Port Metro Vancouver on the coal sourced from PRB in the United States. This report concluded that the impact of any coal dust reaching the marine environment would be negligible to marine habitat.

Studies of the marine environment around Texada Quarry, and in particular the area near the expanded coal storage area, identified that there were no species listed as having a conservation status on the Conservation Data Centre, BC Species and Ecosystems Explorer. The report did not identify any negative impact on marine habitat by the past 20 years of coal transshipment by Texada Quarry.

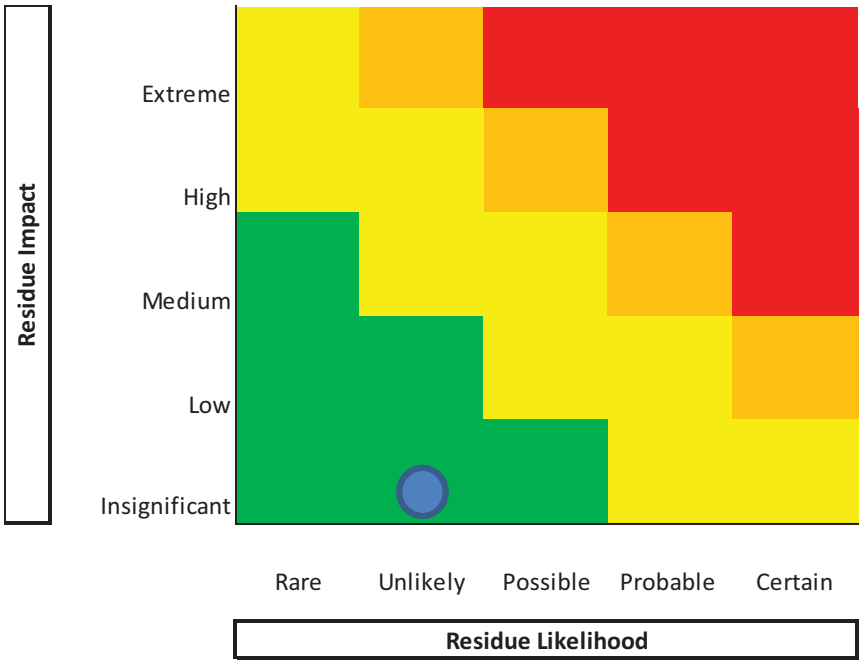
Lafarge is aware of an active oyster bed located 200m from the boundary of Lafarge property. Lafarge has conducted periodic testing on the oyster beds, and as of mid 2013 the oysters do not show any negative impact from coal handling activities.

Additionally, there is no evidence to suggest that coal dust has had any adverse effect on the waters surrounding Westshore coal terminal or Neptune facility; most notable is the exposed position of Westshore to the marine environment.

Given the scientific studies conducted by Triton Environment, together with the absence of any data to highlight any adverse impact from coal handling activities, the impact of any isolated fugitive dust event would be **insignificant**.

## Residue Risk Rating

The residue risk rating for marine exposure to fugitive dust is considered extremely low.




## Monitoring of Risk

Environmental monitoring remains the most practical and real-time indicator for highlighting a change in risk profile. Lafarge proposes to undertake continued monitoring for total particulate fugitive coal dust. This will involve the following steps:

1. Validating a monitoring schedule with the MoEM for air quality monitoring.
2. Validating through periodic testing of the health of the oyster bed located ~200m from the property boundary.
3. Utilising calibrated equipment and pre-weighed sample disks;
4. Utilising a third party accredited laboratory to measure and report results.
5. Reviewing the results to identify any change to the risk profile, and
6. Making any changes necessary to improve the handling process and residue risk associated with coal dust.

## Metcalfe, Megan MEM:EX

**From:** Taje, Eddy MEM:EX
**Sent:** Friday, August 30, 2013 12:57 PM
**To:** Hoffman, Al MEM:EX
**Cc:** Haines, Mark R MEM:EX; Amann-Blake, Nathaniel MEM:EX
**Subject:** FW: Coal Transhipping - Texada Island

This e-mail chain regarding to Texada coal shipping is honestly worth reading

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**From:** Bouffard, Maryann J MEM:EX
**Sent:** Friday, August 30, 2013 12:33 PM
**To:** Taje, Eddy MEM:EX
**Subject:** FW: Coal Transhipping - Texada Island


*MARYANN J. BOUFFARD*

**Operations Coordinator/Inspector of Mines**
Ministry of Energy & Mines
Mining and Mineral Resources Division
Southwest Region Mining Office
6th Floor- 1810 Blanshard
Victoria BC V8W 9N3
Phone: (250) 387 4825
Cell: s.17
Fax (250) 953 3878
Maryann.Bouffard@gov.bc.ca


**From** s.22
**Sent:** Friday, August 30, 2013 12:31 PM
**To:** Southwest Regional Mines Division MEM:EX
**Subject:** Coal Transhipping - Texada Island

Re: Coal Transhipping on Texada;

As long as the Ministry is looking out for our best interests, and ensuring that the coal on Texada is handled safely and with minimal environmental impact, I support the coal expansion project on Texada Island.

Below is a link to the Drax power station - a coal-fired power station that is as clean (if not cleaner) than many of the 'green' alternatives available. While I don't believe that coal is the answer to our energy problems, I do believe that it's a necessary source of energy that we must learn to live with until we have alternative energy widely available, at a cost that the majority can afford. Drax is an example of how we can take 'dirty' energy and utilize it in a way that has minimal impact on our environment and minimal (if any) contribution to greenhouse gases.

http://www.drax.com/

As for the shipping/trans-shipping of coal, I would like to ask only one question: if not here, then where?

I don't like contributing to pollution, or impacting our natural environment - I spend a great deal of time outdoors and treasure our environment. However, I strongly believe that if we close our doors to these industries in BC and Canada, these industries will move abroad where companies may be tempted to exploit the sub-standards of the third world. This would certainly make our environmental pollution problems worse, not better. Pollution does not recognize borders. If we force industry offshore, we lose our ability to monitor and police it. That is not a responsible or sustainable solution.

We have environmental regulators in Canada for a reason. If the inroads we've made in environmental awareness and accountability have not created an effective system, then what are our tax dollars funding? It's time to let the safe-guards we've put in place, do the job they were designed to do.

We may not have realistic alternative energy options, but we do have the technology to do things better and cleaner. I believe that the solution is not saying 'NO' to coal and other energy proposals. The solution is to say "Do it, but do it CLEAN". We can make sure they do...as long as they're here in Canada.

Thank you for your time and consideration of my comments.

Sincerely,

s.22

Gillies Bay (Texada Island), BC

## Metcalfe, Megan MEM:EX

**From:** Howe, Diane J MEM:EX
**Sent:** Thursday, May 9, 2013 9:01 AM
**To:** Taje, Eddy MEM:EX
**Cc:** Hoffman, Al MEM:EX
**Subject:** Texada -Lafarge Application

Hi Ed,

I read over the application last night and have a few questions:

1) Is there a digital copy?
2) There is no section on reclamation or liability costing (actually would like to see an update for the whole site)
3) What is the current handling capacity?
4) Has Lafarge talked to the EAO about their project? (It looks unlikely but never know) (Look under Marine Port Facility under the reviewable projects regulation there is a area trigger of >2 ha of disturbance)

   It looks like the folks that will need to be involved are MEMNG, FLNRO (Water Act), DFO (?) and FN., so I believe this should go to a major projects committee. I don't see it as being too onerous of a review but because of the Fed involvement it would be good to have a project manager assigned.

   Can I leave it to you to coordinate with FLNRO? I will provide a letter from the CI asking for a committee once you have had the discussion with FLNRO.

Regards, Diane

**Diane Howe**
Deputy Chief Inspector, Reclamation and Permitting
Ministry of Energy, Mines and Natural Gas
Victoria, BC
(250) 952-0183

## Metcalfe, Megan MEM:EX

**From:** Rollo, Andrew MEM:EX
**Sent:** Wednesday, August 14, 2013 10:39 AM
**To:** Demchuk, Tania MEM:EX
**Subject:** RE: Base/Acid Ratio and US Coal Logistics Chain

Hey Tania:

No, I have never heard of or used the base acid ratio.

Yes, I do believe your understanding that it is totally different to ABA is correct. I did a quick search and came up with this definition:

> B/A – Base to acid ratio, sum of total bases divided by sum of all acid elements
>
> $$B/A = \frac{Fe2O3 + CaO + MgO + K2O + Na2O}{SiO2 + Al2O3 + TiO2}$$
>
> Since most of the basic elements are troublesome the B/A is an indication of the level of fluxing agents.

It seems to be related to coal quality.

-A-

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**From:** Demchuk, Tania MEM:EX
**Sent:** Wednesday, August 14, 2013 10:32 AM
**To:** Rollo, Andrew MEM:EX
**Subject:** FW: Base/Acid Ratio and US Coal Logistics Chain

Hey,

Have you ever seen/used a base acid ratio before (below)?
Do you know if my understanding is correct that this is a test done on coal to assess coal ash (i.e. is totally different from acid-base-accounting...)?

Thanks,
T

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**From:** Lincoln Kyne [mailto:lincoln.kyne@lafarge.com]
**Sent:** Tuesday, August 13, 2013 10:45 AM
**To:** Demchuk, Tania MEM:EX; Taje, Eddy MEM:EX; Brad Kohl
**Subject:** Base/Acid Ratio and US Coal Logistics Chain

Tania,

further to you request for information on both the base acid ratio calculations and logistics chain, please find below the following responses.

**BASE ACID RATIO**

$$BAR = \frac{Fe_2O_3+CaO+MgO+K_2O+Na_2O}{SiO_2+Al_2O_3+TiO_2}$$

$Fe_2O_3$= Ferric Oxide
CaO= Calcium Oxide
MgO= Magnesium Oxide
$K_2O$= Potassium Oxide
$Na_2O$= Sodium Oxide

$SiO_2$= Silicon Dioxide
$Al_2O_3$= Aluminum Oxide
$TiO_2$= Titanium Oxide

**LOGISTICS CHAIN**

The typical time that the coal is in the logistics chain is as follows:

Mine Site: 1<2 days
Transit by Rail: 4<5 days
Barging: .05>1 day
Stockpile on Texada: 20 days (Average)

So to be safe, from mine extraction to loading on a ship, you could be looking at around 25>30 days.

Importantly, I would note that the coal coming from the US is treated with both an anti-oxidant and a dust suppressant. The effective coverage of this agent is 99.999% with a life span well exceeding the likely supply chain scenario *including* the transit and off-load to the end customer in Asia.

Regards,

Lincoln Kyne

Project Manager

Lafarge Canada Inc. - Building Better Cities™

#200 7455 132 Street, Surrey, BC, V3W 1J8

Telephone: (604) 502-5207 | Mobile: (604) 789-3006 | Email: lincoln.kyne@lafarge.com

www.lafarge-na.com

**From:** Taje, Eddy MEM:EX
**Sent:** Monday, August 12, 2013 8:43 AM
**To:** Pope, Rue MEM:EX
**Subject:** FW: Lafarge Permit Amendment (M-66, File 14745-20) Texada Island

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**From:** Metcalfe, Shelley ENV:EX
**Sent:** Friday, August 9, 2013 5:02 PM
**To:** Taje, Eddy MEM:EX
**Cc:** Veale, J Graham ENV:EX; Hebert, David ENV:EX; Chor, Alan K ENV:EX; Braman, Jonn ENV:EX
**Subject:** Lafarge Permit Amendment (M-66, File 14745-20) Texada Island

Dear Ed,

Thank you for referring Lafarge Canada's permit amendment application (Permit M-66, File 14745-20) to the Ministry of Environment to review. As you and I discussed earlier this week, the ministry believes an effluent permit (and possibly an air permit) will be required under the *Environmental Management Act* and we have communicated this to Lafarge's project manager, Lincoln Kyne, as of today, August 9, 2013.

We are pleased, however, to provide the following comments on the proposed permit amendment application, primarily from an air perspective. We do have questions regarding the storm water management at the site, although these can be addressed via our ministry's permit application process. We should consider, however, how our respective authorizations may overlap and address these areas if and when they occur. (Would you please send me a copy of their current permit?)

Air Quality Comments:

It is not clear if the current authorization (Permit M-66 ?) contains any measures or requirements for the control and management of fugitive dust from the existing coal handling and storage facilities. The referral package includes correspondence dating back to 1990 from the then Ministry of Energy, Mines and Petroleum Resources and the federal Department of Fisheries and Oceans commenting on an application for the storage and handling of coal at the site and recommending that dust suppression systems "be available". However, the actual facility authorization (Permit M-66 ?) is not included in the referral package and it cannot be determined if any dust suppression systems were required and are actually operating.

There is no information provided in the amendment application regarding assessment of the potential for generation of fugitive particulate (dust) from the expanded handling and storage facilities and no explicit discussion of management and mitigation actions (e.g. dust management plan) that may be required. The Stormwater Management Plan (Appendix B, Section 01 11 00, sub-section 2.13) makes brief reference to dust control measures such as a water misting system but it appears to be related to management of dust generated during the construction of the Stormwater Management facility rather than the overall coal handling and storage facilities. In correspondence from Kreator Equipment and Services Inc. (included in the referral package) regarding the construction of loading facilities, dust mitigation actions

(enclosing of transfer points, dust suppression systems) are mentioned but little detail is provided.

In summary, there is insufficient detail provided by the proponent to determine the potential impacts to air quality from the expanded coal handling and storage project. I would recommend that an air quality assessment is required for the project, including identification of potential emission sources, especially fugitive dust emissions, and detailing mitigation/control options and monitoring (if necessary) to demonstrate that there will not be unacceptable impacts to ambient air quality in the area. It is likely that the identified dust mitigation/control activities and any monitoring will be incorporated into an overall dust management plan which should form part of any authorization issued.

If you require clarification or more information regarding our specific comments above, please contact our Air Quality Meteorologist, Graham Veale, at 604-582-5286. For any other questions, please feel free to contact me.

Sincerely,

**Shelley Metcalfe, P.Ag.**
**Section Head, Business & Standards Unit**
BC Ministry of Environment - South Coast Region
200- 10470 152nd St., Surrey BC V3R 0Y3
p. 604-582-5332 | f. 604-930-7119 | e. shelley.metcalfe@gov.bc.ca

# Procedure

| Product Line: | ALL | Number: PRO-01-04-002 |
|---|---|---|
| Subject: | SHIP LOADER SAFETY PROCEDURES | |
| | | |

**1. Purpose**

To establish methods that ensures the operations at the Ship Loader System are identified and carried out in a safe and productive manner protecting all personnel and impact to the environment.

**2. Definitions**

None

**3. Hazards**

- Water hazards
- Weather
- Dust
- Equipment or structure damage
- Slips, trips, ergonomics
- Pinch points

**4. Precautions**

Refer to JHA

**5. Procedures**

**All Employees**

**1. <u>Pre-use checks</u>**

**1.1** Ship loading facility inspection is carried prior to ship or barge arrival as per Texada Quarry Port Security Plan and Preventative Maintenance Plan.

**1.2** FLRA must be completed by workers before starting job.

**1.3** Weather conditions must be monitored prior to ship or barge berthing at Ship Loading Facility. Accepting the Ship or barge may have to be delayed until calmer conditions if the weather is notably adverse with high winds and extreme seas.

**1.4** Availability of water truck to control dust around roadway and stock piles.

**1.5** Dust suppression system operational. Weather monitoring instruments operational.

**1.6** If the weather is dry or forecasted to be dry the water truck will water down the roadway leading from the Ship Loader to the stockpile area along with and any other routes that are needed. Observations of dry conditions (roadways or product) by Employees or Supervisors during loading will prompt additional water application.

**1.7** Dust monitoring will take place as needed to monitor Worker Exposure and Environmental Standards as per Workplace Monitoring Procedure. Periodic environmental air monitoring will also occur outside of what is detailed in the Workplace Monitoring Procedure.

**1.8** Full PPE along with life jackets must be worn. Ensure proper footwear with good soles. ENSURE you are NOT wearing loose clothing

**1.9** Walkway surface are clean and metal grating and handrails in good repair.

**1.10** MAINTAIN a three point contact when mounting and dismounting any ladders. MAINTAIN a two point contact when travelling up or down stairs.

**1.11** System lighting must be on and working during night operations, workers will need additional lighting (headlamps & flashlights).

**1.12** 2 way radios are available

**1.13** Berth is free of logs or any other water hazards

## 2. Ship Arrival

**2.1** REFER to Shiploader Tie Up Procedures

## 3. Ship Loader Operator Responsibilities

**3.1** REFER to Shiploading Operating Procedure for operation instructions.

**3.2** OPERATOR must have good depth perception for raising and lowering the ship loader, so as not to make contact with the ship.

**3.3** OPERATOR may take his personal floatation vest off once safely inside the ship loader cab. Hang the vest inside cab beside the door for easy access.

**3.4** MUST coordinate loading with the ship's crew via VHF radio, Texada Quarry radios must have proper channels installed.

**3.5** SHALL direct deck hands as to what is required as per ship's crew requirements.

**3.6** ENSURE proper operation of the computerized load out system.

**3.7** FOLLOW the load sheet as to what product goes into what hole in the ship.

**3.8** OPERATOR must maintain control of the dump lights at the Truck Dump Bin and use radio in conjunction to communicate verbally to the Operators.

**3.9** OPERATOR must monitor dust suppression system while loading and adjust accordingly as per 8.0 DUST SUPPRESION of the Shiploading Operating Procedure.

**3.10** OPERATOR must monitor wind speed and note the following warnings and actions will take place as per 9.0 HIGH WIND OPERATION of the Shiploading Operating Procedure.

**3.11** SHIPS first mate will signal the ship loader operator as to where he wants material to be placed in each hole.

**3.12** OPERATOR must watch for LIST in ship, do this by following the lights below the Pilot House. WHITE – Centered, RED – Ship listing to port, GREEN – Ship listing to starboard.

**3.13** OPERATOR must keep a detailed log of ship loading times; log must be timed to the minute. Use stop watches.

**3.14** LOG must include start feed, when you change holes and any delays or feed problems.

**3.15** LOG book must be detailed as it has to be compared to the ships log, once the loading is finished.

**3.16** All efforts on the ships behalf must be made to conduct business in a safe manner. The Shipping Agent must be notified **IMMEDIATELY** of any accidents or spills that occur on the shore or into the water. Any spills of fuel or oil into the water from the ship must be controlled without delay.

**6. Exceptions** NONE

**7. Implementation** All Texada Quarry Supervision shall ensure adherence to this procedure.

**8. Interpretation & Updating** The Safety Manager shall ensure interpretation and updating of this procedure.

# Procedure

| Product Line: | ALL | Number: PRO-01-04-002 |
|---|---|---|
| Subject: | SHIP LOADER SAFETY PROCEDURES | |
| | | |

## 9. Approved by

**Amir Merat**
Safety Manager
Aggregates & GVA Market

**** NOTE ** Original signed copy retained by the Safety Department**

# Safe Work Procedure

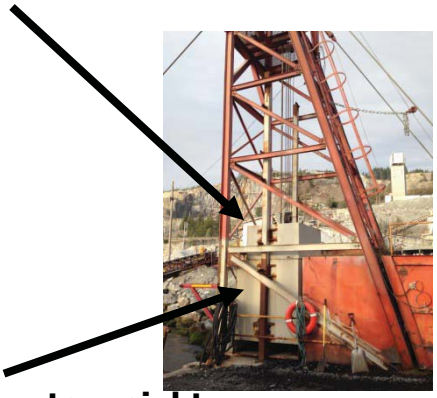
| Product Line: | TEXADA QUARRY | Number: PRO-01-04-003 |
|---|---|---|
| Subject: | BARGE RAMP PROCEDURES | Reference: |
| | | |

## 1. Purpose

To establish guidelines for the use of the barge ramp, the winches and operating equipment over the Barge Ramp & onto barges.

## 2. Definitions

**Small Counterweight**
Smaller additional weight that is raised or lowered onto Main counterweight using ramp controls causing ramp to move up or down



**Main Counterweight**
Large weight attached to the bottom of both main cable supports

## 3. Hazards

- Water hazards
- Weather
- Dust
- Equipment or structure damage
- Slips, trips, ergonomics
- Pinch points

## 4. Precautions

Refer to the attached JHA form

## 5. Procedure

**All Employees and Contractors**

### 1. Pre-use Checks

**3.1** Workers operating mobile equipment must be qualified equipment operators. Trained and signed off on ramp & winch operations and be able to monitor system.

**3.2** FLRA must be completed by workers before starting job.

**3.3** Weather conditions must be monitored prior to barge berthing at Barge Ramp facility. If the weather is notably adverse with high winds and extreme seas accepting the barge may have to be delayed until calmer conditions.

**3.4** Availability of water truck or fire hose, to control dust around roadway and barge deck.

**3.5** If the weather is dry or forecasted to be dry the water truck will water down the roadway leading from the Barge Ramp to the stockpile area along with and any other routes that are needed. Dust monitoring will take place as needed to monitor Worker Exposure and Environmental Standards as per Workplace Monitoring Procedure. Periodic environmental air monitoring will also occur outside of what is detailed in the Workplace Monitoring Procedure.

**3.6** Full PPE along with life jackets must be worn. Ensure proper footwear with good soles.

**3.7** Ramp surface is clean and metal grating in good repair.

**3.8** System lighting must be on and working during night operations, workers will need additional lighting (headlamps & flashlights).

**3.9** 2 way radios are available

**3.10** Counter weights are in the correct position in the guides

**3.11** Hoist winch cables are wound under the bottom of the winch drum and not crossed

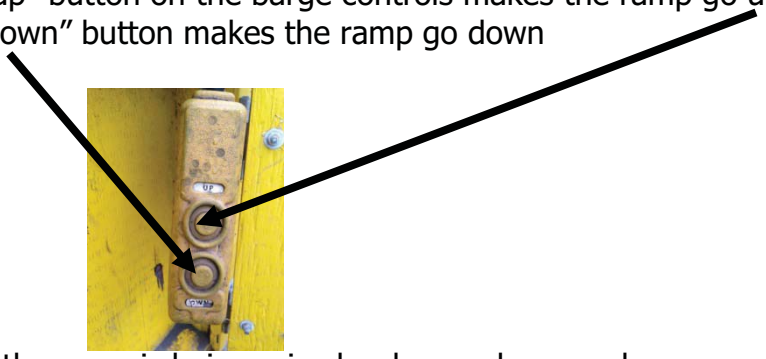
**3.12** Ramp berth is free of logs or other hazards

**3.13** Cables are in the correct position within the sheaves

## 2. Barge Arrival

**2.1** Communicate with the deck hand and tug to position the barge before lowering the ramp.

**2.2** The "up" button on the barge controls makes the ramp go up; the "down" button makes the ramp go down



**2.3** While the ramp is being raised or lowered, no worker or equipment is allowed on the ramp.

**2.4** No access to the ramp without a barge situated underneath the ramp.

**2.5** Once the ramp is on the barge, 2 workers secure the winch ropes to the bollards and tighten the winches. Proper body positioning must be maintained when securing ropes to avoid muscle strains and slips or trips. Keep fingers and hands out of pinch point between bollards, ropes and winch system.

- **NOTE:** Workers operating shore winches must be qualified and signed off on winch operation. Operation procedures are available in the life jacket shed.

**2.6** Two additional ropes should be tied from the pipe dolphins to barge cleats in the direction away from the ramp ( to reduce pull on the ramp winches); at least one other rope should be tied in the direction towards the ramp

**2.7** Once the barge is secure, raise the small counter weights up off the main counterweights close to the top of the towers

**2.8** Empty measurements may need to be taken and recorded

## 3. Barge Offloading or Loading

**3.1** Barge must be secure, ramp cables tensioned to hold barge into ramp and barge secured by ropes to dolphins by tug crew

**3.2** During winch adjustments all equipment movement must stop on the barge

**3.3** Monitor the barge ropes and adjust when required

- **NOTE:** Ramp is only certified for the maximum GVW of 250,000lbs for the loaded CAT 775D trucks and CAT 988H loaders only. Equipment must not travel over ramp when workers are walking over ramp. Equipment must not be operating while workers, or tug crew are on the deck.

**3.4** Tug will have to stay and push barge into ramp until the loader is able to have all 4 wheels on barge while digging.

**3.1** All efforts on the Tugs behalf must be made to conduct business in a safe manner. The Tug Crew must be notified **IMMEDIATELY** of any accidents or spills that occur on the shore or into the water. Any spills of fuel or oil into the water from the Tug must be controlled without delay.

**3.5** Equipment must have 2 way radios, clean windows & mirrors, lights, backup lights and alarms must be functional.

**3.6** MAINTAIN a three point contact when mounting and dismounting equipment.

**3.7** Loader operator must add suitable material to the transition apron at the end of the ramp and monitor as off loading or loading progresses.

- **NOTE:** Tides and the angle of the ramp must be monitored during offloading or loading. If main counterweight is on the ground and cables are slack the CAT 988H or the CAT 990 can be safely operated on the ramp during high tide/empty barge events that cause the lifting lines to go slack. Only one piece of equipment shall be on the ramp at any given time. Product may have to be removed from the center of the barge leaving material on the stern to compensate for tide. During product offloading or loading material may have to be placed at stern to compensate for tide. **During extreme high or low tides, high winds and extreme seas offloading or loading may have to stop**.

**3.8** Loader operator must be aware or give clearance for equipment to come onto the barge.

**3.9** Speed of haul trucks must be slow and cautious in first gear forward or reverse. Loaders need to maintain a slow safe speed.

**3.10** Truck operator must pay attention to loader operator's direction and or loader position when backing up to be loaded. The loader operator may use 2 way radio or horn to indicate when to stop or leave when loaded.

**3.11** Observations of dry conditions (roadways or product) by Employees or Supervisors during loading or offloading will prompt water application to mitigate dust.

**3.12** Loader buckets and haul trucks must not be overloaded to cause spills on ramp or over cargo wall & barge deck. Loaders can prevent spillage on the ramp by flipping the bucket to shake off loose material before travelling onto ramp.

**3.13** Equipment must maintain a berm on the deck to stop equipment from travelling over the edge of the barge. When there is no material in place at the edge or during clean up the equipment must be operated slowly cautiously and maintain a safe distance away from edges.

**3.14** When unloading or loading is complete, clean the apron area onto the barge to prevent spillage into the water.

## 4. Ramp raising

**4.1** Loosen the securing winches as per the winch procedures and hang the ropes on the end of the ramp, leave the cables and ropes tensioned enough to be out of the water.

**4.2** Push the "up" button on the bug, to lower the small counter weight onto the large counter weights, to raise the ramp to the highest point. If slack occurs on the hoisting cables, stop lowering the small counter weights until the large counter weights catch up when the ramp raises.

**4.3** If the two small counter weights become uneven, use the breaker switches in Panel #9 to deactivate one winch and even them up.


**4.4** After the barge leaves, repeat the pre-check and note anything unusual in the *log book.*

**6. Exceptions** None

**7. Implementation** All Texada Quarry Supervision shall ensure adherence to this procedure.

**8. Interpretation & Updating** The Safety Manager shall ensure interpretation and updating of this procedure.

**9. Approved by**

**Amir Merat**
Safety Manager
Aggregates & GVA Market

**** NOTE ** Original signed copy retained by the Safety Department**

# Safe Work Procedure

| | | | |
|---|---|---|---|
| Product Line: | **TEXADA QUARRY** | Number: | **PRO-01-04-003** |
| Subject: | **BARGE RAMP PROCEDURES** | Reference: | |
| | | | |

# Safe Work Procedure

| Product Line: | TEXADA QUARRY | Number: PRO-01-04-008 |
|---|---|---|
| Subject: | STOCKPILE MANAGEMENT PROCEDURES | Reference: |
| | | |

**1. Purpose**

To establish guidelines for the management of coal stockpiles to minimize health, safety and environmental risks whilst maintaining the quality of the commodity in storage.

Stockpiles can be constructed using front-end loaders, trucks or conveyor systems. The types of stockpiles and stockpiling procedures will depend upon the available land and equipment, the flow characteristics of the material, the climate and length of the processing season, quantity of material and range of products.

**2. Definitions**

Quality of the product refers to maintaining the contracted BTU values, gradation and quantity of the product.

**3. Hazards**

- Dust
- Product spillage
- Equipment or structure damage
- Slips, trips, ergonomics
- Damage to nesting sites

**4. Precautions**

- Workers operating mobile equipment must be qualified equipment operators.
- FLRA must be completed by workers before starting job.
- Weather conditions will be assessed prior to operations and any control measures required reflected in the FLRA. Personnel are able to get current and predicted weather conditions from the Logistics Manager. The ship loader has an inbuilt anemometer that can identify current wind speed and direction on the ship loader.
- 2 way radios are available and should be used in all operating machinery
- All personnel are to report immediately if any bird nesting sites are observed within the stockpile area.
- System lighting must be on and working during night operations, workers will need additional lighting (headlamps & flashlights).

**5. Procedure**

The following safety and environmental considerations should also be noted when undertaking procedures that build or maintain stockpiles:

- Stockpiles must be managed according to Part 6 of the HSRC for

Mines in B.C. and Lafarge Stock Pile Advisory.

- The Operations Manager will approve the stockpile activities to ensure product is managed correctly. The Operations Manager, or his delegate, will identify the assets and personnel committed for each shift for the management of stockpiles and handling of material.
- Stockpiles are to be created within the designated footprint and in a manner approved by the Operations Manager.
- Stockpiles are to be kept off perimeter access roads to ensure product is retained on site and to ensure dust is reduced.
- If the weather is dry or forecasted to be dry the water truck will water down the roadways around the stockpiles.
- Observations of dry conditions (roadways or product) by Employees or Supervisors during stockpile management activities will prompt water application to mitigate dust.
- Dust monitoring will take place as needed to monitor Worker Exposure and Environmental Standards as per Workplace Monitoring Procedure.
- Periodic environmental air monitoring will also occur outside of what is detailed in the Workplace Monitoring Procedure.
- Speed of haul trucks must be slow and cautious in first gear forward or reverse. Loaders need to maintain a slow safe speed.
- Loader buckets and haul trucks must not be overloaded to cause spillage.
- When radial stackers are used, the drop height of the product to the stockpile should be kept at a safe minimum.
- Compaction of the ramp and stockpile is required to ensure product stability and mitigation of fugitive dust exposure.
- When operating on top of stockpiles, it may be necessary to water the ramp and operating platform to reduce the risk of fugitive dust.
- Unauthorized access is to be prevented.

**6. Exceptions** None

**7. Implementation** All Texada Quarry Supervision shall ensure adherence to this procedure.

**8. Interpretation &** The Safety Manager shall ensure interpretation and updating of this

# Safe Work Procedure

| Product Line: | TEXADA QUARRY | Number: PRO-01-04-008 |
|---|---|---|
| Subject: | STOCKPILE MANAGEMENT PROCEDURES | Reference: |
| | | |

**Updating** procedure.

**9. Approved by**

**Amir Merat**
Safety Manager
Aggregates & GVA Market

**** NOTE ** Original signed copy retained by the Safety Department**


# TEXADA QUARRY

# MINE
# WORKPLACE MONITORING PROGRAM

**DATE: January 5 2009**
**DATE REVISED: Dec 12 2013**
**PREPARED BY: SCOTT MARSHALL**

## MINE SUMMARY

| | |
|---|---|
| Name: | Texada Quarry |
| Mine Type: | Lime Stone and Aggregates |
| Mine Address: | #2 Airport Road |
| Location: | Gillies Bay B.C. Canada |
| Mine No. | 0800009 |
| Mine manager:<br>Phone: | Andre Balfe<br>604-486-7627 |
| Tonnage Mined: | 3.5 MT |
| Commodities: | Limestone & Aggregates |
| Transloading: | Coal |
| Year Opened: | Lafarge Texada Quarry 1998 |
| Number of Employees: | 73 |
| Number of Contractrors: | 4 |
| Length of Shift: | 8 Hours x 2 shifts |
| | |
| Mine Safety Supervisor:<br>Phone: | Scott Marshall<br>604 - 486 - 2015 |
| OHSC Worker Co-Chair<br>Phone: | Rick Clayton<br>604 - 414-8703 |
| OHSC Management Co-Chair<br>Phone: | Scott Marshall<br>604 - 486 - 2015 |

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## 1.0 DUST SECTION 1 SAMPLING METHODOLOGY

| | | | |
|---|---|---|---|
| Areas of concern: | Crusher / screening outside areas. load out areas, shipping and barging facilities, Drills, Loaders, Haultrucks and other heavy production equipment, stockpile storage areas (Limestone, Aggregates, coal) | | |
| Sampling and calibration equipment | 10 mm aluminum cyclone with Aircheck 2000 pump Dry Cal DC Lite Calibrator | | |
| Sampling Procedure: | Filter type: Pre-weighed particulate matter filter cassette (37mm 5µ pvc filter) for silica dust and total respirable dust, PM-10 | | |
| | **Method** | NIOSH7602 Silica 0.1 mg/m3, Toatal respirable 3.0 mg/m3, Coal 2 mg/m3 | PM-10 |
| | **Pump** | ✓ | ✓ |
| | **Tubing and cassette holder** | ✓ | ✓ |
| | **Sampling Head** | Cyclone | Closed Face Cassette |
| | **Flow Rate** | 2.5 LPM (2.375 to 2.625LPM) | 2.5 LPM |
| | **Sample Volume** | 400 to 800L | 400 to 800L |
| | **Sampling Time** | 160 to 320 minutes | 160 to 320 minutes |
| | **Particle Size measured** | <5µm | <10µm |
| | Location of testing will be on personnel assigned to specific operations. Environmental monitoring will be placed at high risk areas dependant on operation, weather conditions and operational safety. Examples include perimiter fencelines or within conveyor footprints | | |

| | |
|---|---|
| | Sample for majority of shift, **Note:** Date, Test Site, Sampler Name, Location, Weather conditions, Process Information, Sample ID, Target Substance, Sample Matrix, Pump #, Start Time, Start Flow LPM, End Time, End Flow LPM, Elapsed Tim (min), Average Flow (LPM), Total Air Volume (L) |
| | Results will be communicated with mine employees in Safety Meetings & posted on bulletin boards. Records will also be made available to the Ministry of Energy and Mines, and community on request |
| | Area sampling will be conducted as required<br>Calibration on pumps is conducted both pre and post sampling. Sample discarded if >5% discrepancy between readings |
| Quality Assurance / Quality Control ( QA/QC): | Calibration of Dry Cal DC Lite calibrator completed every year and records kept with Health, Safety & Environment Department.<br>One field blank is used for every 10 samples sent to the lab for analyses |
| Analyses Procedure: | Samples are sent to Maxxam Analytics for analyses of total respiable & silica dust Niosh 7602, PM-10 |
| Engineering Administrative Controls | **1)** Mobile equipment door and window seals are checked periodically, cabs are pressurized and air conditioned.<br>**2)** Crusher operator room is sealed and air conditioned.<br>**3)** Roads and conveyors are watered during dry days, observations prompt additional applications<br>**4)** Ventilation in the weld shop is checked for adequacy.<br>**5)** Proper house keeping is encouraged. Water and/or skid steer is used for material spill clean up.<br>**6)** Drill operator cabs are sealed and air conditioned. |

## 2.0 WELDING FUMES

| | |
|---|---|
| Areas of concern: | Weld shop, personal samples on mobile welders. |
| Sampling and calibration equipment | Aircheck 2000 pump Dry Cal DC Lite Calibrator |
| Sampling Procedure: | Filter type: Preloaded Cassette, MCE, 37mm 0.8µm |
| | Sampling procedure follows 2.1 levelton Engineering sampling protocols and frequencies outlined in chapter 2-3 of Workplace Monitoring manual<br><br>Area sampling will be conducted as required<br><br>Flow rates used 1.7 l / min<br><br>Calibration on pumps is conducted both pre and post sampling. Sample discarded if >5% discrepancy between readings |
| Quality Assurance / Quality Control ( QA/QC): | Calibration of Dry Cal DC Lite calibrator done every year and records kept with Health, Safety & Environment Department.<br><br>One field blank is used for every 10 samples sent to the lab for analyses |
| Analyses Procedure: | Samples are sent to Cantest for analyses of total dust and metals, Niosh 7300. ICP procedures |
| Engineering and Administrative Controls | **1)** Welding shop has local exhaust. Ventilation in the weld shop is checked monthly.<br><br>**2)** Proper house keeping is encouraged.<br><br>**3)** Respirators are used when local exhaust is not adequate or as additional protection |

## 3.0 ASBESTOS

| | |
|---|---|
| Areas of concern: | Ware house dry area. |
| Sampling and calibration equipment | Aircheck 2000 pump Dry Cal DC Lite Calibrator |
| Sampling Procedure: | Filter type: 25mm, 0.8µm MCE<br><br>Sampling procedure follows 2.1 levelton Engineering sampling protocols and frequencies outlined in chapter 2-3 of Workplace Monitoring manual<br><br>Area sampling will be conducted as required<br><br>Flow rates used 0.5 to 16 LPM<br><br>Calibration on pumps is conducted both pre and post sampling. Sample discarded if >5% discrepancy between readings |
| Quality Assurance / Quality Control ( QA/QC): | Calibration of Dry Cal DC Lite calibrator done every year and records kept with Health, Safety & Environment Department.<br><br>One field blank is used for every 10 samples sent to the lab for analyses |
| Analyses Procedure: | Samples are sent to Cantest for analyses of total dust and fibers, Niosh 7400 light microscopy, phase contrast. |
| Engineering and Administrative Controls | **1)** Ware house dry walls are stable and undisturbed.<br>**2)** Proper house keeping is encouraged.<br>**3)** Removal will adhere to Worksafe Procedures |

## 4.0 NOISE

| | |
|---|---|
| Areas of concern: | Crushers/ screening areas, Load out areas Ship loader , W.S Barge loader, drills, loaders, dozer, excavators, haul trucks, welding and maintenance shops. |
| Sampling and calibration equipment | Quest Noise Pro Dosimeter, Quest QC-10 Calibrator |
| Sampling Procedure: | Sampling procedures based on CSA standard Z107.56-94 and frequencies outlined in chapter 2-3 of Workplace Monitoring Manual.<br><br>Area sampling will be conducted as required<br><br>Calibration is conducted both pre and post sampling. Sample discarded if >5% discrepancy between readings |
| Quality Assurance / Quality Control ( QA/QC): | Calibration of Quest Noise Pro calibrator done every year |
| Analyses Procedure: | Data downloaded into PC |
| Engineering and Administrative Controls | **1)** Personal use of ear plugs, muffs encouraged in areas > 85 dBA +<br>**2)** Crusher control rooms and mobile equipment are enclosed and air conditioned to encourage keeping windows closed. |

## SECTION 2 MONITORING SCHEDULE

| Area | Process | Occupation | Agent | # of Employees In Seg | Total # In Seg |
|---|---|---|---|---|---|
| Maintenance Shop | Mechanical Repairs | Mechanic | Dust | 4 | 15 |
| | | Serviceman | | 2 | |
| Crushing Areas | Mill Maint | Field Maint | | 7 | |
| Quarry | | | Noise | | |
| | Q.C. | Lab Techs | | 2 | |
| Weld Shop | Welding Fabricating | Welder | Welding fumes | 5 | 5 |
| | | | Dust | | |
| | | | Noise | | |
| Quarry | Production | Truck drivers | Dust | 18 | 54 |
| | | Loader Operators | | 12 | |
| | | Excavator Operators | | 3 | |
| | | Blaster | | 1 | |
| | | Road Maintenance | | 2 | |
| | | Dozer | Noise | 2 | |
| | | Drillers | | 3 | |
| | | Barge Loaders | | 2 | |
| | | Ship Loader | | 4 | |
| | | Crusher Operators | | 3 | |
| | | Supervisors | | 4 | |
| Coal Handling | Material Handling | Labourer | Dust | 2 | 15 |
| | | Truck drivers | | 3 | |
| | | Loader Operators | | 2 | |
| | | Dozer | | 1 | |
| | | QAQC | | 3 | |
| | | Ship Loader | | 2 | |
| | | Supervisors | | 2 | |

| | Maintenance | Welding | Quarry | Coal | Asbestos |
|---|---|---|---|---|---|
| JAN | Noise x 2 | Fumes, Dust, Noise | Dust x 4 | Coal Dust x 1 | |
| FEB | Dust x 2 | | Noise x 3 | Coal Dust x 2 | Dust x 2 |
| MAR | Noise x 2 | | Dust x 4 | Coal Dust x 2 | |
| APR | Dust x 2 | Fumes, Dust, Noise | Noise x 3 | Coal Dust x 2 | Dust x 2 |
| MAY | Noise x 2 | | Dust x 4 | Coal Dust x 2 | |
| JUN | Dust x 2 | | Noise x 3 | Coal Dust x 4 | Dust x 2 |
| JUL | Noise x 2 | Fumes, Dust, Noise | Dust x 4 | Coal Dust x 4 | |
| AUG | Dust x 2 | | Noise x 3 | Coal Dust x 4 | Dust x 2 |
| SEP | Noise x 2 | | Dust x 4 | Coal Dust x 4 | |
| OCT | Dust x 2 | Fumes, Dust, Noise | Noise x 3 | Coal Dust x 2 | Dust x 2 |
| NOV | Noise x 2 | | Dust x 4 | Coal Dust x 2 | |
| DEC | Dust x 2 | | Noise x 3 | Coal Dust x 1 | Dust x 2 |

This schedule details the minimum expected sampling activities.
If environmental or opeational conditions are observed that increase the risk, more environmental montioring is to be undertaken.

## Metcalfe, Megan MEM:EX

**From:** Taje, Eddy MEM:EX
**Sent:** Tuesday, July 9, 2013 9:42 AM
**To:** Veale, J Graham ENV:EX
**Cc:** Bouffard, Maryann J MEM:EX
**Subject:** RE: LaFarge (Texada Quarrying Ltd)
**Attachments:** texada amendment.pdf

As discussed here is the referral package on the Texada proposal, As I noted the storm water plan based on a 5 year event will not fly form our end and will have to be upgraded. The normal referral period is 30 day however as I will be away the last week of July any comments by the first week of August will be appreciated.

---

**From:** Veale, J Graham ENV:EX
**Sent:** Monday, July 8, 2013 3:27 PM
**To:** Taje, Eddy EMNG:EX
**Subject:** LaFarge (Texada Quarrying Ltd)

Hi Eddy:
Our office has been discussing the above facility related to current coal storage practices and the potential for expansion as part of the Fraser Surrey Docks proposal. As you may be aware the Fraser Surrey Docks proposal is receiving considerable public and media attention and staff in our office are trying to determine regulatory requirements for the Texada portion of the FSD proposal.

According to an article in the Powell River Peak http://prpeak.com/articles/2013/06/26/news/doc51ca362fe45be344560120.txt it appears that Lafarge (or Texada Quarrying Ltd) has a permit from Energy and Mines allowing stockpiling/shipping of coal from a Vancouver Island company (Hillsborough Resources Ltd) and possibly another company (Coalmont). They have applied for an amendment to their permit to increase coal storage capacity (see link at end of article) and have submitted a stormwater management plan in support of the application.

I'd appreciate it if you could provide a copy of the company's permit. I believe the permit reference number is M-66.

Thanks, Graham

Graham Veale
Air Quality Meteorologist
South Coast Region
Ministry of Environment
Suite 200 - 10470-152nd Street
Surrey BC V3R 0Y3
Phone: (604) 582-5286
Fax: (604) 930-7119
Email: j.graham.veale@gov.bc.ca

Want to know more about air quality in BC ? Check out BC Air Quality - Home

May 7, 2013

Ministry of Energy and Mines
Mining & Minerals Division
6th Floor, 1810 Blanshard Street
Victoria, B.C
V8W 9M9

Attention: Ed Taje

Dear Sir:

**Re: Letter of Amendment to increase Coal Storage on Texada Quarries Reclamation Permit M-66, File 14745-20.**

Texada Quarries has the opportunity to expand it coal transshipment business through its existing facility. To facilitate the increased business we must modify the offload system and increase our live storage. We have engaged a consultant to design a comprehensive storm water management plan to capture and manage all runoff water from the stockpile area. The volume of coal that will need to be stockpiled will increase to 800k tonnes.

The following are documents are for your reference and approval:

1. Storm water management plan from Norwest Corporation
2. Shoreline improvements and conveyor modifications from Kreator Equipment.
3. Site plan incorporating the modifications, storm water management plan and existing infrastructure.
4. Previous correspondence from 1990 to Ideal Cement now Texada Quarries.
5. Aerial view with Water Lot leases plotted on.

All conditions stated in the June 5, 1990 amendment will remain the same. The stockpiles of coal will remain on Lots 606 and 575 and no additional area will need to be permitted. As requested the ship loader conveyor belt will we upgraded to grade 2 flame resistant belting to match the rest of the conveyor upgrades.

LAFARGE CANADA INC.
19633 98A Avenue, Langley, BC V1M 3G5
Office: (604) 455-6200 Fax: (604) 882-7108
Web: www.lafargenorthamerica.com

I trust you will find the above request in order. If you have any questions or concerns please contact me directly.

Regards,

Brad Kohl
Vice President, Vancouver Aggregates

# STORMWATER MANAGEMENT PLAN
# COAL STOCKPILE AREA
# TEXADA ISLAND SHIP LOADING AREA

Submitted to:
**LAFARGE CANADA INC.**

Date:
April 18, 2013

**Norwest Corporation**
Suite 2700, 411 – 1st Street, S.E.
Calgary, Alberta
T2G 4Y5
Tel: (403) 237-7763
Fax: (403) 263-4086
Email calgary@norwestcorp.com

**www.norwestcorp.com**

Author:
**GORDON J. JOHNSON, M.SC., P.ENG.**

NORWEST
CORPORATION

NORWEST
CORPORATION

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NORWEST
CORPORATION

# CERTIFICATE of AUTHENTICATION

This report has been prepared for Lafarge Canada Inc. (Lafarge). The text contained herein presents documentation of the design work carried out by Norwest Corporation regarding the Stormwater Management Plan to support the expansion of coal stockpiling facilities associated with Lafarge's Texada Island quarry and ship loading facilities. The report includes information provided by Lafarge and third parties that has not been independently verified.

All data contained herein has been reviewed and interpreted by, or generated under the direct supervision of, Gordon J. Johnson, P.Eng. All designs have been reviewed and approved for submission by Gordon J. Johnson, P.Eng.

"original signed and sealed by author"

April 18, 2013

Gordon J. Johnson, P.Eng.
Vice President, Water Resources
Norwest Corporation

# 1 INTRODUCTION

## 1.1 BACKGROUND

Lafarge Canada Inc. (Lafarge) operates a quarry and marine loading facility on the south shore of Texada Island (Site), shown in Figure 1-1. Lafarge is upgrading these facilities by increasing stockpile capacity for transhipping coal for its current and potential future customers. The quarry produces raw materials for cement manufacturing and specialty rock products for the construction industry. The loading facilities are used to ship limestone and transhipping coal because it is the only deep water port in the area that can load ocean-going ships.

Lafarge is currently developing plans to expand the area that is used to stockpile and transhipping coal, and it wants to include active stormwater management as part of this expansion to mitigate the potential environmental effects associated with the release of coal sediments into the surrounding marine environment.

Lafarge has retained Norwest Corporation (Norwest) to develop a Stormwater Management Plan to support this expansion.

## 1.2 PURPOSE AND SCOPE

This report describes the design of the Stormwater Management Plan associated with expansion of the coal stockpiling area and includes the following information:

- description of the coal transshipping area, proposed expansion and associated stormwater management strategy;
- design criteria and standards applied to the stormwater containment and diversion system designs;
- assessments completed to support the design of the stormwater infrastructure;
- overview of the design features and standards used as a framework;
- construction specifications, including quality assurance and quality control (QA/QC) procedures; and
- design drawings.

## 1.3 REPORT ORGANIZATION

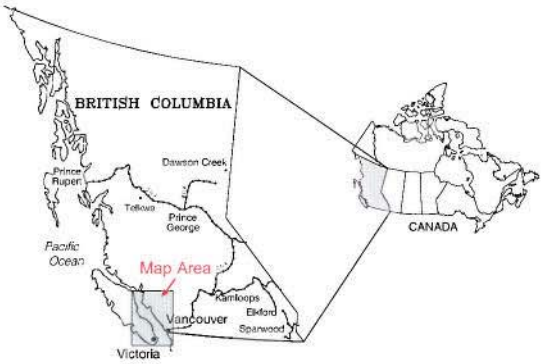
The main body of this report describes the design principles and the basis for the Stormwater Management Plan. Engineering-design drawings can found in Appendix A. Technical specifications can be found in Appendix B.

## 1.4 ROLES AND RESPONSIBILITY

The following roles and responsibilities have been established for this project:

- Lafarge will manage the expansion project: project managers are Shawn Holloway and Andre Balfe;
- Kreator Equipment will design and install the facilities associated with the expansion project;
- Norwest will design the Stormwater Management Plan: project manager is Gordon Johnson, VP Water Resources; and,
- Earthworks will implement be implemented by Lafarge, using existing Site equipment, or by third party contractor.

The regulatory agency for this work is the BC Ministry of Energy and Mines.


LAFARGE

TEXADA STORMWATER MANAGEMENT

## PROJECT LOCATION MAP

FIGURE 1-1

| | | |
|---|---|---|
| DRAWN BY: A.W.<br>CHK'D BY: M.U<br>DATE: 13 03 13 | FILE: Fig 1-1_Project Location Map.dwg<br>G:\ProjectData\Lafarge Canada_586\586-1_Texada\Reports\Draft | NORWEST<br>APEGGA Permit P05015 |

# 2 SITE DESCRIPTION

## 2.1 GENERAL

Lafarge's Texada Island facilities are located approximately 100 km northwest of Vancouver, adjacent to the town of Powell River (Figure 1-1). The operation produces minerals and aggregate from one of the most significant mineral reserves on the west coast of BC and has been operating for more than 60 years.

Lafarge mines high-quality limestone, construction and asphalt-quality aggregates from this area where gold was mined a century ago, and iron ore was mined until the 1970s. Since then, companies such as Lafarge have mined millions of tonnes of limestone. The facility also imports coal, gypsum and slag by barge, and transships these materials to customers overseas using the deep water port.

In 2012, total production of quarried limestone and construction materials is estimated to be 3 million tonnes. Limestone production is the largest part of the operation and limestone is used for cement manufacturing, chemical plants, agriculture products and specialty products. Materials are sorted according to composition, quality, size and colour and are loaded onto ships and barges using one of three existing loading facilities.

## 2.2 SHIPPING FACILITIES

The shipping facilities include three individual loading facilities that are supported by the material staging and stockpiling area. The first one is located northwest of the staging and stockpiling area: it is dedicated to loading limestone for cement manufacturing and is supported by three offshore loading dolphins. The remaining two loading facilities are shore-based, located on the northwest corner of the staging and stockpile area: they receive and ship coal and specialty rock products. The foreshore staging and stockpiling area is a flat, semi-circular area constructed of waste rock fill covering an area of approximately 4 ha. The current foreshore facilities are shown in Figure 2-1.

The expansion program consists of modifying the materials handling facilities to increase capacity and throughput, and expanding the staging area to allow larger volumes of coal to be stockpiled. The expansion of the staging area is the component of the project that is most relevant to stormwater management. This expansion will be achieved by moving the staging area access ramp to the southeast end of the pad and excavating into the slope that forms the north boundary

of the staging area. The intent is to expand the area available for stockpiling materials to approximately 6 ha. A plan view of the proposed expansion is shown in Figure 2-2.

## 2.3 PHYSIOGRAPHY AND DRAINAGE

Lafarge's shipping facilities are located on the northwest end of Texada Island, where the land slopes moderately to steeply to the southwest towards the Georgia Strait. On the northwest end of Texada Island, the ground surface elevation varies from sea level to approximately 300 masl. In the immediate vicinity of Lafarge's quarry and shipping facilities, the ground surface elevation varies from sea level to approximately 100 masl. In the vicinity of the shipping facilities, the ground surface has been largely altered by quarrying activities and related infrastructure. With the exception of the ephemeral creek, runoff in this area is directed into quarry depressions. The ephemeral creek that will be redirected into the eastern estuary is the only natural drainage feature in the project development area.

## 2.4 CLIMATE

Climate information for the project location was obtained from Environment Canada weather stations that are located in Powell River and Comox, BC. Texada Island is situated within a temperate rainforest, Coastal Western Hemlock biogeoclimatic zone, which is the rainiest biogeoclimatic zone in BC. The zone typically has a cool meso-thermal climate: cool summers (although hot dry spells can be frequent) and mild winters. The mean annual temperature is about 8°C and the mean monthly temperature is above 10°C for four to six months of the year. Mean annual precipitation for Powell River is 1,100 mm. Table 2.1 summarizes the climate normals for Powell River.

**TABLE 2.1**
**CLIMATE SUMMARY FOR POWELL RIVER**

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Record high °C (°F) | 15.6 (60.1) | 18 (64) | 20 (68) | 23.9 (75) | 33 (91) | 33 (91) | 33.9 (93) | 33 (91) | 29.4 (84.9) | 24 (75) | 20 (68) | 15 (59) | 33.9 (93) |
| Average high °C (°F) | 6.2 (43.2) | 7.7 (45.9) | 10.1 (50.2) | 13.3 (55.9) | 16.9 (62.4) | 19.7 (67.5) | 22.7 (72.9) | 22.6 (72.7) | 19.3 (66.7) | 13.6 (56.5) | 8.9 (48) | 6.5 (43.7) | 14 (57) |
| Average low °C (°F) | 1.7 (35.1) | 2.3 (36.1) | 3.3 (37.9) | 5.4 (41.7) | 8.5 (47.3) | 11.5 (52.7) | 13.7 (56.7) | 14.1 (57.4) | 11.7 (53.1) | 8 (46) | 4.3 (39.7) | 2.2 (36) | 7.2 (45) |
| Record low °C (°F) | −14.4 (6.1) | −12 (10) | −10 (14) | −1.7 (28.9) | −6.7 (19.9) | 3.3 (37.9) | 6.1 (43) | 6 (43) | 0 (32) | −4 (25) | −11 (12) | −12.8 (9) | −14.4 (6.1) |
| Precipitation mm (inches) | 138.4 (5.449) | 105.2 (4.142) | 98 (3.86) | 67.7 (2.665) | 70.4 (2.772) | 62.5 (2.461) | 40.1 (1.579) | 47.1 (1.854) | 56.9 (2.24) | 116.2 (4.575) | 160.3 (6.311) | 141.2 (5.559) | 1,103.7 (43.453) |
| Rainfall mm (inches) | 125.5 (4.941) | 98.4 (3.874) | 95.9 (3.776) | 67.7 (2.665) | 70.4 (2.772) | 62.5 (2.461) | 40.1 (1.579) | 47.1 (1.854) | 56.9 (2.24) | 116 (4.57) | 156.4 (6.157) | 135.5 (5.335) | 1,072.1 (42.209) |
| Snowfall cm (inches) | 12.9 (5.08) | 6.9 (2.72) | 2.1 (0.83) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0.2 (0.08) | 3.9 (1.54) | 5.7 (2.24) | 31.6 (12.44) |

(Environment Canada)

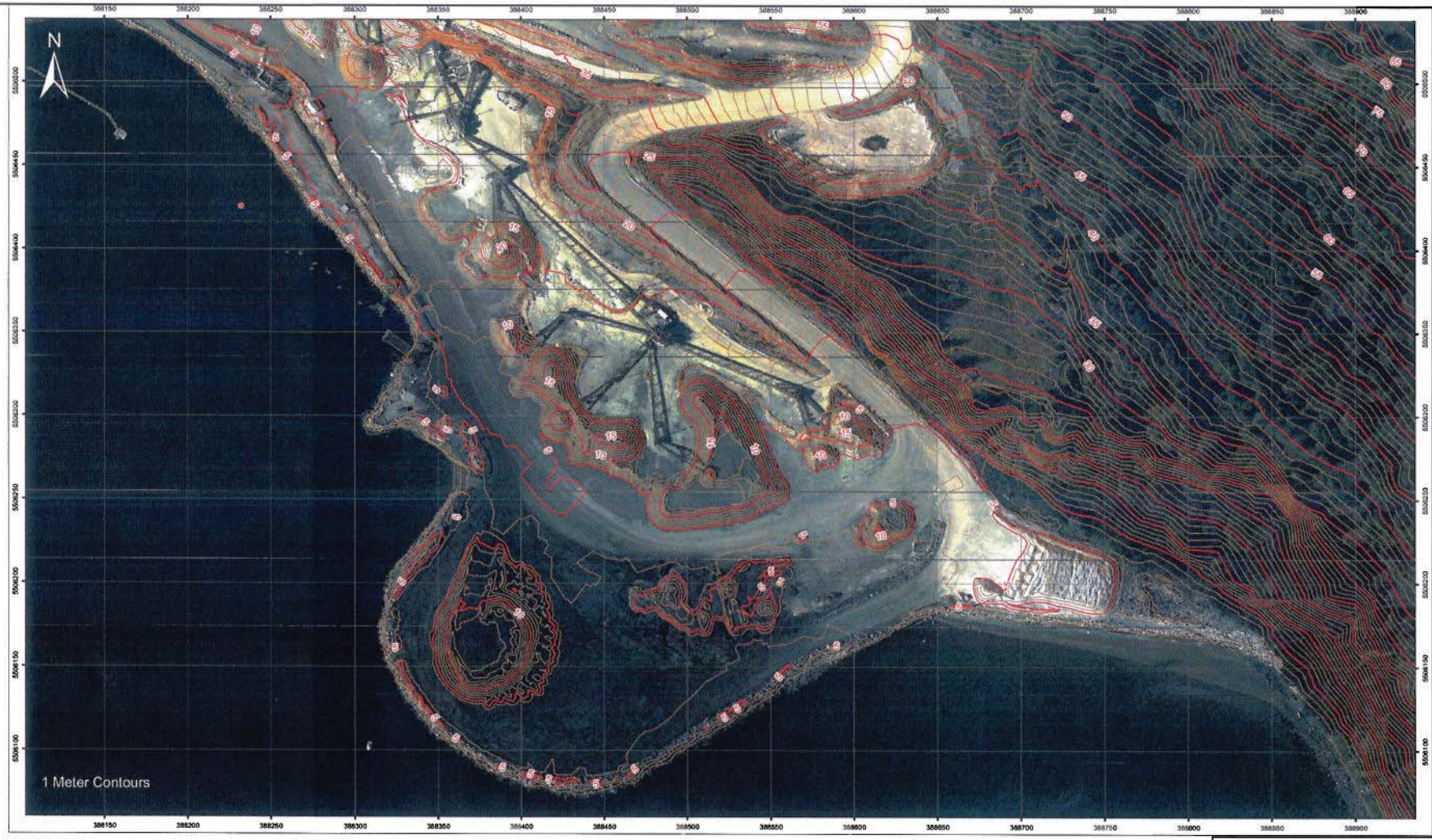
## 2.5 STORMWATER MANAGEMENT STRATEGY

Modifications to the management of stormwater flows in the coal stockpiling portion of the staging area are required to prevent runoff containing suspended coal sediments from discharging directly into the surrounding marine foreshore.

The following strategies will be used to manage the stormwater in the coal stockpile area (Figure 2-3):

1. Use a water infiltration pond to allow stormwater runoff to seep into the ground and into the adjacent estuary. The pond would be located along the north edge of the staging area, in the planned excavation area, and be bound to the south and west by the staging pad, to the north by the excavated embankment and to the east by the new access ramp to the stockpiling area.
2. Divert flows in the existing ephemeral creek using a ditch constructed along the northeast edge of the access ramp to the staging area. This ditch will discharge into the small estuary located east of the staging area.
3. Fill and grade the surface of the staging area to drain towards the north, away from the ocean and towards the infiltration pond.
4. Construct perimeter ditches around the outside of the staging area foreshore to prevent direct release of staging area runoff into the ocean. This ditch will also act as an infiltration structure.

This strategy is consistent with generally recognized "Best Management Practices" for stormwater and is similar to the stormwater management practices used around the coal stockpiles of the Richmond Cement Plant in Richmond, BC.




Basemap data obtained from Natural Resource Canada, Aero Geometrics Ltd., Imagery acquired August 2012

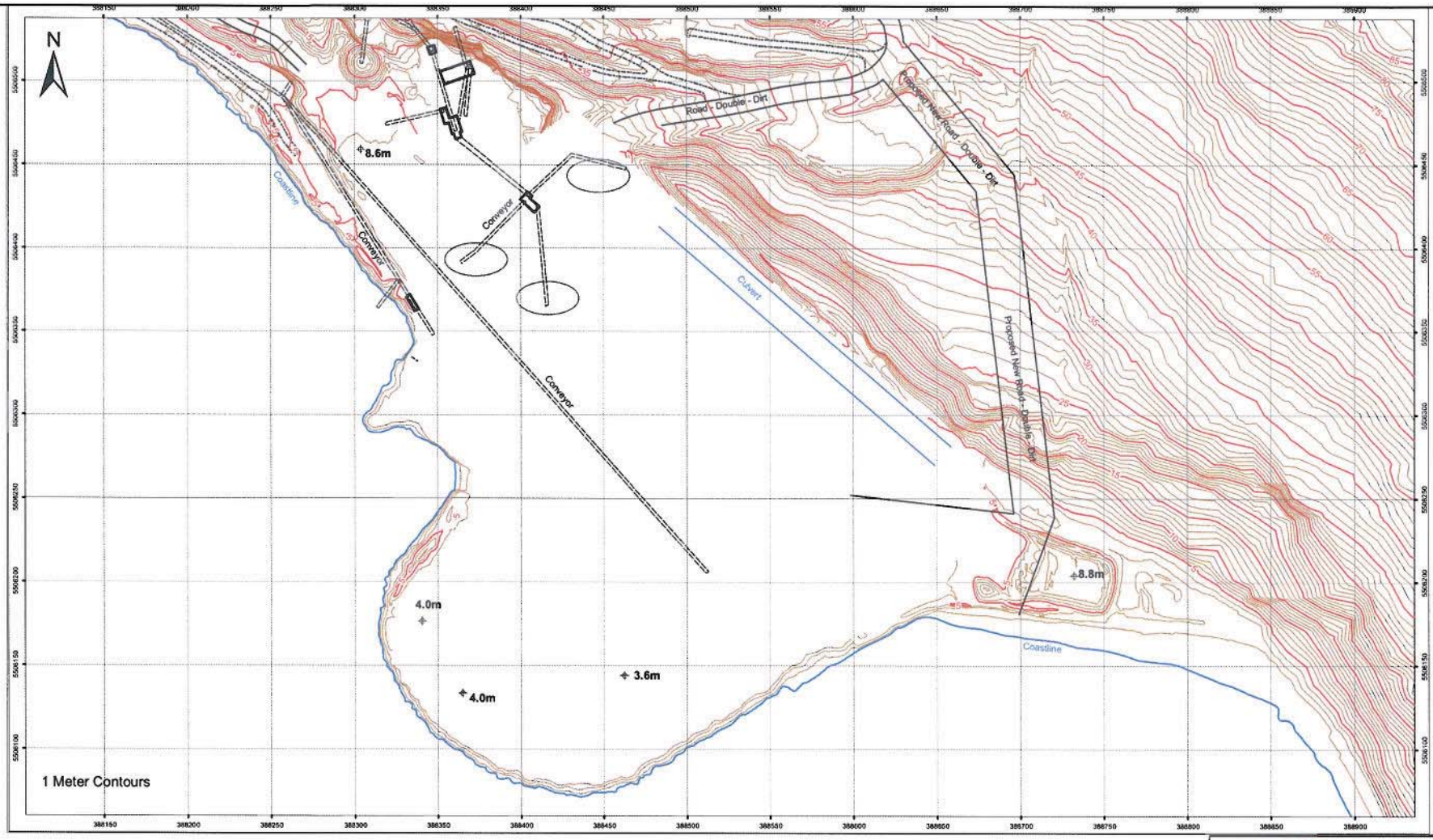
LAFARGE

TEXADA STORMWATER MANAGEMENT

**PLAN VIEW OF EXISTING FORESHORE**

FIGURE 2-1

| | | |
|---|---|---|
| DRAWN BY: M.E.<br>CHKD BY: M.U<br>DATE: 13.03.15 | FILE: Fig 2-1 Plan View of Existing Foreshore<br>G:\Project\Data\Lafarge Canada_586\586-1_Texada\Reports\Draft | NORWEST<br>APEGGA Permit P05015 |




Basemap data obtained from Natural Resource Canada.
Aero Geometric's Ltd., Imagery acquired August 2012

0 12.5 25 50 75 100
Meters

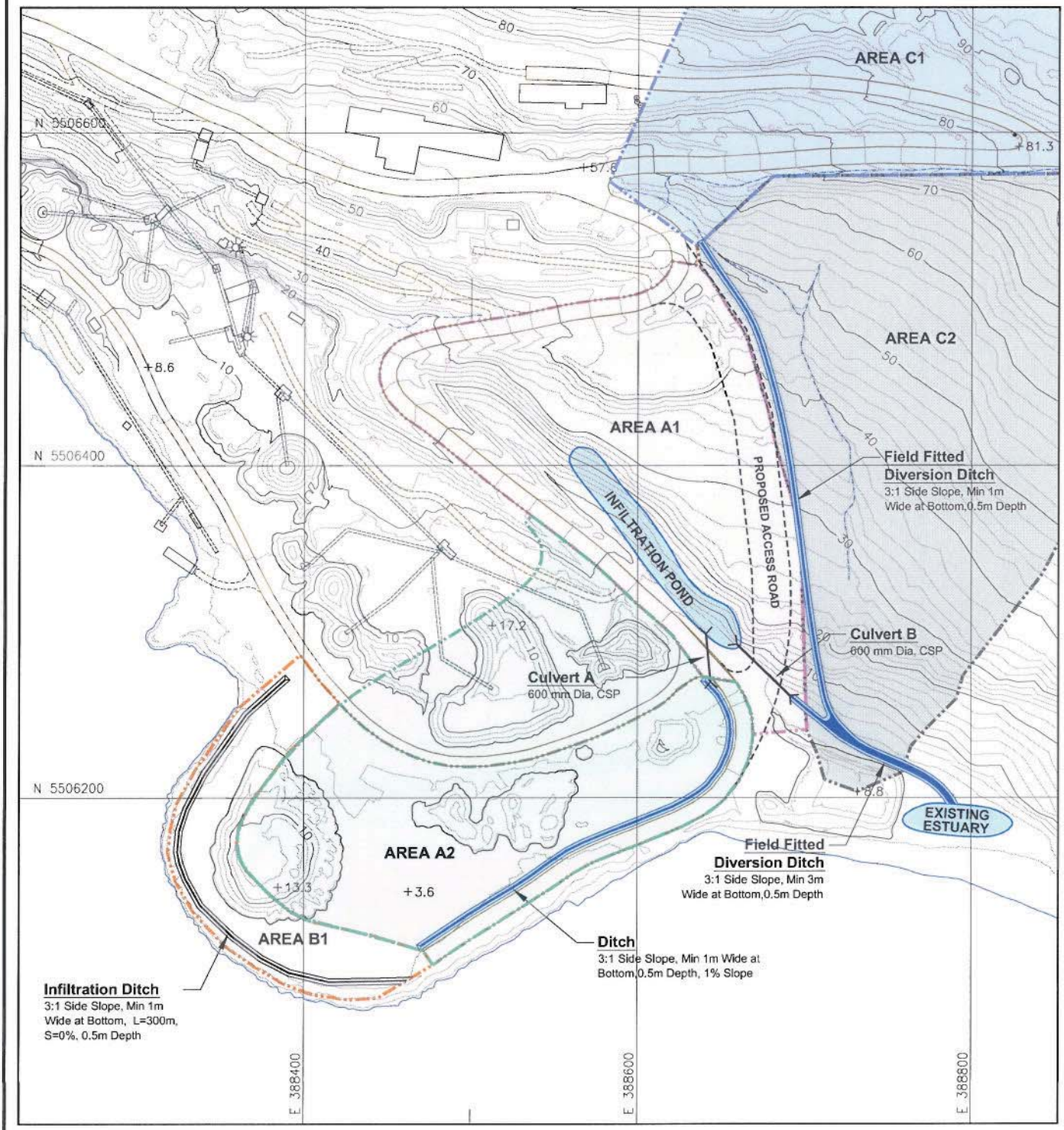
LAFARGE

TEXADA STORMWATER MANAGEMENT

**POST EXPANSION PLAN VIEW**

FIGURE 2-2

| | | |
|---|---|---|
| DRAWN BY: M.E.<br>CHKD BY: M.U<br>DATE: 13 03 15 | FILE: Fig 2-2 Plan View - Post Expansion.dwg<br>G:\Project\Data\Lafarge Canada_589\586-1_Texada\Reports\Draft | NORWEST<br>APEGGA Permit P05015 |




## LEGEND

- Existing Creek or Ditch Alignment
- 20 — Contour Index (2m Interval)
- Conveyor
- Gravel Road
- Pole
- Pole Utility
- Light

Notes:

* Contour lines in treed areas should be treated as indefinite.
* Water levels at time of photography.

100 0 100

Metres

Projection: UTM Zone 10 Datum NAD83
NTS Mapsheet 92F/10 & 15

LAFARGE

TEXADA STORMWATER MANAGEMENT

# OVERVIEW OF STORMWATER MANAGEMENT PLAN

FIGURE 2-3

| | | |
|---|---|---|
| DRAWN BY: A.W.<br>CHK'D BY: M.U<br>DATE: 13 03 15 | FILE: Fig 2-3_Overview of Stormwater Mana...<br>G:\ProjectData\Lafarge Canada_586\586-1_<br>Texada\Reports\Draft | NORWEST<br>APEGGA Permit P05015 |

# 3 DESIGN BASIS

## 3.1 DESIGN CRITERIA AND METHODS

The following design criteria have been used:

1. The pond and perimeter ditch are designed to contain the runoff generated by the 1 in 5 years, 24-hour rainfall event. The 1 in 5 years, 24-hour rainfall event is estimated to be 54 mm.
2. Infiltration structures (access ramp, pond perimeter and infiltration ditches) are designed to allow the natural seepage of stormwater equivalent to the runoff generated during the average wettest month (usually November), plus one standard deviation, conveyed over a 30-day period. The estimated precipitation during the wettest month, plus one standard deviation, is 180 mm.
3. The 1:100-year return period, 24-hour duration storm simulated by the SWMHYMO model was used to evaluate the overland drainage conveyance systems, and erosion and sediment control measures.
4. Continuous simulation of the post-expansion Site conditions were estimated using the QHM model and were used to evaluate the storage requirements for the proposed infiltration ditch and infiltration pond. The historical hourly precipitation database was obtained from the National Climate Data and Information Archive services and covered the period from 1962 to 2005.

Coal dust is known to have relatively low bulk density, similar to and potentially less than that of water. The low specific gravity hinders the ability of the coal particles to settle when suspended in water. Therefore, the infiltration ditch and infiltration pond are being used to contain runoff and mitigate the release of coal fines into the adjacent marine environment. These facilities will be designed to totally contain any runoff associated with normal runoff events, and to reduce the runoff associated with extreme runoff events.

## 3.2 DESIGN STANDARDS

Because there are no standards to design or construct the Stormwater Management Plan for Lafarge's Texada Island facilities, the BC Ministry of Water, Land and Air Protection's *A Guidebook for British Columbia Stormwater Planning* (May, 2002) was used, where relevant, to guide the design of the Lafarge's Stormwater Management Plan.

# 4 TECHNICAL APPROACH

## 4.1 GOVERNING PRINCIPLES

The Stormwater Management Plan for the Site will allow the coal handling area to drain overland and be directed by road ditches to desired locations. Road ditches will be directed to culverts, and an infiltration pond and infiltration ditch will receive direct overland sheet runoff. Culverts to and from the infiltration pond will convey the runoff under roadways allowing the runoff to cross roads without interfering with traffic.

The runoff generated from the 1:100-year return period, 24-hour duration rainfall event will be used to design the overland drainage system, including culverts and evaluation of erosion and sediment control measures for the development. Culverts will be a minimum of 600 mm in diameter (as required by BC's *A Guidebook for British Columbia Stormwater Planning* (May, 2002).

## 4.2 NUMERICAL MODELING APPROACH

The SWMHYMO and QHM computer models were used to simulate runoff from the Site and the ephemeral creek that will be diverted by the expansion works. Both SWMHYMO and QHM models are widely accepted for use in this type of study and are capable of the following:

- generating hydrological models to simulate watershed conditions for specific design storm events;
- producing hydrographs, flow volumes and flow rates at specified points;
- evaluating flows in engineering structures (e.g., channels, control structures and reservoirs);
- determining flows for future land use conditions; and
- accepting input in the form of hydrographs.

### STORMWATER FLOW ESTIMATES

Drainage characteristics of the study area were estimated for post-expansion conditions. These characteristics include catchment size, imperviousness ratio, slope, depression storage and Soil Conservation Service (SCS) runoff curve number. Modeling parameters were selected in accordance with the SWMHYMO manual and as determined by Norwest.

The total study area (41.25 ha) was delineated into five catchments based on Site contours, drainage patterns and proposed road profiles (Figure 4-1). Table 4.1 shows the catchment parameters used for the post-expansion analysis.

The SWMHYMO model with 1:100-year return period and 24hour duration rainfall event was applied to assess the overland drainage and to determine the erosion protection measures required to mitigate the risk of erosion. Table 4.2 shows the resulting peak discharges, depths of flow and velocities of flow for the critical flow locations, as shown in Figure 4-1.

**TABLE 4.1**
**POST-EXPANSION CATCHMENT PARAMETERS**

| Catchment ID | Area (ha) | Curve Number | Initial Abstraction (mm) |
|---|---|---|---|
| A1 | 3.73 | 71.6 | 20.1 |
| A2 | 3.02 | 94 | 6.3 |
| B1 | 0.93 | 94.2 | 3.2 |
| C1 | 26.59 | 69 | 22.8 |
| C2 | 6.98 | 69 | 22.8 |
| **Total Area (ha)** | **41.25** | | |

**TABLE 4.2**
**OVERLAND FLOW ASSESSMENT**

| Catchment ID | Peak Discharge[1] (L/s) | Slope of Overland Drainage (%) | Maximum Depth (mm) | Maximum Velocity (m/s) | Culvert/ Location ID |
|---|---|---|---|---|---|
| A2 | 400 | 1 | 192 | 1.325 | Conveyance Ditch |
| C1 | 1,022 | 33 | 89 | 3.7 | U/S End of Diversion |

Note: [1] The flows are based on the design storm event (1:100-year return period, 24-hour duration rainfall event).

### STORMWATER STORAGE REQUIREMENTS

The simulated stormwater storage requirements for the infiltration pond and ditch are shown in Table 4.3, with the SWMHYMO, QHM and extrapolated HYDSTAT results for 1:100-year return period storage requirements.

TABLE 4.3
SUMMARY OF REQUIREMENTS FOR STORMWATER STORAGE

| Storage Facility ID | SWMHYMO Storage (cumulative) | QHM Storage (cumulative) | HYDSTAT Storage (cumulative) [1] | SWMF Storage Provided (cumulative) |
|---|---|---|---|---|
| Infiltration Pond | 1,378 | 4,120 | 2,375[2] | 2,414 |
| Infiltration Ditch | 345 | 674 | 668[3] | 784 |

Notes: [1] Governing volume (SWMHYMO versus QHM/HYDSTAT).
[2] Represents 1 in 5 years return period volume.
[3] Represents 1 in 100 years return period volume.

### EROSION AND SEDIMENT CONTROL MEASURES

Several areas were identified as being susceptible to erosion during high-flow events (Figure 4-1). Table 4.4 summarized the measures that were included in the design to reduce potential erosion and sediment transportation.

TABLE 4.4
EROSION AND SEDIMENT CONTROL MEASURES (ESCM)

| Area of Concern | Channel Geometry[1] | ESC Rock Armoring[2] | Peak Flow (L/s) |
|---|---|---|---|
| A – Culverts | 3, 1, 3, 1% | $d_{50}$ = 125 mm, 3 m Long Apron | 185 |
| B – Upper Portion of Diversion Channel | 3, 1, 3, 33% | $d_{50}$ = 230 mm | 1.022 |
| C – Directional Bends of Diversion Channel | 3, 3, 3, 33% | $d_{50}$ = 350 mm | 1,022 |
| D – Lower Portion of Diversion Channel | 3, 3, 3, 0.5% | $d_{50}$ = 125 mm | 1,022 |

[1] - Channel Geometry is identified as left bank slope, bottom width, right bank slope, longitudal slope (%) (3,0.3,3,1% - means the left bank slope is 3H:1V, the bottom with is 1 m, the right bank slope is 3H: 1V and the longitudal slope is 1%).
[2] - Results are based on Riprap Design Curves from BC Ministry of Transportation Guidelines.

## 4.3 FILTER AND LINER DESIGNS

The upper surfaces of the perimeter ditches, stormwater pond, stockpile surface and face of the access road adjacent to the pond are lined with finer grained granular materials designed to act as filters, preventing the finer grained suspended coal sediments from seeping through these liners, migrating through native soils and discharging into the adjacent aquatic environments. For the

purpose of this assessment, it is assumed that the suspended coal sediments will have the grain-size distribution that is summarized in Table 4.5.

**TABLE 4.5**
**ASSUMED GRAIN-SIZE DISTRIBUTION OF COAL FINES**

| Particle Size Indicator | Size Range (microns) |
|---|---|
| $D_{85}$ | 75 to 100 |
| $D_{50}$ | 25 to 75 |
| $D_{15}$ | 10 to 25 |

The filter lines were designed using the following typical criteria:

- D15 (filter) < 5 x D85 (sediment); and
- D60 (filter) < 6 x D10 (filter).

The particle size distribution for the filter is summarized in Table 4.6.

**TABLE 4.6**
**GRAIN-SIZE DISTRIBUTION OF FILTER**

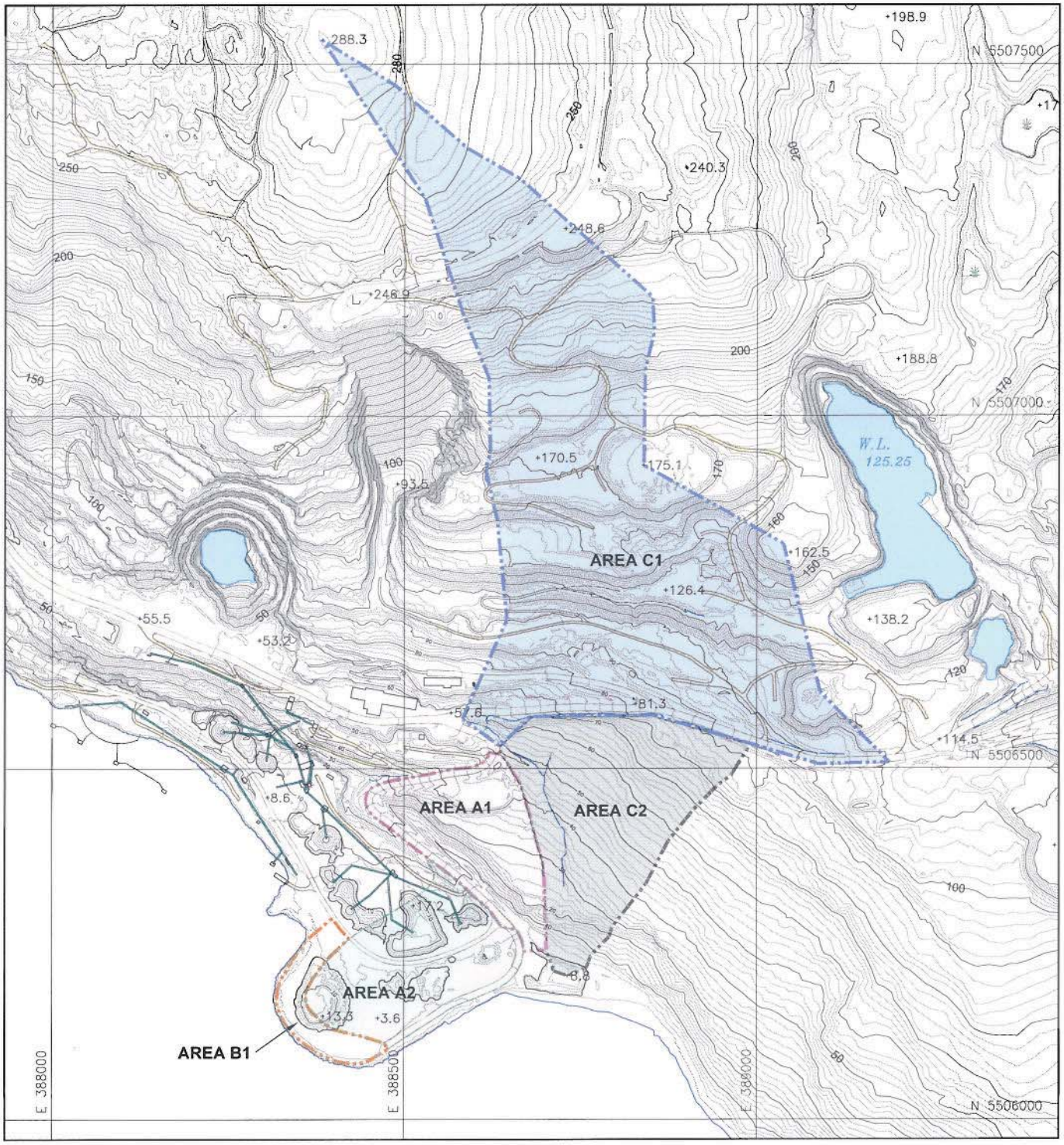
| Particle Size Indicator | Size Range (mm) |
|---|---|
| $D_{85}$ | 1 to 3 |
| $D_{60}$ | 0.8 to 1.2 |
| $D_{15}$ | 0.20 to 0.3 |
| $D_{10}$ | > 0.2 |

The hydraulic conductivity of the proposed filter layer is estimated using the following variation on the Hazen Formula (Bear and Verruijt, 1987): $k = C(D_{10})^2$

where:

- k is the hydraulic conductivity (m/sec);
- C is a constant (100 m/sec); and
- $D_{10}$ is the grain size of the filter (m).

Based on a $D_{10}$ = 0.2 mm, the hydraulic conductivity of the filter is estimated to be $4 \times 10^{-6}$ m/sec.




**LEGEND**

- Contour Index (2m Interval)
- Gravel Road
- Marsh
- Lake

200 0 200

Metres

Projection: UTM Zone 10 Datum NAD83
NTS Mapsheet 92F/10 & 15

Notes:

* Contour lines in treed areas should be treated as indefinite.
* Water levels at time of photography.

LAFARGE

TEXADA STORMWATER MANAGEMENT

# CATCHMENT AREAS

FIGURE 4-1

| | | |
|---|---|---|
| DRAWN BY: A.W.<br>CHK'D BY: M.U<br>DATE: 13 03 15 | FILE: Fig 4-1_Catchment Areas.dwg<br>G:\ProjectData\Lafarge Canada_586\586-1_Texada\Reports\Draft | NORWEST<br>APEGGA Permit P05015 |

# 5 STORMWATER MANAGEMENT PLAN

## 5.1 DESIGN FEATURES

The design of the Stormwater Management Plan includes the following features:

1. The main body of the coal staging and stockpiling area is graded so that it drains toward the north, away from the foreshore, and towards the stormwater pond and management system.
2. The stormwater infiltration pond is located along the north edge of the staging area and is formed through excavation.
3. A permeable access ramp to the east edge of the pond allows water that accumulates in the pond to seep into the existing estuary to the east of the ramp.
4. An overflow culvert conveys extreme flows through the access ramp, and into the estuary.
5. A diversion ditch constructed along the northeast edge of the access ramp to the staging area intercepts and diverts flows from the existing ephemeral creek and discharges into the small estuary located east of the staging area.
6. An infiltration ditch around the outside perimeter of the staging area foreshore prevents direct release of runoff from the outer perimeter of the staging area.

The following subsections describe each of these Stormwater Management Plan design features. Drawing 1 (Appendix A) shows the coal stockpile development plan that is required to support expansion of the coal transshipping facilities, and Drawings 2 to 4 (Appendix A) show the design features.

## 5.2 GRADING PLAN

The coal stockpiling area is filled and graded to direct the majority of runoff towards the stormwater infiltration pond. The pond serves to remove suspended coal particles from the runoff by filtering those particles using the pond bottom and the access road embankment as filter media. The grading of the stockpiling area also serves to improve drainage, which should improve productivity and workability of the coal piles.

Waste rock products are used as fill to raise the elevation of the coal stockpile area to establish the desired grade. These materials comprise relatively durable granular fill which will enhance infiltration and drainage; this will reduce the proportion of rainfall that runs off the stockpiling area. Granular material will also improve trafficability of the stockpile surface.

The elevations of the stockpile area are determined by the following:

- desired grade of 1%;

- dimensions of the stockpile surface; and
- minimum elevation required to maintain the stockpile area above the potential height of storm surge (4 masl).

Drawing 2 (Appendix A) shows the desired grade of the pad along with the approximate thicknesses of fill required to achieve the design grade.

## 5.3 STORMWATER INFILTRATION POND

### EXCAVATION AND POND CONSTRUCTION

The stormwater infiltration pond is sized to contain the runoff generated by the 1 in 5 years, 24-hour single storm rainfall runoff event and by the continuous simulation of runoff based on historical hourly precipitation records. The more demanding simulation governs the infiltration pond design storage capacity. The infiltration pond is positioned to minimize its impact on the area available for stockpiling coal and to the activities associated with handling and loading the coal. Towards this end, the pond is located along the north edge of the stockpiling area, adjacent to the hillside that rises up into the quarry and materials crushing and sorting area. The pond is elongated and situated in an existing depression that collects water from the existing ephemeral stream.

Excavation will be used to establish the dimensions of the pond: the side-slopes will be built to a slope of 2:1 due to frequent water level fluctuation. The finish grade of the pond will provide a storage depth of 3 m. For the most part it will be possible to excavate the soils and colluvium that are present using a track-mounted excavator. In some areas it may be necessary to jack-hammer weathered surface rock to develop the grades. Blasting of bedrock is not required or desirable. If competent rock is encountered, it will be left in place and the pond geometry will be adjusted accordingly. The pond excavation will be covered by a filter liner that is 0.5 m thick. Coarse rock may be used to stabilize the perimeter of the pond.

### ACCESS ROAD EMBANKMENT DESIGN

The access road design includes a coarse rock core that is designed to freely drain and is covered by a filter layer adjacent to the pond that prevents seepage of coal fines out of the pond. The core is constructed using waste rock which has a 75 mm minus particle size gradation. The inside face of the access road is covered with a minimum 3-metre thick filter layer up to the top of the overflow culvert.

### OVERFLOW CULVERT

An overflow culvert is included in the access road design to convey extreme stormwater runoff flows that exceed the storage capacity of the pond. The invert of the culvert is located at an

elevation of 4 masl, which is positioned to prevent flooding of the stockpile surface. The culvert design consists of the following:

- 600-mm diameter, galvanized, corrugated steel pipe;
- 100-mm thick layer of sand bedding and backfill around the culvert;
- 1-metre thick, sand-bentonite plugs at either end of the culvert; and
- flared ends with bar screens.

Culverts are prepared, placed and covered in sequence with the access road construction. Preparation of the culvert bed consists of the following:

- removing all ice, snow, organic matter, protrusions and sizes greater than 200 mm in the area of the culvert footprint;
- developing a 1% grade over the length of the culvert, towards the estuary (east) to allow the culvert to freely drain following extreme runoff flow events;
- placing and smoothing bedding materials along the footprint of the culvert; and
- backfilling the culvert to a level suitable to support subsequent road construction.

The culvert length is sized to protrude a minimum of 1 m past the edges of the embankments, assuming an embankment slope of 4H:1V.

## 5.4 INFILTRATION DITCH

The infiltration ditch finished grade is excavated to a depth of 0.75 m at an average slope of 2H:1V and an average base width of 1 m. The liner for the ditch is placed to an average thickness of 300 mm, after the ditch excavation has been completed. The ditch has a containment capacity of approximately 1 $m^3/m$ when 2/3 full of water. The corresponding infiltration rate of the ditch is estimated to be 0.1 $m^3/day/m$. This rate of seepage is expected to diminish over time as the ditch liner gradually fills with coal fines. Norwest recommends that the ditch is cleaned whenever the infiltration rate is inhibited by accumulated coal fines.

## 5.5 DIVERSION

The diversion channel for the existing natural creek with a base flow will provide a controlled and modified alignment of the stream and a safe conveyance of runoff flows to the existing estuary. The finished grade of the diversion ditch provides a minimum of 0.5 m depth and 3H:1V side slopes. Directional bends and curves of the diversion ditch will be armored and steepened, and the depth increased to a minimum of 1 m.

# 6 CONSTRUCTION STANDARDS AND QUALITY CONTROL

The components of the Stormwater Management Plan will be constructed by Lafarge's Texada Island workforce, using equipment and materials already on Site. It will be constructed according to the technical specifications found in Appendix B. These technical specifications, when followed, will result in construction quality that is consistent with the basis and assumptions of the Stormwater Management Plan design.

Construction will also be subject to QA/QC procedures, which complement the technical specifications, and these will be used by Lafarge's construction team and engineer. The QA/QC program will be implemented during construction to ensure that construction materials and methods comply with the performance and design standards described in this report. Specific aspects of the QA/QC program are described in the construction specifications and can be found in Appendix B. The complete QA/QC testing program is summarized in Table 6.1.

**TABLE 6.1**
**SUMMARY OF QUALITY CONTROL AND QUALITY ASSURANCE TESTING PROGRAM**

| Component | Property | ASTM[1] Standard | Frequency | Requirement |
|---|---|---|---|---|
| Ditch Liner | Grain Size | D421 | 3 Total | $0.15 < D_{10} < 0.3$ (mm) |
| Stockpile Surface | Grain Size | D421 | 3 Total | $0.15 < D_{10} < 0.3$ (mm) |
| Stockpile Surface | Density | D2922 | 1 per 250 $m^3$ | > 95% SPD |
| Access Road Surface | Density | D2922 | 1 per 250 $m^3$ | > 95% SPD |
| Access Road Core | Grain Size | D421 | 3 Total | $D_{50} > 1.0$ (mm) |
| Access Road Apron | Grain Size | D421 | 3 Total | $0.15 < D_{10} < 0.3$ (mm) |
| Pond Liner | Grain Size | D421 | 3 Total | $0.15 < D_{10} < 0.3$ (mm) |

Notes: [1] American Standard of Testing and Measures

# 7 REFERENCES

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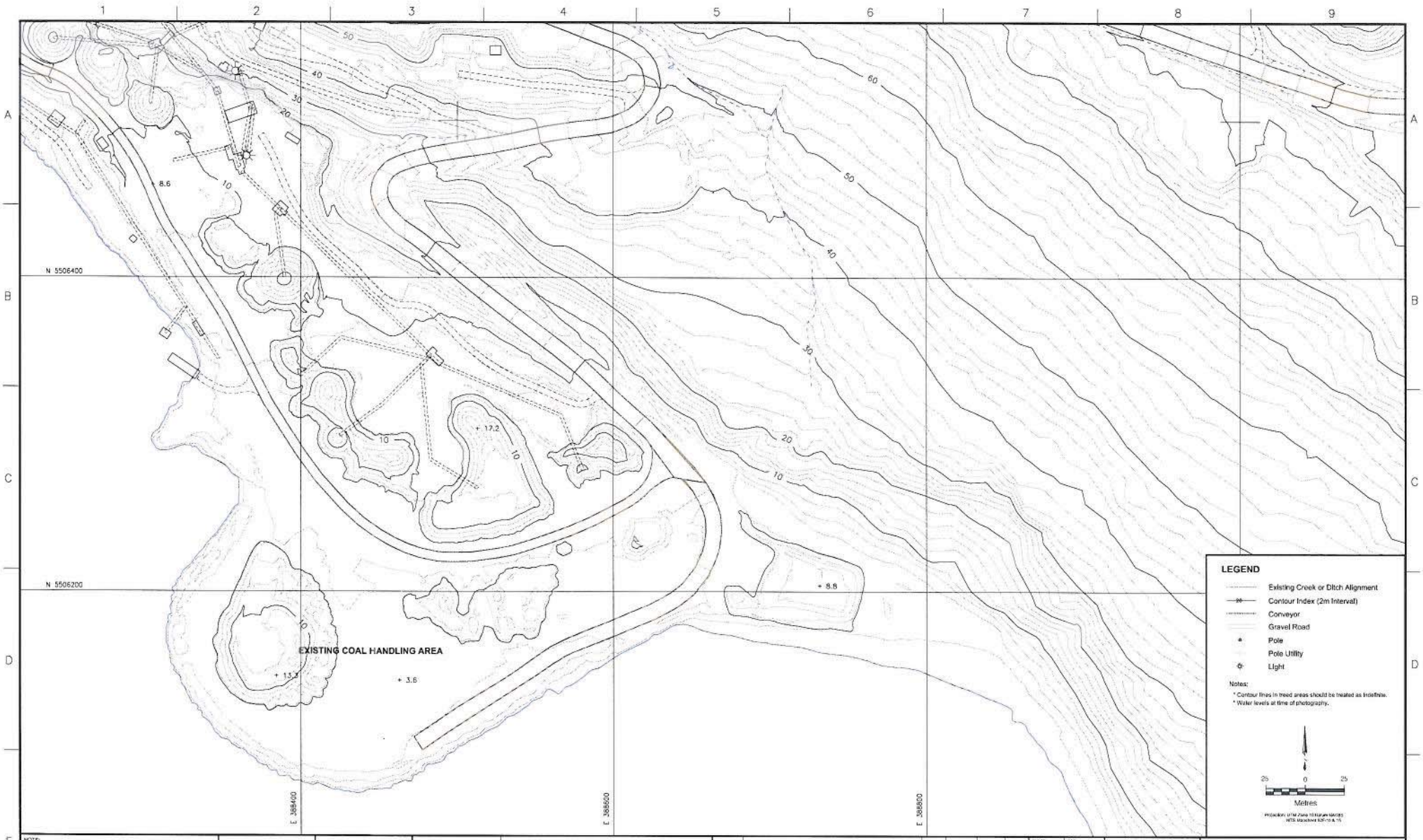
# APPENDIX A
# DESIGN DRAWINGS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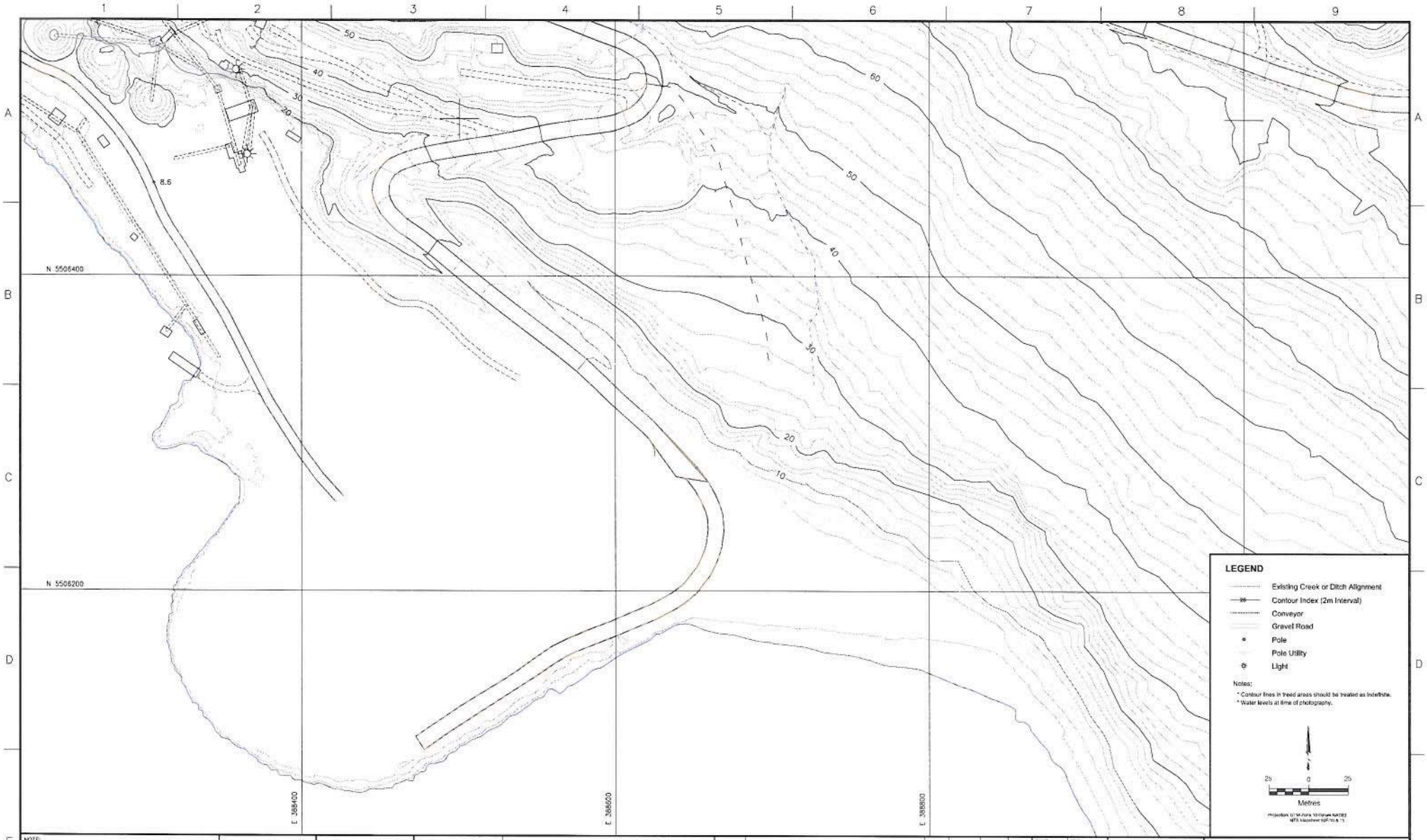
N 5506200
E 388400
E 388600
E 388800
EXISTING COAL HANDLING AREA
+ 8.6
+ 17.2
+ 13.3
+ 3.6
+ 8.8
LEGEND
Existing Creek or Ditch Alignment
Contour Index (2m Interval)
Conveyor
Gravel Road
Pole
Pole Utility
Light
Notes:
* Contour lines in treed areas should be treated as indefinite.
* Water levels at time of photography.
25 0 25
Metres
NORWEST
APEGS Certificate 20800
DRAWINGS/DOCUMENTS
REVISIONS
TEXADA_STORMWATER_MANAGEMENT
EXISTING CONDITIONS
586-1-01
1 OF 1
13.04.17




NOTE:
1. xx

NORWEST
APEGS Certificate
20800

| Dwg 2_Proposed Excavation Plan | G:\Projects\Data\Lafarge Canada_586\586-1_Texada Property\Draft Drawings | REV_0 | ISSUED_FOR_REGULATORY_APPROVAL | M.E. | JUN_05 | G.G. | G.L. |
|---|---|---|---|---|---|---|---|
| DWG NAME | FILE LOCATION | REV. NO. | DESCRIPTION | BY | DATE | CHECKED | ENG. |

DRAWINGS/DOCUMENTS

REVISIONS

| | |
|---|---|
| DRAWN: K.W. | DATE: MARCH_15 |
| CHECKED: M.U. | DATE: MARCH_15 |
| ENG. G.L. | DATE: MARCH_15 |
| CERTIFICATE No. | ******* |
| SCALE | 1:2000 |

TEXADA_STORMWATER_MANAGEMENT

PROPOSED EXPANSION PLAN

| DRAWING No. | SHEET | REV. |
|---|---|---|
| 586-1-02 | 1 OF 1 | 1 |

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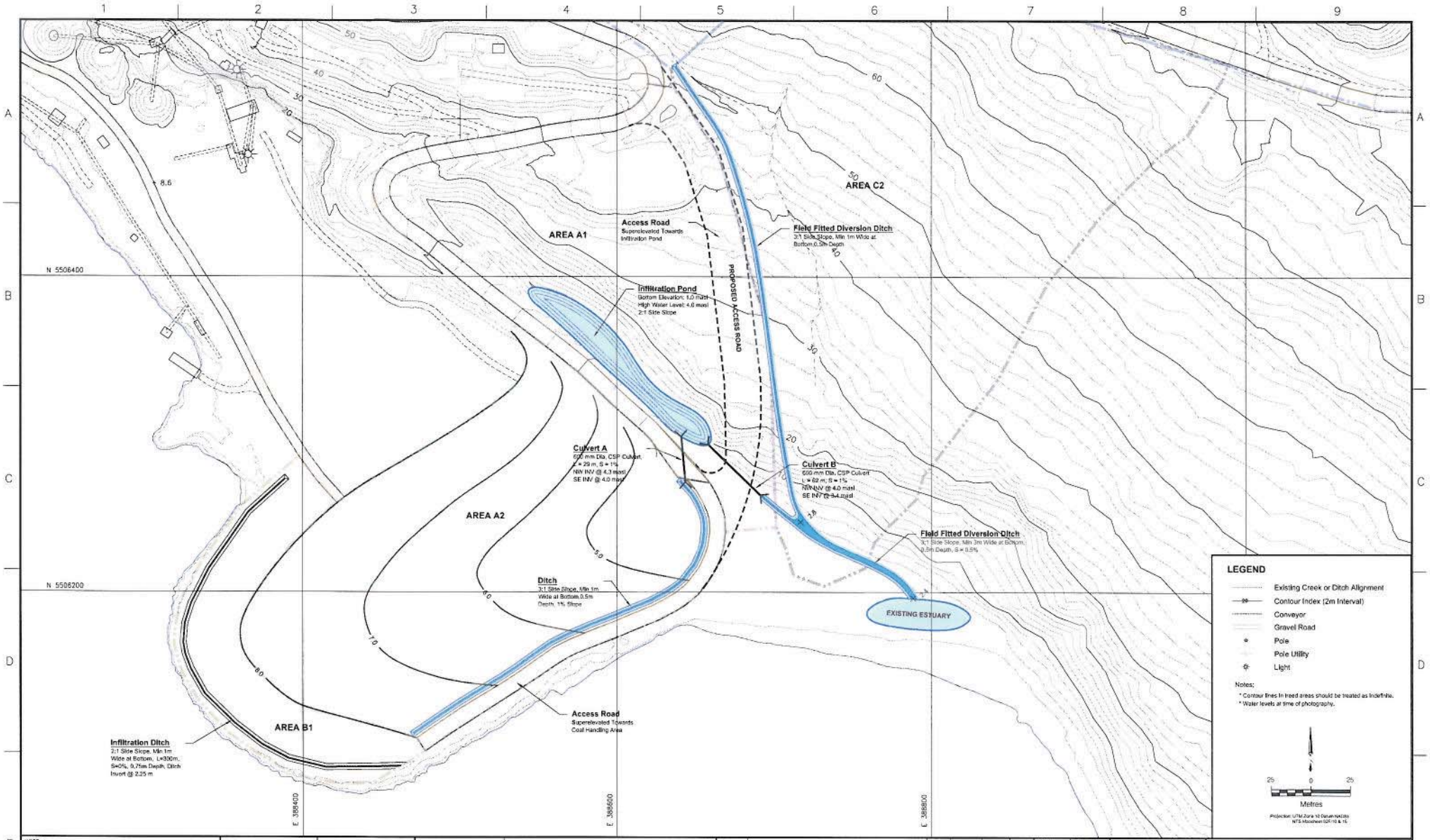
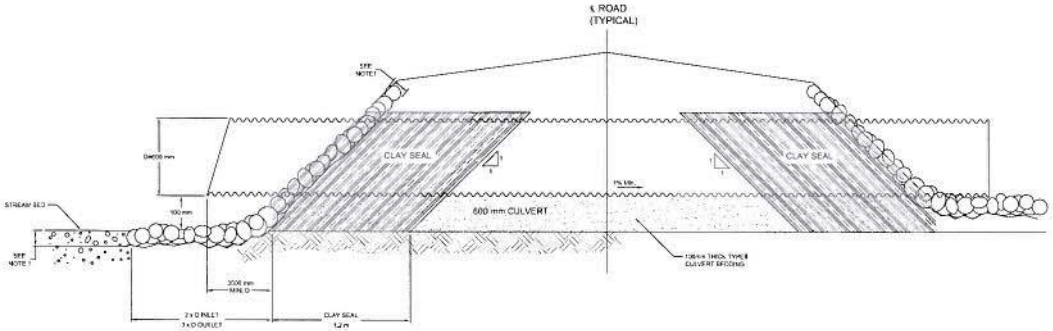
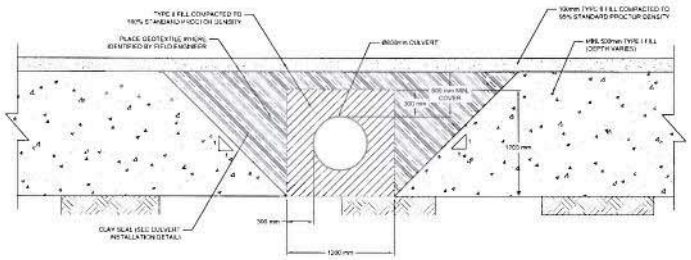
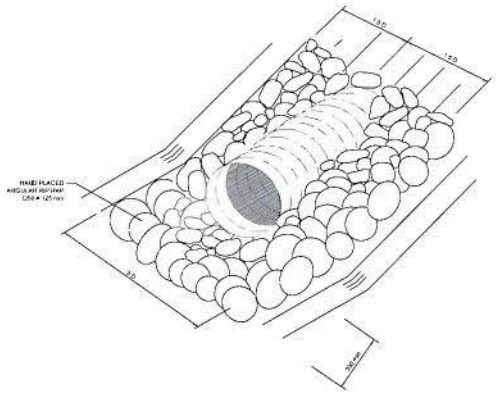

AREA A1
AREA A2
AREA B1
AREA C2
Access Road
Superelevated Towards Infiltration Pond
Infiltration Pond
Bottom Elevation: 1.0 masl
High Water Level: 4.0 masl
2:1 Side Slope
PROPOSED ACCESS ROAD
Field Fitted Diversion Ditch
3:1 Side Slope, Min 1m Wide at Bottom 0.3m Depth
Culvert A
600 mm Dia. CSP Culvert
L = 29 m, S = 1%
NW INV @ 4.3 masl
SE INV @ 4.0 masl
Culvert B
600 mm Dia. CSP Culvert
L = 62 m, S = 1%
NW INV @ 4.0 masl
SE INV @ 3.4 masl
Field Fitted Diversion Ditch
3:1 Side Slope, Min 3m Wide at Bottom, 0.5m Depth, S = 0.5%
Ditch
3:1 Side Slope, Min 1m Wide at Bottom 0.5m Depth, 1% Slope
Access Road
Superelevated Towards Coal Handling Area
Infiltration Ditch
2:1 Side Slope, Min 1m Wide at Bottom, L=300m, S=0%, 0.75m Depth, Ditch Invert @ 2.25 m
EXISTING ESTUARY
N 5506400
N 5506200
E 388400
E 388600
E 388800
LEGEND
Existing Creek or Ditch Alignment
Contour Index (2m Interval)
Conveyor
Gravel Road
Pole
Pole Utility
Light
Notes:
* Contour lines in treed areas should be treated as indefinite.
* Water levels at time of photography.
25 0 25
Metres
Projection: UTM Zone 10 Datum NAD83
NTS Mapsheet 92F/10 & 15
NORWEST
APEGS Certificate 20800
TEXADA_STORMWATER_MANAGEMENT
PLAN VIEW
STORMWATER MANAGEMENT PLAN
586-1-03
1 OF 1
1:2000
ISSUED FOR REGULATORY APPROVAL
DRAWINGS/DOCUMENTS
REVISIONS





**ISOMETRIC VIEW**
SCALE: N.T.S.

**NOTE:**

1. RIPRAP THICKNESS 300mm
2. ANGULAR RIP RAP SHALL BE HAND PLACED ROCK OR AS SPECIFIED BY THE ENGINEER.
3. MINIMUM CULVERT DIA 300 mm
4. 100 mm DROP FROM BOTTOM OF CULVERT TO RIP RAP IS FOR OUTLET END ONLY
5. PLAN VIEW - CULVERT TO BE PLACED AT THE BEGINNING OF CURVE OF THE CURB RETURN

**DITCH SECTION**
- Upper Portion of Diversion Channel
SCALE: N.T.S.

**DITCH SECTION**
- Directional Berms of Diversion Channel
SCALE: N.T.S.

**DITCH SECTION**
- Lower Portion of Diversion Channel
SCALE: N.T.S.

**DITCH SECTION**
- Infiltration
SCALE: N.T.S.

NOTE:
1. xx

NORWEST
APEGS Certificate
20800

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Dwg 4_Culvert and Ditch Detail.dwg | G:\Project\Data\Lafarge Canada_586-586-1_Texada\Reports\Draft\Drawings | REV_0 | ISSUED FOR REGULATORY APPROVAL | M.E. | MAR_15 | G.G. | G.J. |
| DWG NAME | FILE LOCATION | REV. NO. | DESCRIPTION | BY | DATE | CHECKED | ENG. |
| DRAWINGS/DOCUMENTS | | REVISIONS | | | | | |

| | | |
|---|---|---|
| DRAWN | A.W. | DATE MARCH_15 |
| CHECKED | M.U. | DATE MARCH_15 |
| ENG | G.J. | DATE MARCH_15 |
| CLIENT No. | ****** | |
| SCALE | 1:2000 | |

**TEXADA_STORMWATER_MANAGEMENT**

**CULVERT AND DITCH DETAILS**

| DRAWING No. | SHEET | REV. |
|---|---|---|
| 586-1-04 | 1_OF_1 | 1 |

13.01.15

# APPENDIX B
# TECHNICAL SPECIFICATION

# 1 GENERAL

## 1.1 SECTION INCLUDES

This section includes information on the following items of work specifically associated with the construction of the Pond and related earthworks.

## 1.2 REFERENCES

- American Society for Testing and Materials (ASTM) D422 – 63(2007) Standard Test Method for Particle-Size Analysis of Soils.
- ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.
- ASTM D2216 – 05 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock –by Mass.
- ASTM D2922 – 04 Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- ASTM D3017 – Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

## 1.3 TESTS AND INSPECTIONS

a. The testing and inspection of materials and compaction of embankments will be carried out by a qualified third party to be retained by the Owner. Standards for construction of earthworks are summarized in Table 4.1.

b. Cooperate with the Engineer and third party testing technician, and assist as required to allow efficient execution of the works.

## 1.4 BURIED SERVICES

a. Before commencing work, establish with Owner the location of all potential buried services on and adjacent to the Site.

b. Arrange with Owner for relocation of buried services that interfere with the execution of the works. The Owner shall be responsible for any costs incurred associated with the relocation of buried services.

### 1.5 PROTECTION

a. Keep excavations clean, free of standing water and the soil loose.

b. Protect natural and manmade features required to remain undisturbed.

## 2 PRODUCTS

### 2.1 GENERAL GRANULAR FILL

Off-specification aggregate native to the Site, which is free of lumps or rocks larger than 75 mm, frozen lumps, sharp fragments, organic material, debris and swelling clays.

### 2.2 FILTER LAYER

Filter material to comply with the underlying particle size distribution.

**GRAIN SIZE DISTRIBUTION OF FILTER**

| Particle Size Indicator | Size Range (mm) |
|---|---|
| $D_{85}$ | 1 to 3 |
| $D_{60}$ | 0.8 to 1.2 |
| $D_{15}$ | 0.20 to 0.30 |
| $D_{10}$ | > 0.2 |

## 3 EXECUTION

### 3.1 EXCAVATION

a. Excavate all material encountered as required to complete the works.

b. Remove any soft zones or zones containing deleterious materials and replace it with compacted fill.

### 3.2 FILLING - GENERAL

a. Inspection: do not commence backfilling until fill material and areas to be filled have been inspected and approved by the Engineer.

b. Remove construction debris, organic soil, and standing water from areas to be filled.

## 3.3 COMPACTED FILL

a. Use General Granular Fill as specified by the Engineer.

b. Use only acceptable material from the Pond excavation, as directed by the Engineer.

c. Place and compact fill in (maximum) 300 mm thick loose lifts and compact each lift of material to a minimum of 95% of the maximum dry density as measured by ASTM D698 (Standard Proctor Density, SPD).

## 3.4 FILTER LAYER

a. Use Filter material as specified by the Engineer.

b. Place in 300 mm thick loose lifts and tamp to form a smooth, consistent and firm surface.

## 3.5 CULVERT BACKFILL

**Culvert Pipe Zone Granular Backfill Material** – pipe zone granular backfill material shall consist of filter material or equivalent.

A mixture of 10% bentonite and granular backfill materials, by dry weight, shall be used to construct end plugs on either end of the culvert installation.

**Culvert Pipe Materials** – the drainage culvert pipes shall be 600 mm diameter, lock-seam, galvanized corrugated steel pipe (CSP). The CSP culvert pipe body shall have helical corrugations, while the culvert pipe ends shall have annular corrugations. The CSP culvert pipe shall be made from 2 mm thick galvanized steel. All CSP culvert pipe fittings shall be galvanized and shall be compatible with the pipe type and end treatments.

**Culvert Subgrade And Site Preparation** - the contractor shall ensure that the ground surface and the general area of the culvert installation is suitably prepared prior to the commencement of the installation of the pipe culvert.

**Culvert Pipe Zone Granular Backfill Material Placement** – pipe zone granular backfill material shall be used for culvert pipe bedding. Pipe zone granular backfill shall be placed in uniform lifts not to exceed 125 mm thick throughout the culvert pipe zone. Pipe zone granular backfill material shall be placed, spread and levelled in uniform lifts using suitable equipment and construction methods.

The placement of pipe zone granular backfill material shall only be initiated when the owner and his representative have approved the condition of the foundation soils at the base (invert) of the existing drainage ditch.

**Culvert Pipe Installation** – install the culvert pipe at the locations shown on the drawings. Install the culvert pipe so that the end of the culvert pipe extends 1.0 m beyond the toe of slope of the access road random fill/pipe zone backfill through the ditch section.

**Culvert Random Fill Material Placement** – random fill above the pipe zone shall be dumped and spread in loose lifts/layers not to exceed 0.45 m thick. Random fill materials shall be placed, spread and levelled in uniform lifts on a continuous basis using suitable equipment and construction methods.

The contractor shall ensure that there is a minimum of 1.2 m of total cover over the crown of the culvert pipe prior to using heavy construction equipment.

**Culvert Pipe Zone Granular Material Compaction** – the contractor shall compact each pipe zone granular backfill material lift with a combination of personnel operated and self-propelled compaction equipment that is capable of providing sufficient static or dynamic force to achieve a density of a minimum of 95% of the standard proctor density. Compaction of pipe zone granular material shall not cause damage to the culvert pipe or cause the culvert pipe to displace horizontally or vertical.

**Culvert Pipe Random Fill Compaction** – the contractor shall compact each random fill lift with a minimum of four passes with self-propelled compaction equipment that is capable of providing sufficient static or dynamic force to adequately consolidate the soil materials to form a stable access road/ditch culvert pipe embankment fill. The contractor shall ensure that there is a minimum of 1.2 m of total cover over the crown of the culvert pipe prior to using heavy construction equipment.

**Culvert Pipe Installation Alignment And Grade** – the culvert pipes for ditch crossings shall be installed on an alignment that is coincident with the centreline of the ditch and at a grade that allows for the unimpeded, efficient movement of water along the drainage ditch without significant ponding at either end of the pipe culvert.

**END OF SECTION**

# 1 GENERAL

## 1.1 SECTION INCLUDES

- Scope of Work;
- Drawings;
- Description of Work;
- Use of Site;
- Mobilization and Start Up;
- Existing Services;
- Superintendence;
- Examination;
- Work by Others;
- Restoration;
- Record Documents;
- Water Control;
- Erosion and Sediment Control;
- Dust and Particulate Control;
- Demobilization; and
- Health and Safety.

## 1.2 RELATED SECTIONS

- Section 01 13 00 – Surveying; and,
- Section 31 14 11 – Earthworks.

# 2 GENERAL INSTRUCTIONS

## 2.1 SCOPE OF WORK

Works to be performed under the specified conditions include construction of the Stormwater Management Plan in accordance with the Drawings presented in Table 1 and these Specifications.

## 2.2 DRAWINGS

a. Drawings issued with and forming part of this Report, and complementing these Specifications are listed below.

b. Perform the works in accordance with these Drawings and associated Specifications. Where conflict exists between the Drawings and Specifications, immediately request clarification from the Engineer.

c. Revised Drawings may be issued from time to time by the Engineer and such Drawings will supersede previous versions.

**TABLE 1**
**DRAWINGS**

| | | |
|---|---|---|
| Existing Conditions | Drawing 1 | Current Site conditions (before development). |
| Expansion Plan | Drawing 2 | Stockpile area after the expansion. |
| Plan View – Stormwater Management Plan | Drawing 3 | Plan View of the Pond with details. |

## 2.3 DESCRIPTION OF WORK

The works include but are not limited to, the following:

a. Mobilization, start-up and demobilization of construction equipment;

b. General excavation of pond;

c. General filling and grading of the coal stockpile area;

d. Excavation of the perimeter exfiltration ditch;

e. Installation of the overflow culvert; and,

f. Lining of the ditch, pond and stockpile area.

The overall expansion of Lafarge's Texada facility staging area is not included in this scope.

## 2.4 USE OF SITE

a. When unfavorable conditions exist, discontinue operations and work that may be adversely affected by such conditions. Do not construct or cause to be constructed any portion of the works under conditions which would adversely affect the quality of the works, unless special means or precautions are taken to perform the works in a proper and satisfactory manner.

b. Maintain adequate facilities for storage of materials, tools and equipment which are subject to damage by weather.

## 2.5 MOBILIZATION AND START-UP

a. Ensure planned activities are consistent with existing regulatory approvals.

b. Perform planning and scheduling activities as required for the performance of the works.

c. Purchased materials, mobilized equipment and supplies are incidental to the Site.

d. Use the existing Site access roads to the designated work areas during mobilization. Complete improvements to roads as required.

e. Confining equipment, storage of materials and operation to work in areas designated by the Owner. Do not unreasonably encumber the Site with construction equipment or other materials and equipment.

## 2.6 SUPERINTENDENCE

Provide all necessary superintendence during the execution of the works. Employ and assign to the works a competent and authorized individual, herein referred to as the Superintendent, who shall be responsible for supervision, inspection and direction of the works. The Superintendent will have responsibility and authority over the Site activities. Upon request, the Engineer will confirm instructions in writing. The superintendent shall be available to the works and the Site at all times during execution of the works.

## 2.7 EXAMINATION

a. Inspect the Site to review and establish the condition of the area of the works including existing buildings, wells, trees and other plants, grassed areas, fencing, service poles,

wires, paving, and survey bench marks or monuments on or adjacent to the Site which may be affected by the works.

b. Provide ongoing review, inspection, and attendance during performance of the works to properly document conditions. Promptly note any existing conditions at the Site affected by the works which may require restoration, repair, or replacement. Do not cover up any of the works prior to the appropriate testing and verification.

c. Protect existing Site structures and facilities from damage while work is in progress and repair any damage resulting from the works.

d. Verify that existing Site conditions and substrate surfaces are acceptable for subsequent work.

## 2.8 WORK BY OTHERS

Activities will be coordinated with other Contractors when they are incorporated into the works. If any part of the works under this design Specification depends on the proper execution or result upon the work of another Contractor, report promptly to Owner, in writing, any defects which may interfere with proper execution of the works.

## 2.9 RESTORATION

a. Except where specifically required otherwise by other Specification sections, restore areas affected by the performance of the works to match the condition of similar adjacent, undisturbed areas.

b. Ensure that restored areas match prescribed grade and surface drainage characteristics, except as otherwise specified, and ensure a smooth transition from restored surfaces to existing surfaces.

c. Utilize construction methods and procedures during the performance of the works which keep the disturbance and damage of whatever existing nature to the practical minimum.

## 2.10 RECORD DOCUMENTS

a. Maintain on Site, one set of the following documents:

   i. Drawings;

   ii. Specifications;

iii. QA/QC requirements summary sheet; and,

iv. QA/QC testing results.

b. Maintain a record of execution of the works, including all approved changes. Ensure entries are complete and accurate, enabling future reference.

c. Record information concurrent with construction progress.

## 2.11 WATER CONTROL

a. Maintain excavations free of water. Provide, operate, and maintain necessary equipment appropriately sized to keep excavations, and other work areas free from water.

b. Transfer water into local depressions that are located entirely within the boundaries of the Site. Water shall not be released to the surrounding watershed unless testing shows that the water quality meets the surface water discharge criteria.

## 2.12 EROSION AND SEDIMENT CONTROL

a. Plan and execute construction by methods to control surface drainage from cuts and fills, from stockpiles, and other work areas. Prevent erosion and sedimentation.

b. Provide and maintain temporary measures to prevent erosion and migration of silt and sediment off of the Site.

## 2.13 DUST AND PARTICULATE CONTROL

Provide and maintain dust and particulate control measures such as a water misting system as required to prevent the generation of dust and particulate.

## 2.14 HEALTH AND SAFETY REQUIREMENTS

a. Complete works in accordance with the Health, Safety and Environmental Plan to be provided by Owner.

b. Implement construction activities in accordance with Occupational Health and Safety (OH&S) legislation of the Province of British Columbia.

c. The Superintendent is responsible for ensuring that all employees comply with the health and safety policies on the Site.

**END OF SECTION**

# 1 GENERAL

## 1.1 SECTION INCLUDES

This section includes all surveying work in support of stormwater management plan construction activities.

# 2 GENERAL INSTRUCTIONS

## 2.1 SCOPE OF WORK

a. Work to be performed includes surveying of the works as directed by these Specifications and as directed by the Engineer.

b. The term "Surveyor" may be used to refer to and individual surveyor, or a surveying company, provided in relation to the survey requirements to execute the works.

c. The Owner will supply benchmarks and control points required for vertical and horizontal control. The Surveyor will be provided with this information prior to mobilizing to the Site. All other staking and survey control after the initial set of control points shall be the responsibility of the Surveyor.

d. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.

e. Should work be suspended for any reason, complete a detailed survey of the condition of the works at the time of work suspension and submit it to the Engineer.

## 2.2 COMPETENCE AND AVAILABILITY

a. The Surveyor shall be selected based on competency and availability to the Site. The Surveyor shall be experienced in completing survey work in support of earthworks projects.

b. The Surveyor shall be provided with a minimum of 24 hours of notice prior to the expected time the Surveyor is required to be on the Site.

c. The Surveyor shall be available to the Site at all times, provided the request for services is submitted in a timely manner (i.e. minimum of 24 hours of notice). The Surveyor shall provide a competent replacement to the Site in the event that the Surveyor is not available so as not to cause a delay to the works. It is the responsibility of the Surveyor to provide the replacement with the relevant information to the works, including, but not limited to:

design drawings, coordinate system, control points, Site contacts, data labeling format and background information related to the work already completed.

d. The Surveyor shall make all reasonable efforts to accommodate to the request for services. If the Surveyor is not able to provide service on the requested date, and no replacement is found, the Engineer shall be informed immediately.

### 2.3 FIELD SURVEYING

a. Verify locations of survey control points prior to starting work. Promptly notify the Engineer of any discrepancies discovered.

b. Locate, preserve, and protect survey control and reference points as set or established. Promptly replace the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

c. Maintain a complete and accurate log of control and survey work as it progresses.

## 3 PART 3 EXECUTION

### 3.1 GENERAL

a. Prior to the commencement of work, the Surveyor and Engineer shall develop a list of the minimum expected surveying requirements for the associated works.

b. Prior to the commencement of work, the Surveyor, Owner and the Engineer shall develop a list of milestones, which will require submission of survey data to verify grades, elevations and alignment.

c. All data recorded by the Surveyor shall be neat and orderly such that it is easily transferred, and so the Engineer may interpret the data in a timely manner. The Surveyor may record any number of shots as requested or required by the Surveyor, the Owner or the Engineer; however, these survey points shall not be included with the as-built package of survey points if not required by Section 3.2 of this Specification.

d. All discrepancies shall be immediately reported to the Engineer. Works that would be affected by the discrepancy shall not be completed until the discrepancy has been clarified to the satisfaction of the Engineer.

## 3.2 SURVEY DATA REQUIREMENTS

a. The following provides information on the minimum survey data required for completion of the as-built package following completion of the works:

   i. An initial survey has been completed to capture the existing conditions prior to the commencement of the works. The initial survey covers all areas where existing condition are to be disturbed or constructed upon. The purpose of the initial survey is to reconcile construction volumes upon completion of the works and to verify the survey information used for design.

   ii. Upon completing the stockpile area and pond, complete a detailed survey in a maximum 20 m x 20 m spaced grid to confirm the elevations and geometry, which includes a survey of all break points to show the limits and depth of pond.

   iii. Once the culvert has been placed and the diversion ditch has been excavated, complete a detailed survey to confirm locations and grades.

b. All data points shall be clearly labeled. If the Surveyor has a preferred legend for labeling data, the legend must be approved by the Engineer prior to use.

c. Survey data shall be made available to the Engineer to verify grades, elevations, geometries, thicknesses or any other component of the works as requested by the Engineer. The Engineer shall be provided with a minimum 48 hours of notice of the incoming information. At a minimum, the survey data as described within this Specification shall be organized and provided to the Engineer.

**END OF SECTION**

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19633 98A Ave
Langley, BC V1M 3G5
CANADA

Mr. Brad Kohl,

Please find attached the technical scope of the shoreline conveyor system for Texada Island.

The scope of work for Kreator is to Design, Engineer, Build, Transport and Install a system to unload 8,000 metric ton barges and convey the material to the storage area for future shipping and / or to load the ship loader directly. The material being handled is Powder River Basin Coal; the weight is 44 lbs. per cubic foot. The material will be unloaded by two Crawler Mounted Material Handlers with $8m^3$ clam style buckets. The material handlers will gather the material from the barge and load it into the hoppers located on the unload barge system. The barge will be equipped with a conveyor system and loading hoppers to deliver the material to the shore line conveyor system. The shore line conveyor system will have the ability to take the material to the storage yard allowing the coal storage area to be reloaded and / or be sent directly to the ship loader.

It is pertinent to note the following points when considering the system design:

a. All belts are 440PIW ¼" x 1/8" grade 2 flame resistant belting.
b. All transfer points are enclosed to minimize fugitive dust.
c. Dust suppression systems have been incorporated into the design at critical transfer points.
d. The system will tie into the existing 60" ship loading conveyor at the existing ship loading conveyor reload hopper.
e. Lafarge will upgrade the existing ship loading conveyor to 60" grade 2 flame resistant belting.
f. The existing piles will be used to secure the unloading barge. No reconfiguration of the existing shoreline is required.
g. The coal will be stored on the existing material storage pad.
h. The design has incorporated the location of the existing ground-water monitoring wells.
i. The design has been developed to remain complimentary to the existing environmental management and material handling best practice currently applied on Texada Island.
j. The design has considered that all material coming from Powder River Basin will be coated with a Dust Suppressant agent and, when seasonal conditions require, an Anti-Oxidant agent for spontaneous combustion management.
k. The design has been validated with operational site visits to a source mine in Powder River Basin, Montana to consider the handling process, material composition and the application of dust suppressant and anti-oxidant agents.

Regards,

Wm. Keith Miles
KREATOR

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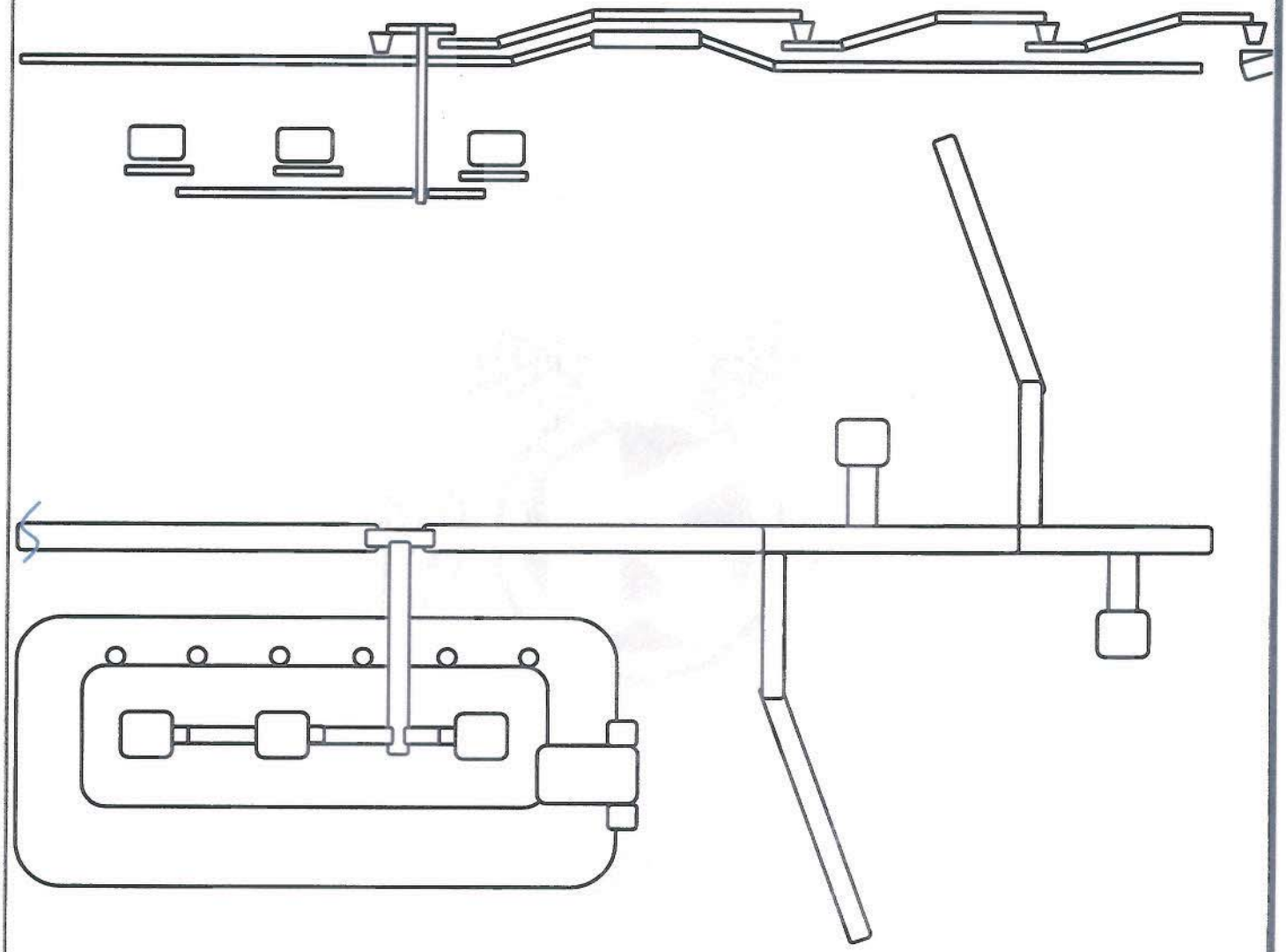
Attn: Lincoln Kyne – lincilon.kyne@lafarge-na.com Eric Anderson – eric.anderson@lafarge-na.com

Lafarge Texada - 120425KM1R12 - Coal Trans Shipping Project



**Quote Summary:**

Design, Engineer, Build, Transport and Install a system to unload 8,000 metric ton barges and convey the material to the storage area for future shipping and / or to load the ship loader directly. The material being handled is Powder River Basin Coal; the weight is 44 lbs. per cubic foot. The material will be unloaded by an excavator like material handler with a 6 to 8 yard clam style bucket. The material handler will gather the material from the barge and load it into the hoppers located on the unload barge system. The barge will be equipped with a conveyor system and loading hoppers to deliver the material to the shore line conveyor system. The shore line conveyor system will have the ability to take the material to the storage yard allowing the coal storage area to be reloaded and / or be sent directly to the ship loader.

The success of this project will be based on a well understood scope between both parties.
If anything is unclear please indicate what it is and we will send you a revision for final approval.
Thank you for the interest in our company.

**Equipment Summary:**

**Barge System:**

Equipment No. CC1 (60" x 160' @ 800fpm Horizontal Think System Channel Conveyor).

Equipment No. CC2 (60" x 60' @ 800fpm Horizontal Think System Channel Conveyor).

Equipment No. CC3 (60" x 140' @ 800fpm Inclined Think System Truss Conveyor).

Equipment No. HP1 (20' x 20' load hopper c/w relieving angle bottom and 60 degree sides).

Equipment No. HPC2 48" x 24' feeder cartridge set on a constant speed of 120fpm with a 35:1 307SMTP and 25HP motor

Equipment No. HP2 (20' x 20' load hopper c/w relieving angle bottom and 60 degree sides).

Equipment No. HPC2 48" x 24' feeder cartridge set on a constant speed of 120fpm with a 35:1 307SMTP and 25HP motor

Equipment No. HP3 (20' x 20' load hopper c/w relieving angle bottom and 60 degree sides).

Equipment No. HPC2 48" x 24' feeder cartridge set on a constant speed of 120fpm with a 35:1 307SMTP and 25HP motor

Barge Switch Gear and Lock Out Room

**Shore Line System:**

Equipment No. CC4 (60" x 40' @ 800fpm Horizontal Think System Reversible Conveyor).

Equipment No. CC5 (60" x 40' @ 800fpm Truss section, shore line truck feed conveyor).

Equipment No. CC6 - 60" x 435' @ 800fpm Horizontal Think System Channel Conveyor that will be directional to the stock pile area from the barge main transfer.

Equipment No. CC7 - 60" x 200' 800fpm Horizontal Think System Channel Conveyor that will be directional to the stock pile area from the barge main transfer.

Equipment No. CC8 - 60" x 210' 800fpm Horizontal Think System Channel Conveyor that will be directional to the stock pile area from the barge main transfer.

Two re-feed points that will sit over the 60" conveyor on (CC6,7,8)

Two re-feed points that will sit over the 60" conveyor (CC7)

Equipment No. CC9 - 60" x 1200' - 800fpm Horizontal Think System Channel Conveyor that will be directional from the stock pile area to the ship loader .

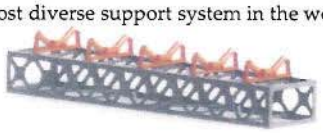
Equipment No. CC10 & CC11 - Two (2) 60" x 60' Portable Feeders (Pit Portable)

Equipment No. CC12 & CC13 - Two (2) 60" x 60' jump conveyors (Pit Portable)

Equipment No. CC14 & CC15 - Two (2) 60" x 125' stackers Truss Pit Portable

Control Tower and Switch Gear Tower (20' x 8')

The most diverse support system in the world!



**Barge System:**

**Equipment No. CC1 60" x 160' @ 800fpm Horizontal Think System Channel Conveyor. HP2 and HP3 conveyor on the barge.**

Specific Specification:
This conveyor will be mounted to the deck of the barge at a height of 40" to 48".
The conveyor components will have 35 degree rollers.
The conveyor will be galvanized.
The tail section will be a wing pulley c/w tail guard.
The head section will come complete with a martin QC1 belt scraper
The head section will come complete with a transition chute to the next conveyor
The electrical on this conveyor will be done back to the control room switch gear.
The conveyor is supplied for site assembly.
Return roller guards included
The belting will be 440PIW 1/4" x 1/8" x 60" grade 2 Flame resistant belting
Vulcanized splice

Generic Specification:
Kreator integral channel design.
The entire main frame of this system is an engineered to structurally withstand forces from X,Y,Z axis. This is not typical in the industry, as a conventional truss designs are engineered to withstand forces from X,Y axis and do a lesser job with the Z axis forces. During flex fatigue failure and catastrophic failure a truss assemble will twist prior to failure, prevent the twist prevent the failure.
Our side plates are laser cut and formed with a calculated corner radius to maximize the twisting resistance of the system
Having the side segments be in one piece 20' long and 8" deep allow us maximum flexibility the side plates have incremental hole spacing throughout the side, top and bottom for mounting idlers, e stop brackets, belt loops, hoods, electrical supports, impact beds, safety guarding, etc. This conveyor is designed so that any field fitting is a bolt on assembly, no expensive damaging field welding required.
The lateral and transverse members of the system are made up of 2" schedule 40 106B pipe with a standard Kreator designed bolted connection. The connection is jointed at the perfect junction to eliminate stress dissipation in the joints, but rather distribute the stress for load sharing.
The system can be purchased as a kit for field erection
Fits into sea containers and is limited on weight before volume like conventional truss assemblies
The majority of the components are interchangeable and reversible for ease of assembly
The design is engineered to ensure proper coating of the materials prior to assembly. This allows for a holiday free coating.
The standard coating is galvanized transverse and lateral supports, and optional painted or galvanized sides.
Our standard color is Orange, although we will paint it to your company color. (optional)
This truss system is engineered for applications in military bridging, municipal walkways due to its cosmetically pleasing appearance. Relieve bridging in catastrophic weather relieve, flood shoring, dynamic load supports, vertical static load supports. The system can be stacked vertically and horizontally to achieve any width and length.
Vertical support columns will be constructed of 4" formed channel or equivalent.
Conveyor to have a walkway down both sides. Right hand side will be tied in to the off load hopper walkway, and the left will be straight down to the tail of the conveyor.

Drive Calculations:
V-Belt drives adjusted to reflect ½" lagging on head/drive pulley. If other than ½" used we can adjust.

**CC1 Barge Conveyor – 60" x 160'**

Material:

Coal Kreator

| | |
|---|---|
| Repose: | 38 deg |
| Surcharge: | 25 deg |
| Density: | 44 lb/ft³ |
| Maximum Incline: | 22 |

| | |
|---|---|
| Location of Gtu: | 0 from tail |
| Location of Drive: | 160 from tail |

**Inputs**

| | |
|---|---|
| Belt Width: | 60 in |
| Belt Speed: | 800 fpm |
| Capacity: | 2200 tph |
| Length: | 160 ft |
| Lift: | 0 ft |
| Incline: | 0 % |
| TU Weight: | 4129 |
| Skirtboard: | 10 |
| Min temp: | 32 F |
| # Plows: | 1 |
| # Scrapers: | 1 |
| % Belt PIW: | 15 % |
| Belt Selection: | 440 PIW |
| Idler Type: | E7 |

**Tension Summary**

| | |
|---|---|
| Te: | 1969 lbs. |
| T-1: | 3990 lbs |
| T-2: | 2021 lbs. |
| T-t: | 2065 lbs. |
| T-tu: | 2065 lbs. |
| T-head: | 3990 lbs. |
| Start Torque: | 196 ft*lb. |
| HP: | 60 hp |
| Demand HP: | 52 hp |
| % Loaded: | 67 % |

Theoretical Capacity: 3281 tph

**Reducer Information**

| | | | |
|---|---|---|---|
| Motor Type: Hostile Duty | Shaft mount reducer: 307SMTP05 | Driver Sheave: 3B5V90 | Belt Qty: 3 |
| Motor RPM: 1750 | Torque Arm Kit: 307TAP-H | Driver Bushing: B 2 3/8 | V-Belt Svc Factor: 1.3 |
| Motor: H60P2E | Shaft mount bushing: 307TBP215 | Driven Sheave: 3B5V124 | Reducer Svc Factor: Class 2 1.4 SF |
| Motor Base: MB215-307 | Backstop: N/A | Driven Bushing: B 2 | Mechanical SMTP HP: 93.91182 |
| Motor Base Adapter: MMA307 | Fan Kit: N/A | Belts: 5VX1030 | BG Mat: 307BGMKPT |
| Motor Base Support: MMS307H | Belt Guard: BGP24 24-38 | | |

The success of this project will be based on a well understood scope between both parties.
If anything is unclear please indicate what it is and we will send you and revision.
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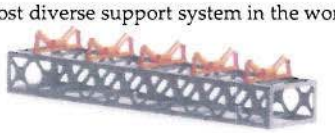


Pulley Information

| Location | Pulley Diameter | Face Width | Shaft Diameter | Bearing Journal | Drive Journal | Shaft Length | Lagging | Wrap |
|---|---|---|---|---|---|---|---|---|
| Drive | 12 | 63 | 4-7/16 | 3-7/16 | 2-15/16 | 106 | Yes | 180 |
| Tail | 12 | 63 | 3-15/16 | 2-15/16 | | 87 | | 180 |

Pulley design is based on CEMA standards. Contact pulley manufacturer for exact pulley design, dimensions and load capacity.

**Equipment No. CC2 60" x 60' @ 800fpm Horizontal Think System Channel Conveyor. HP1 conveyor on the barge.**

Specific Specification:
This conveyor will be mounted to the deck of the barge at a height of 40" to 48".
The conveyor components will have 35 degree rollers.
The conveyor will be galvanized.
The tail section will be a wing pulley c/w tail guard.
The head section will come complete with a martin QC1 belt scraper
The head section will come complete with a transition chute to the next conveyor
The electrical on this conveyor will be done back to the control room switch gear.
The conveyor is supplied for site assembly.
Return roller guards included
The belting will be 440PIW 1/4" x 1/8" x 60" grade 2 Flame resistant belting
Vulcanized splice

Generic Specification:
Kreator integral channel design.
The entire main frame of this system is an engineered to structurally withstand forces from X,Y,Z axis. This is not typical in the industry, as a conventional truss designs are engineered to withstand forces from X,Y axis and do a lesser job with the Z axis forces. During flex fatigue failure and catastrophic failure a truss assemble will twist prior to failure, prevent the twist prevent the failure.
Our side plates are laser cut and formed with a calculated corner radius to maximize the twisting resistance of the system
Having the side segments be in one piece 20' long and 8" deep allow us maximum flexibility the side plates have incremental hole spacing throughout the side, top and bottom for mounting idlers, e stop brackets, belt loops, hoods, electrical supports, impact beds, safety guarding, etc. This conveyor is designed so that any field fitting is a bolt on assembly, no expensive damaging field welding required.
The lateral and transverse members of the system are made up of 2" schedule 40 106B pipe with a standard Kreator designed bolted connection. The connection is jointed at the perfect junction to eliminate stress dissipation in the joints, but rather distribute the stress for load sharing.
The system can be purchased as a kit for field erection
Fits into sea containers and is limited on weight before volume like conventional truss assemblies
The majority of the components are interchangeable and reversible for ease of assembly
The design is engineered to ensure proper coating of the materials prior to assembly. This allows for a holiday free coating.
The standard coating is galvanized transverse and lateral supports, and optional painted or galvanized sides.
Our standard color is Orange, although we will paint it to your company color. (optional)
This truss system is engineered for applications in military bridging, municipal walkways due to its cosmetically pleasing appearance. Relieve bridging in catastrophic weather relieve, flood shoring, dynamic load supports, vertical static load supports. The system can be stacked vertically and horizontally to achieve any width and length.
Vertical support columns will be constructed of 4" formed channel or equivalent.
Conveyor to have a walkway down both sides. Right hand side will be tied in to the off load hopper walkway, and the left will be straight down to the tail of the conveyor.

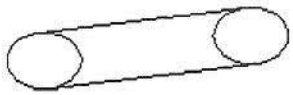
Drive Calculations:

**CC2 Barge – 60" x 60'**

Material:

Coal Kreator

| | |
|---|---|
| Repose: | 38 deg |
| Surcharge: | 25 deg |
| Density: | 44 lb/ft³ |
| Maximum Incline: | 22 lb/ft³ |



| | |
|---|---|
| Location of Gtu: | 0 from tail |
| Location of Drive: | 60 from tail |

Inputs

| | |
|---|---|
| Belt Width: | 60 in |
| Belt Speed: | 800 fpm |
| Capacity: | 2200 tph |
| Length: | 60 ft |
| Lift: | 0 ft |
| Incline: | 0 % |
| TU Weight: | 4129 |
| Skirtboard: | 10 |
| Min temp: | 32 F |
| # Plows: | 1 |
| # Scrapers: | 1 |
| % Belt PIW: | 14 % |
| Belt Selection: | 440 PIW |
| Idler Type: | E7 - |

Tension Summary

| | |
|---|---|
| Te: | 1519 lbs. |
| T-1: | 3568 lbs |
| T-2: | 2048 lbs. |
| T-t: | 2065 lbs. |
| T-tu: | 2065 lbs. |
| T-head: | 3568 lbs. |
| StartTorque: | 131 ft*lb. |
| HP: | 50 hp |
| Demand HP: | 40 hp |
| % Loaded: | 67 % |

Theoretical Capacity: 3281 tph

Reducer Information

Motor Type: Hostile Duty  Shaft mount reducer: 307SMTP05  Driver Sheave: 3B5V80  Belt Qty: 3

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| | | | |
|---|---|---|---|
| Motor RPM: 1750 | Torque Arm Kit: 307TAP-H | Driver Bushing: B 2 1/8 | V-Belt Svc Factor: 1.3 |
| Motor: H50P2E | Shaft mount bushing: 307TBP215 | Driven Sheave: 3B5V110 | Reducer Svc Factor: Class 2 1 4 SF |
| Motor Base: MB215-307 | Backstop: N/A | Driven Bushing: B 2 | Mechanical SMTP HP: 93.91182 |
| Motor Base Adapter: MMA307 | Fan Kit: N/A | Belts: 5VX950 | BG Mnt: 307BGMKPT |
| Motor Base Support: MMS307H | Belt Guard: BGP20 22-34 | | |

Pulley Information

| Location | Pulley Diameter | Face Width | Shaft Diameter | Bearing Journal | Drive Journal | Shaft Length | Lagging | Wrap |
|---|---|---|---|---|---|---|---|---|
| Drive | 12 | 63 | 4-7/16 | 3-7/16 | 2-15/16 | 106 | Yes | 180 |
| Tail | 12 | 63 | 3-15/16 | 2-15/16 | | 87 | | 180 |

**Equipment No. CC3 - 60" x 140' @ 800fpm Inclined Think System Truss Conveyor. Barge to Land conveyor.**

Specific Specification:
This conveyor will be mounted to the deck of the barge at the tail at a height of 40" to 48" and go to the land conveyor system at approximately 20' high and mount to the shore line system.
The conveyor components will have 35 degree rollers.
The return rollers will be set on Kreator EZ slide mounts.
The conveyor will be galvanized.
The tail section will be a wing pulley c/w tail guard.
The head section will come complete with a martin QC1 belt scraper
The head section will come complete with a transition chute to the next conveyor
The electrical on this conveyor will be done back to the control room switch gear.
The conveyor is supplied for site assembly.
Return roller guards included
The belting will be 440PIW 1/4" x 1/8" x 60" grade 2 Flame resistant belting
Vulcanized splice

Generic Specification:
Kreator integral channel design.
The entire main frame of this system is an engineered to structurally withstand forces from X,Y,Z axis. This is not typical in the industry, as a conventional truss designs are engineered to withstand forces from X,Y axis and do an lesser job with the Z axis forces. During flex fatigue failure and catastrophic failure a truss assemble will twist prior to failure, prevent the twist prevent the failure.
Our side plates are laser cut and formed with a calculated corner radius to maximize the twisting resistance of the system
Having the side segments be in one piece 20' long and 30" deep allow us maximum flexibility the side plates have incremental hole spacing throughout the side, top and bottom for mounting idlers, e stop brackets, belt loops, hoods, electrical supports, impact beds, safety guarding, etc. This conveyor is designed so that any field fitting is a bolt on assembly, no expensive damaging field welding required.
The lateral and transverse members of the system are made up of 2" schedule 40 106B pipe with a standard Kreator designed bolted connection. The connection is jointed at the perfect junction to eliminate stress dissipation in the joints, but rather distribute the stress for load sharing.
The system can be purchased as a kit for field erection
Fits into sea containers and is limited on weight before volume like conventional truss assemblies
The majority of the components are interchangeable and reversible for ease of assembly
The design is engineered to ensure proper coating of the materials prior to assembly. This allows for a holiday free coating.
The standard coating is galvanized transverse and lateral supports, and optional painted or galvanized sides.
Our standard color is Orange, although we will paint it to your company color. (optional)
This truss system is engineered for applications in military bridging, municipal walkways due to its cosmetically pleasing appearance. Relieve bridging in catastrophic weather relieve, flood shoring, dynamic load supports, vertical static load supports. The system can be stacked vertically and horizontally to achieve any width and length.
Vertical support columns will be constructed of 4" formed channel or equivalent.
Conveyor to have a walkway down both sides. Right hand side will be tied in to the off load hopper walkway, and the left will be straight down to the tail of the conveyor.

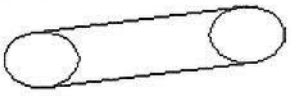
Drive Calculations:

CC3 Barge 60" x 140' barge to shore line sytem

**Material:**

Coal Kreator

| | |
|---|---|
| Repose: | 38 deg |
| Surcharge: | 25 deg |
| Density: | 44 lb/ft$^3$ |
| Maximum Incline: | 22 1 |



| | |
|---|---|
| Location of Gtu: | 0 from tail |
| Location of Drive: | 140 from tail |

Inputs

| | |
|---|---|
| Belt Width: | 60 in |
| Belt Speed: | 800 fpm |
| Capacity: | 2200 tph |
| Length: | 140 ft |
| Lift: | 30 ft |
| Incline: | 12.37 % |
| TU Weight: | 6268 |
| Skirtboard: | 10 |
| Min temp: | 32 F |
| # Plows: | 1 |
| # Scrapers: | 1 |
| % Belt PIW: | 31 % |

Tension Summary

| | |
|---|---|
| Te: | 4549 lbs. |
| T-1: | 8189 lbs |
| T-2: | 3639 lbs. |
| T-t: | 3134 lbs. |
| T-tu: | 3134 lbs. |
| T-head: | 8189 lbs. |
| StartTorque: | 369 ft*lb. |
| HP: | 125 hp |
| Demand HP: | 120 hp |
| % Loaded: | 67 % |
| Theoretical | 3281 tph |

The success of this project will be based on a well understood scope between both parties.
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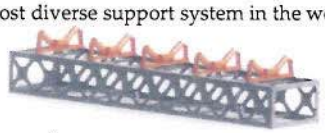

| | Belt Selection: 440 PIW<br>Idler Type: E7 | Capacity: |
|---|---|---|

**Reducer Information**

| | | | |
|---|---|---|---|
| **Motor Type:** Hostile Duty | **Shaft mount reducer:** 415SMTP05B | **Driver Sheave:** N/A | **Belt Qty:** 0 |
| **Motor RPM:** 1750 | **Torque Arm Kit:** 415TAP-HB | **Driver Bushing:** N/A | **V-Belt Svc Factor:** 1.3 |
| **Motor:** H125P2F | **Shaft mount bushing:** 415TBP415B | **Driven Sheave:** N/A | **Reducer Svc Factor:** Class 2 1.4 SF |
| **Motor Base:** MB407-415 | **Backstop:** 415BSP | **Driven Bushing:** N/A | **Mechanical SMTP HP:** 214.582984 |
| **Motor Base Adapter:** MMA407-415 | **Fan Kit:** N/A | **Belts:** N/A | **BG Mnt:** N/A |
| **Motor Base Support:** MMS415H | **Belt Guard:** N/A | | |

Note 3: It is your responsibility to select appropriate shaft diameter. Bushing selected only because it has the MAXIMUM bore this reducer will accept. Larger shaft diameter will require larger reducer.

Note 4: Belt guards are available from PTS, and are required by OSHA to be installed on all Belt drives.

**Pulley Information**

| Location | Pulley Diameter | Face Width | Shaft Diameter | Bearing Journal | Drive Journal | Shaft Length | Lagging | Wrap |
|---|---|---|---|---|---|---|---|---|
| Drive | 14 | 63 | 4-15/16 | 3-15/16 | 4-15/16 | 112 | Yes | 180 |
| Tail | 12 | 63 | 4-7/16 | 3-7/16 | | 87 | | 180 |

Pulley design is based on CEMA standards. Contact pulley manufacturer for exact pulley design, dimensions and load capacity.

**Equipment No. HP1 (20' x 20' load hopper c/w relieving angle bottom and 60 degree sides).**

**Equipment No. HPC2 48" x 24' feeder cartridge set on a constant speed of 120fpm with a 35:1 307SMTP and 25HP motor**

Constructed of ¼" SA36 plate steel and 8" x 26 lbs. wide flange beam

Liner to be removable ¼" AR400 liner

Tapered opening in the bottom of the hopper to control the material discharge and prolong skirting life

The feeder hopper will be mounted on 6" male / female pins in opposing corners

Painted orange and grey c/w yellow guarding

**Equipment No. HP2 (20' x 20' load hopper c/w relieving angle bottom and 60 degree sides).**

**Equipment No. HPC2 48" x 24' feeder cartridge set on a constant speed of 120fpm with a 35:1 307SMTP and 25HP motor**

Constructed of ¼" SA36 plate steel and 8" x 26 lbs. wide flange beam

Liner to be removable ¼" AR400 liner

Tapered opening in the bottom of the hopper to control the material discharge and prolong skirting life

The feeder hopper will be mounted on 6" male / female pins in opposing corners

Painted orange and grey c/w yellow guarding

**Equipment No. HP3 (20' x 20' load hopper c/w relieving angle bottom and 60 degree sides).**

**Equipment No. HPC2 48" x 24' feeder cartridge set on a constant speed of 120fpm with a 35:1 307SMTP and 25HP motor**

Constructed of ¼" SA36 plate steel and 8" x 26 lbs. wide flange beam

Liner to be removable ¼" AR400 liner

Tapered opening in the bottom of the hopper to control the material discharge and prolong skirting life

The feeder hopper will be mounted on 6" male / female pins in opposing corners

Painted orange and grey c/w yellow guarding

**Barge Switch Gear and Lock Out Room**

10' x 20' container with the required switch gear for the barge

This will allow the barge to have a single line running to shore, with the exception of the communications cables

Air conditioning

Vented

Two man doors c/w windows

Window next to each door

Painted Grey

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## Shore Line System

**Equipment No. CC4 (60" x 40' - 800fpm Horizontal Think System Reversible Conveyor).**

Specific Specification:
This conveyor will be mounted to a frame at a height of 30' so that the system will have the flexibility to load 777D rock trucks off the back side if desired.
The conveyor components will have 20 degree rollers.
The conveyor will be galvanized.

30" truss conveyor under the hopper c/w 20 degree rollers spaced every 12"

Drive to be a 25:1 ratio 307STMP shaft mounted gearbox with a 40HP 575volt 60Hz 1800RPM motor

Guarded both sides

No back stop
The tail section will be a drum pulley c/w guard.
The head section will come complete with a martin QC1 belt scraper on both sides of the conveyor
The head section will come complete with a transition chute to the next conveyor
The electrical on this conveyor will be done back to the control room switch gear.
The conveyor is supplied for site assembly.
Return roller guards included
The belting will be 440PIW 1/4" x 1/8" x 60" grade 2 Flame resistant belting
Vulcanized splice

Generic Specification:
Kreator integral channel design.
The entire main frame of this system is an engineered to structurally withstand forces from X,Y,Z axis. This is not typical in the industry, as a conventional truss designs are engineered to withstand forces from X,Y axis and do an lesser job with the Z axis forces. During flex fatigue failure and catastrophic failure a truss assemble will twist prior to failure, prevent the twist prevent the failure.
Our side plates are laser cut and formed with a calculated corner radius to maximize the twisting resistance of the system
Having the side segments be in one piece 20' long and 8" deep allow us maximum flexibility the side plates have incremental hole spacing throughout the side, top and bottom for mounting idlers, e stop brackets, belt loops, hoods, electrical supports, impact beds, safety guarding, etc. This conveyor is designed so that any field fitting is a bolt on assembly, no expensive damaging field welding required.
The lateral and transverse members of the system are made up of 2" schedule 40 106B pipe with a standard Kreator designed bolted connection. The connection is jointed at the perfect junction to eliminate stress dissipation in the joints, but rather distribute the stress for load sharing.
The system can be purchased as a kit for field erection
Fits into sea containers and is limited on weight before volume like conventional truss assemblies
The majority of the components are interchangeable and reversible for ease of assembly
The design is engineered to ensure proper coating of the materials prior to assembly. This allows for a holiday free coating.
The standard coating is galvanized transverse and lateral supports, and optional painted or galvanized sides.
Our standard color is Orange, although we will paint it to your company color. (optional)
This truss system is engineered for applications in military bridging, municipal walkways due to its cosmetically pleasing appearance. Relieve bridging in catastrophic weather relieve, flood shoring, dynamic load supports, vertical static load supports. The system can be stacked vertically and horizontally to achieve any width and length.
Vertical support columns will be constructed of 4" formed channel or equivalent.
Conveyor to have a walkway down both sides. Right hand side will be tied in to the off load hopper walkway, and the left will be straight down to the tail of the conveyor.

**CC4** manual calculations. Lift beyond program scope. Use same drive as CC3. HP required for 30' lift = 67, plus HP for length and speed = 103HP.

CC4 Main transfer conveyor on the shore line system

**Material:**

Coal Kreator

| | |
|---|---|
| **Repose:** | 38 deg |
| **Surcharge:** | 25 deg |
| **Density:** | 44 lb/ft³ |
| **Maximum Incline:** | 22 |

| | |
|---|---|
| **Location of Gtu:** | 0 from tail |
| **Location of Drive:** | 40 from tail |

**Inputs**

| | |
|---|---|
| Belt Width: | 60 in |
| Belt Speed: | 800 fpm |
| Capacity: | 2200 tph |
| Length: | 40 ft |
| Lift: | 0 ft |
| Incline: | 0 % |
| TU Weight: | 4120 |
| Skirtboard: | 10 |
| Min temp: | 32 F |
| # Plows: | 1 |
| # Scrapers: | 1 |
| **% Belt PIW:** | 13 % |
| **Belt Selection:** | 440 PIW |
| **Idler Type:** | E7 |

**Tension Summary**

| | |
|---|---|
| **Te:** | 1427 lbs. |
| **T-1:** | 3481 lbs |
| **T-2:** | 2054 lbs. |
| **T-t:** | 2065 lbs. |
| **T-tu:** | 2065 lbs. |
| **T-head:** | 3481 lbs. |
| **Start Torque:** | 117 ft*lb. |
| **HP:** | 40 hp |
| **Demand HP:** | 38 hp |
| **% Loaded:** | 67 % |
| **Theoretical Capacity:** | 3281 tph |

**Reducer Information**

| | | | |
|---|---|---|---|
| **Motor Type:** | Hostile Duty | **Shaft mount reducer:** | 215SMTP05 | **Driver Sheave:** | 2B5V94 | **Belt Qty:** | 2 |
| **Motor RPM:** | 1750 | **Torque Arm Kit:** | 215TAP-H | **Driver Bushing:** | B 2 1/8 | **V-Belt Svc Factor:** | 1.3 |
| **Motor:** | H40P2E | **Shaft mount bushing:** | 215TBP215 | **Driven Sheave:** | 2B5V124 | **Reducer Svc Factor:** | Class 2 1.4 SF |
| **Motor Base:** | MB215-307 | **Backstop:** | N/A | **Driven Bushing:** | B 1 7/8 | **Mechanical SMTP HP:** | 62.3252012 |
| **Motor Base Adapter:** | MMA215 | **Fan Kit:** | N/A | **Belts:** | 5VX1000 | **BG Mnt:** | 215BGMKPT |

The success of this project will be based on a well understood scope between both parties.
If anything is unclear please indicate what it is and we will send you and revision.
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**Motor Base Support:** MMS215H **Belt Guard:** BGP20 22-34

Pulley Information

| Location | Pulley Diameter | Face Width | Shaft Diameter | Bearing Journal | Drive Journal | Shaft Length | Lagging | Wrap |
|---|---|---|---|---|---|---|---|---|
| Drive | 12 | 63 | 4-7/16 | 3-7/16 | 2-15/16 | 103 | Yes | 180 |
| Tail | 12 | 63 | 3-15/16 | 2-15/16 | | 87 | | 180 |

Pulley design is based on CEMA standards. Contact pulley manufacturer for exact pulley design, dimensions and load capacity.

Bearing Information

| | Bore Size | Type | Left Bearing | Qty | Right Bearing | Qty |
|---|---|---|---|---|---|---|
| Drive | 3-7/16 | Tapered Roller | RPB-307-4 | 1 | ERPB-307-4 | 1 |
| Tail | 2-15/16 | Tapered Roller | RPB-215-4 | 1 | ERPB-215-4 | 1 |

**Equipment No. CC5 (60" x 40' - 800fpm Truss section, shore line truck feed conveyor).**

**This conveyor will receive from the overflow chute to load trucks if desired. This will allow the trucks to drive in parallel with the system.**

Specific Specification:
The conveyor components will have 35 degree rollers.
The conveyor will be galvanized.
The tail section will be a wing pulley c/w tail guard.
The head section will come complete with a martin QC1 belt scraper
The head section will come complete with a transition chute to the next conveyor
The electrical on this conveyor will be done back to the control room switch gear.
The conveyor is supplied for site assembly.
Return roller guards included
The belting will be 440PIW 1/4" x 1/8" x 60" grade 2 Flame resistant belting
Vulcanized splice

Generic Specifications:
Kreator integral truss design.
The entire main frame of this system is an engineered to structurally withstand forces from X,Y,Z axis. This is not typical in the industry, as a conventional truss designs are engineered to withstand forces from X,Y axis and do an lesser job with the Z axis forces. During flex fatigue failure and catastrophic failure a truss assemble will twist prior to failure, prevent the twist prevent the failure.
Our side plates are laser cut and formed with a calculated corner radius to maximize the twisting resistance of the system
Having the side segments be in one piece 20' long and 30" deep allow us maximum flexibility the side plates have incremental hole spacing throughout the side, top and bottom for mounting idlers, e stop brackets, belt loops, hoods, electrical supports, impact beds, safety guarding, etc. This conveyor is designed so that any field fitting is a bolt on assembly, no expensive damaging field welding required.
The lateral and transverse members of the system are made up of 2" schedule 40 106B pipe with a standard Kreator designed bolted connection. The connection is jointed at the perfect junction to eliminate stress dissipation in the joints, but rather distribute the stress for load sharing.
The system can be purchased as a kit for field erection
Fits into sea containers and is limited on weight before volume like conventional truss assemblies
The majority of the components are interchangeable and reversible for ease of assembly
The design is engineered to ensure proper coating of the materials prior to assembly. This allows for a holiday free coating.
The standard coating is galvanized transverse and lateral supports, and optional painted or galvanized sides.
Our standard color is Orange, although we will paint it to your company color. (optional)
This truss system is engineered for applications in military bridging, municipal walkways due to its cosmetically pleasing appearance. Relieve bridging in catastrophic weather relieve, flood shoring, dynamic load supports, vertical static load supports. The system can be stacked vertically and horizontally to achieve any width and length.
Vertical support columns will be constructed of 8" formed channel or equivalent.
Conveyor to have a walkway down both sides. Right hand side will be tied in to the off load hopper walkway, and the left will be straight down to the tail of the conveyor.

440PIW 4 Ply belting

CC5 manual calculations. Lift beyond program scope. Use same drive as CC3. HP required for 30' lift = 67, plus HP for length and speed = 103HP.

CC5 Truck load conveyor off of the main transfer

**Material:**

Coal Kreator

| | |
|---|---|
| **Repose:** | 38 deg |
| Surcharge: | 25 deg |
| Density: | 44 lb/ft$^3$ |
| Maximum Incline: | 22 |

**Inputs**

| | |
|---|---|
| **Belt Width:** | 60 in |
| **Belt Speed:** | 800 fpm |
| **Capacity:** | 2200 tph |
| **Length:** | 40 ft |
| **Lift:** | 0 ft |
| **Incline:** | 0 % |
| **TU Weight:** | 4129 |
| **Skirtboard:** | 10 |

**Tension Summary**

| | |
|---|---|
| **Te:** | 1427 lbs. |
| **T-1:** | 3481 lbs |
| **T-2:** | 2054 lbs. |
| **T-t:** | 2065 lbs. |
| **T-tu:** | 2065 lbs. |
| **T-head:** | 3481 lbs. |
| **Start Torque:** | 117 ft*lb. |
| **HP:** | 40 hp |

The success of this project will be based on a well understood scope between both parties.
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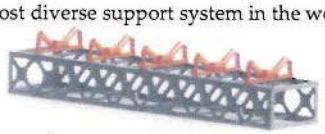

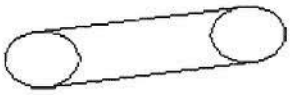

| | |
|---|---|
| **Location of Gtu:** | 0 from tail |
| **Location of Drive:** | 40 from tail |

**Min temp:** 32 F
**# Plows:** 1
**# Scrapers:** 1
**% Belt PIW:** 13 %
**Belt Selection:** 440 PIW
**Idler Type:** E7

**Demand HP:** 38 hp
**% Loaded:** 67 %

**Theoretical Capacity:** 3281 tph

**Reducer Information**

**Motor Type:** Hostile Duty
**Motor RPM:** 1750
**Motor:** H40P2E
**Motor Base:** MB215-307
**Motor Base Adapter:** MMA215
**Motor Base Support:** MMS215H

**Shaft mount reducer:** 215SMTP05
**Torque Arm Kit:** 215TAP-H
**Shaft mount bushing:** 215TBP215
**Backstop:** N/A
**Fan Kit:** N/A
**Belt Guard:** BGP20 22-34

**Driver Sheave:** 2B5V94
**Driver Bushing:** B 2 1/8
**Driven Sheave:** 2B5V124
**Driven Bushing:** B 1 7/8
**Belts:** 5VX1000

**Belt Qty:** 2
**V-Belt Svc Factor:** 1.3
**Reducer Svc Factor:** Class 2 1.4 SF
**Mechanical SMTP HP:** 62.3252012
**BG Mnt:** 215BGMKPT

Pulley Information

| Location | Pulley Diameter | Face Width | Shaft Diameter | Bearing Journal | Drive Journal | Shaft Length | Lagging | Wrap |
|---|---|---|---|---|---|---|---|---|
| Drive | 12 | 63 | 4-7/16 | 3-7/16 | 2-15/16 | 103 | Yes | 180 |
| Tail | 12 | 63 | 3-15/16 | 2-15/16 | | 87 | | 180 |

Pulley design is based on CEMA standards. Contact pulley manufacturer for exact pulley design, dimensions and load capacity.

Bearing Information

| | Bore Size | Type | Left Bearing | Qty | Right Bearing | Qty |
|---|---|---|---|---|---|---|
| Drive | 3-7/16 | Tapered Roller | RPB-307-4 | 1 | ERPB-307-4 | 1 |
| Tail | 2-15/16 | Tapered Roller | RPB-215-4 | 1 | ERPB-215-4 | 1 |

**Equipment No. CC6 - 60" x 435' - 800fpm Horizontal Think System Channel Conveyor that will be directional to the stock pile area from the barge main transfer. (800fpm)**

Specific Specification:
The conveyor components will have 35 degree rollers.
The conveyor will be galvanized.

30 truss conveyor under the hopper c/w 20 degree rollers spaced every 12"

Drive to be a 25:1 ratio 307STMP shaft mounted gearbox with a 40HP 575volt 60Hz 1800RPM motor

Guarded both sides

No back stop
The tail section will be a drum pulley c/w guard.
The head section will come complete with a martin QC1 belt scraper
The head section will come complete with a transition chute to the next conveyor
The electrical on this conveyor will be done back to the control room switch gear.
The conveyor is supplied for site assembly.
Return roller guards included
The belting will be 440PIW 1/4" x 1/8" x 60" grade 2 Flame resistant belting
Vulcanized splice

Generic Specification:
Kreator integral channel design.
The entire main frame of this system is an engineered to structurally withstand forces from X,Y,Z axis. This is not typical in the industry, as a conventional truss designs are engineered to withstand forces from X,Y axis and do an lesser job with the Z axis forces. During flex fatigue failure and catastrophic failure a truss assemble will twist prior to failure, prevent the twist prevent the failure.
Our side plates are laser cut and formed with a calculated corner radius to maximize the twisting resistance of the system
Having the side segments be in one piece 20' long and 8" deep allow us maximum flexibility the side plates have incremental hole spacing throughout the side, top and bottom for mounting idlers, e stop brackets, belt loops, hoods, electrical supports, impact beds, safety guarding, etc. This conveyor is designed so that any field fitting is a bolt on assembly, no expensive damaging field welding required.
The lateral and transverse members of the system are made up of 2" schedule 40 106B pipe with a standard Kreator designed bolted connection. The connection is jointed at the perfect junction to eliminate stress dissipation in the joints, but rather distribute the stress for load sharing.
The system can be purchased as a kit for field erection
Fits into sea containers and is limited on weight before volume like conventional truss assemblies
The majority of the components are interchangeable and reversible for ease of assembly
The design is engineered to ensure proper coating of the materials prior to assembly. This allows for a holiday free coating.
The standard coating is galvanized transverse and lateral supports, and optional painted or galvanized sides.
Our standard color is Orange, although we will paint it to your company color. (optional)
This truss system is engineered for applications in military bridging, municipal walkways due to its cosmetically pleasing appearance. Relieve bridging in catastrophic weather relieve, flood

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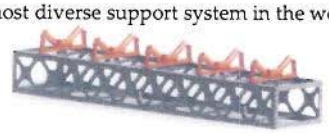

shoring, dynamic load supports, vertical static load supports. The system can be stacked vertically and horizontally to achieve any width and length.
Vertical support columns will be constructed of 4" formed channel or equivalent.
Conveyor to have a walkway down both sides. Right hand side will be tied in to the off load hopper walkway, and the left will be straight down to the tail of the conveyor.

Drive Calculations:
Typical to CC3

**Equipment No. CC7 - 60" x 200' - 800fpm Horizontal Think System Channel Conveyor that will be directional to the stock pile area from the barge main transfer.**

Specific Specification:
The conveyor components will have 35 degree rollers.
The conveyor will be galvanized.
The tail section will be a wing pulley c/w tail guard.
The head section will come complete with a martin QC1 belt scraper
The head section will come complete with a transition chute to the next conveyor
The electrical on this conveyor will be done back to the control room switch gear.
The conveyor is supplied for site assembly.
Return roller guards included
The belting will be 440PIW 1/4" x 1/8" x 60" grade 2 with Vulcanized splice Flame resistant belting

Generic Specification:
Kreator integral truss design.
The entire main frame of this system is an engineered to structurally withstand forces from X,Y,Z axis. This is not typical in the industry, as a conventional truss designs are engineered to withstand forces from X,Y axis and do an lesser job with the Z axis forces. During flex fatigue failure and catastrophic failure a truss assemble will twist prior to failure, prevent the twist prevent the failure.
Our side plates are laser cut and formed with a calculated corner radius to maximize the twisting resistance of the system
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The lateral and transverse members of the system are made up of 2" schedule 40 106B pipe with a standard Kreator designed bolted connection. The connection is jointed at the perfect junction to eliminate stress dissipation in the joints, but rather distribute the stress for load sharing.
The system can be purchased as a kit for field erection
Fits into sea containers and is limited on weight before volume like conventional truss assemblies
The majority of the components are interchangeable and reversible for ease of assembly
The design is engineered to ensure proper coating of the materials prior to assembly. This allows for a holiday free coating.
The standard coating is galvanized transverse and lateral supports, and optional painted or galvanized sides.
Our standard color is Orange, although we will paint it to your company color. (optional)
This truss system is engineered for applications in military bridging, municipal walkways due to its cosmetically pleasing appearance. Relieve bridging in catastrophic weather relieve, flood shoring, dynamic load supports, vertical static load supports. The system can be stacked vertically and horizontally to achieve any width and length.
Head section with walkways down both sides to stairs and stairs to grade.
Guarded both sides
440PIW 4 Ply belting

Drive Calculations:
Typical to CC3

**Equipment No. CC8 - 60" x 210' - 800fpm Horizontal Think System Channel Conveyor that will be directional to the stock pile area from the barge main transfer.**

Specific Specification:
This conveyor will be mounted under the frame of the reversing conveyor and span from the coal storage area to the ship loader.
This conveyor will come complete with a fold or a slide (final decision will come out in the design)
The conveyor components will have 35 degree rollers.
The return rollers will be set on Kreator EZ slide mounts.
The conveyor will be galvanized.
The tail section will be a wing pulley c/w tail guard.
The head section will come complete with a martin QC1 belt scraper
The head section will come complete with a transition chute to the next conveyor
The electrical on this conveyor will be done back to the control room switch gear.
The conveyor is supplied for site assembly.
Return roller guards included
The belting will be 440PIW 1/4" x 1/8" x 60" grade 2 Vulcanized splice Flame resistant belting

Generic Specification:
Kreator integral truss design.
The entire main frame of this system is an engineered to structurally withstand forces from X,Y,Z axis. This is not typical in the industry, as a conventional truss designs are engineered to withstand forces from X,Y axis and do an lesser job with the Z axis forces. During flex fatigue failure and catastrophic failure a truss assemble will twist prior to failure, prevent the twist prevent the failure.
Our side plates are laser cut and formed with a calculated corner radius to maximize the twisting resistance of the system
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field welding required.
The lateral and transverse members of the system are made up of 2" schedule 40 106B pipe with a standard Kreator designed bolted connection. The connection is jointed at the perfect junction to eliminate stress dissipation in the joints, but rather distribute the stress for load sharing.
The system can be purchased as a kit for field erection
Fits into sea containers and is limited on weight before volume like conventional truss assemblies
The majority of the components are interchangeable and reversible for ease of assembly
The design is engineered to ensure proper coating of the materials prior to assembly. This allows for a holiday free coating.
The standard coating is galvanized transverse and lateral supports, and optional painted or galvanized sides.
Our standard color is Orange, although we will paint it to your company color. (optional)
This truss system is engineered for applications in military bridging, municipal walkways due to its cosmetically pleasing appearance. Relieve bridging in catastrophic weather relieve, flood shoring, dynamic load supports, vertical static load supports. The system can be stacked vertically and horizontally to achieve any width and length.
Head section with walkways down both sides to stairs and stairs to grade.
Guarded both sides
440PIW 4 Ply belting ¼" x 1/8" Grade 2

Drive Calculations:
Typical to CC3

**Two re-feed points that will sit over the 60" conveyor on (CC6,7,8)**

Constructed of ¼" SA36 plate steel and 8" x 26 lbs. wide flange beam

Liner to be removable ¼" AR400 liner

Tapered opening in the bottom of the hopper to control the material discharge and prolong skirting life

System guarded to local standards

Painted orange and grey c/w yellow guarding

Follow through sides

**Equipment No. CC9 - 60" x 1200' - 800fpm Horizontal Think System Channel Conveyor that will be directional from the stock pile area to the ship loader under the main barge transfer.**

Specific Specification:
This conveyor will be mounted under the frame of the reversing conveyor and span from the coal storage area to the ship loader.
This conveyor will come complete with a fold or a slide (final decision will come out in the design)
The conveyor components will have 35 degree rollers.
The return rollers will be set on Kreator EZ slide mounts.
The conveyor will be galvanized.
The tail section will be a wing pulley c/w tail guard.
The head section will come complete with a martin QC1 belt scraper
The head section will come complete with a transition chute to the next conveyor
The electrical on this conveyor will be done back to the control room switch gear.
The conveyor is supplied for site assembly.
Return roller guards included
The belting will be 440PIW 1/4" x 1/8" x 60" grade 2 Vulcanized splice Flame resistant belting

Generic Specification:
Kreator integral truss design.
The entire main frame of this system is an engineered to structurally withstand forces from X,Y,Z axis. This is not typical in the industry, as a conventional truss designs are engineered to withstand forces from X,Y axis and do an lesser job with the Z axis forces. During flex fatigue failure and catastrophic failure a truss assemble will twist prior to failure, prevent the twist prevent the failure.
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The system can be purchased as a kit for field erection
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The majority of the components are interchangeable and reversible for ease of assembly
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Our standard color is Orange, although we will paint it to your company color. (optional)
This truss system is engineered for applications in military bridging, municipal walkways due to its cosmetically pleasing appearance. Relieve bridging in catastrophic weather relieve, flood shoring, dynamic load supports, vertical static load supports. The system can be stacked vertically and horizontally to achieve any width and length.
Head section with walkways down both sides to stairs and stairs to grade.
Guarded both sides
440PIW 4 Ply belting ¼" x 1/8" Grade 2

Drive Calculations:

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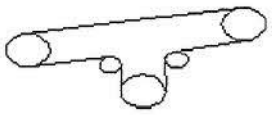
CC9 directional conveyor from the far side of the stockpile area to the Ship loader

**Material:**

Coal Kreator

| | |
|---|---|
| **Repose:** | 38 deg |
| **Surcharge:** | 25 deg |
| **Density:** | 44 lb/ft³ |
| **Maximum Incline:** | 22 |



| | |
|---|---|
| **Location of Gtu:** | 600 from tail |
| **Location of Drive:** | 1200 from tail |

**Inputs**

| | |
|---|---|
| **Belt Width:** | 60 in |
| **Belt Speed:** | 850 fpm |
| **Capacity:** | 3025 tph |
| **Length:** | 1200 ft |
| **Lift:** | 25 ft |
| **Incline:** | 1.19 % |
| **TU Weight:** | 9619 |
| **Skirtboard:** | 10 |
| **Min temp:** | 32 F |
| **# Plows:** | 1 |
| **# Scrapers:** | 1 |
| **% Belt PIW:** | 55 % |
| **Belt Selection:** | 440 PIW |
| **Idler Type:** | E7 |

**Tension Summary**

| | |
|---|---|
| **Te:** | 9746 lbs. |
| **T-1:** | 14619 lbs |
| **T-2:** | 4873 lbs. |
| **T-t:** | 4746 lbs. |
| **T-tu:** | 4809 lbs. |
| **T-head:** | 14619 lbs. |
| **StartTorque:** | 1069 ft*lb. |
| **HP:** | 300 hp |
| **Demand HP:** | 267 hp |
| **% Loaded:** | 92 % |
| **Theoretical Capacity:** | 3691 tph |

No shaft mount solution found

**Pulley Information**

| Location | Pulley Diameter | Face Width | Shaft Diameter | Bearing Journal | Drive Journal | Shaft Length | Lagging | Wrap |
|---|---|---|---|---|---|---|---|---|
| Drive | 24 | 63 | 5-15/16 | 4-15/16 | None | 0 | Yes | 180 |
| Tail | 12 | 63 | 4-15/16 | 3-15/16 | | 87 | | 180 |
| Bend 1 | 16 | 63 | 4-7/16 | 3-7/16 | | 87 | | 90 |
| Bend 2 | 16 | 63 | 4-7/16 | 3-7/16 | | 87 | | 90 |
| TakeUp | 12 | 63 | 4-15/16 | 3-15/16 | | 87 | | 180 |

Pulley design is based on CEMA standards. Contact pulley manufacturer for exact pulley design, dimensions and load capacity.

**Bearing Information**

| | Bore Size | Type | Left Bearing | Qty | Right Bearing | Qty |
|---|---|---|---|---|---|---|
| Drive | 4-15/16 | Tapered Roller | RPB-415-4 | 1 | ERPB-415-4 | 1 |
| Tail | 3-15/16 | Tapered Roller | RPB-315-4 | 1 | ERPB-315-4 | 1 |
| Bend 1 | 3-7/16 | Tapered Roller | RPB-307-4 | 1 | ERPB-307-4 | 1 |
| Bend 2 | 3-7/16 | Tapered Roller | RPB-307-4 | 1 | ERPB-307-4 | 1 |
| TakeUp | 3-15/16 | Tapered Roller | RPB-315-4 | 1 | ERPB-315-4 | 1 |

This solution is based on the use of PTS Components. Substitution of competitive product may result in reduced drive life and/or unsatisfactory performance.

**CC10 & CC11 - Two (2) 60" x 60' Portable Feeders (Pit Portable)**

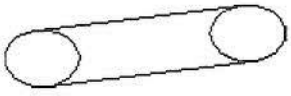
Drive Calculations:

CC10 + 11 Portable Feeders

**Material:**

Coal Kreator

| | |
|---|---|
| **Repose:** | 38 deg |
| **Surcharge:** | 25 deg |
| **Density:** | 44 lb/ft³ |
| **Maximum Incline:** | 22 lb/ft³ |



| | |
|---|---|
| **Location of Gtu:** | 0 from tail |
| **Location of Drive:** | 60 from tail |

**Inputs**

| | |
|---|---|
| **Belt Width:** | 60 in |
| **Belt Speed:** | 900 fpm |
| **Capacity:** | 3025 tph |
| **Length:** | 60 ft |
| **Lift:** | 12 ft |
| **Incline:** | 11.54 % |
| **TU Weight:** | 5442 |
| **Skirtboard:** | 10 |
| **Min temp:** | 32 F |
| **# Plows:** | 1 |
| **# Scrapers:** | 1 |
| **% Belt PIW:** | 24 % |

**Tension Summary**

| | |
|---|---|
| **Te:** | 3298 lbs. |
| **T-1:** | 6220 lbs |
| **T-2:** | 2922 lbs. |
| **T-t:** | 2721 lbs. |
| **T-tu:** | 2721 lbs. |
| **T-head:** | 6220 lbs. |
| **StartTorque:** | 264 ft*lb. |
| **HP:** | 100 hp |
| **Demand HP:** | 89 hp |
| **% Loaded:** | 92 % |
| **Theoretical** | 3691 tph |

The success of this project will be based on a well understood scope between both parties.
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| | Belt Selection: 440 PIW<br>Idler Type: E7 | Capacity: |
|---|---|---|

**Reducer Information 286 RPM**

| | | | |
|---|---|---|---|
| **Motor Type:** Hostile Duty | **Shaft mount reducer:** 407SMTP05B | **Driver Sheave:** N/A | **Belt Qty:** 0 |
| **Motor RPM:** 1750 | **Torque Arm Kit:** 407TAP-HB | **Driver Bushing:** N/A | **V-Belt Svc Factor:** 1.3 |
| **Motor:** H100P2E | **Shaft mount bushing:** 407TBP215B | **Driven Sheave:** N/A | **Reducer Svc Factor:** Class 2 1.4 SF |
| **Motor Base:** MB407-415 | **Backstop:** 407BSP | **Driven Bushing:** N/A | **Mechanical SMTP HP:** 184.196629 |
| **Motor Base Adapter:** MMA407-415 | **Fan Kit:** N/A | **Belts:** N/A | **BG Mnt:** N/A |
| **Motor Base Support:** MMS407H | **Belt Guard:** N/A | | |

Note 4: Belt guards are available from PTS, and are required by OSHA to be installed on all Belt drives.

Pulley Information

| Location | Pulley Diameter | Face Width | Shaft Diameter | Bearing Journal | Drive Journal | Shaft Length | Lagging | Wrap |
|---|---|---|---|---|---|---|---|---|
| Drive | 12 | 63 | 4-15/16 | 3-15/16 | 2-15/16 | 109 | Yes | 180 |
| Tail | 12 | 63 | 4-7/16 | 3-7/16 | | 87 | | 180 |

Pulley design is based on CEMA standards. Contact pulley manufacturer for exact pulley design, dimensions and load capacity.

Bearing Information

| | Bore Size | Type | Left Bearing | Qty | Right Bearing | Qty |
|---|---|---|---|---|---|---|
| Drive | 3-15/16 | Tapered Roller | RPB-315-4 | 1 | ERPB-315-4 | 1 |
| Tail | 3-7/16 | Tapered Roller | RPB-307-4 | 1 | ERPB-307-4 | 1 |

**CC12 & CC13 - Two (2) 60" x 60' jump conveyors (Pit Portable) The system will have the switch gear and cables installed for four additional jump conveyors for future expansion. These are recommended to be purchased with the system to truly utilize the coal storage footprint.**

Drive Calculations:
Typical to CC10 and CC11

**CC14 & CC15 - Two (2) 60" x 125' stackers Truss Pit Portable**

Drive Calculations:
Typical to CC3

Generic Specifications:
Kreator integral truss design.
The entire main frame of this system is an engineered to structurally withstand forces from X,Y,Z axis. This is not typical in the industry, as a conventional truss designs are engineered to withstand forces from X,Y axis and do an lesser job with the Z axis forces. During flex fatigue failure and catastrophic failure a truss assemble will twist prior to failure, prevent the twist prevent the failure.
Our side plates are laser cut and formed with a calculated corner radius to maximize the twisting resistance of the system
Having the side segments be in one piece 20' long and 30" deep allow us maximum flexibility the side plates have incremental hole spacing throughout the side, top and bottom for mounting idlers, e stop brackets, belt loops, hoods, electrical supports, impact beds, safety guarding, etc. This conveyor is designed so that any field fitting is a bolt on assembly, no expensive damaging field welding required.
The lateral and transverse members of the system are made up of 2" schedule 40 106B pipe with a standard Kreator designed bolted connection. The connection is jointed at the perfect junction to eliminate stress dissipation in the joints, but rather distribute the stress for load sharing.
The system can be purchased as a kit for field erection
Fits into sea containers and is limited on weight before volume like conventional truss assembles
The majority of the components are interchangeable and reversible for ease of assembly
The design is engineered to ensure proper coating of the materials prior to assembly. This allows for a holiday free coating.
The standard coating is galvanized transverse and lateral supports, and optional painted or galvanized sides.
Our standard color is Orange, although we will paint it to your company color. (optional)
This truss system is engineered for applications in military bridging, municipal walkways due to its cosmetically pleasing appearance. Relieve bridging in catastrophic weather relieve, flood shoring, dynamic load supports, vertical static load supports. The system can be stacked vertically and horizontally to achieve any width and length.

The success of this project will be based on a well understood scope between both parties.
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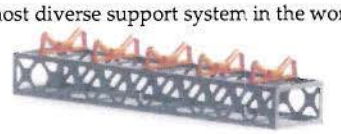


**Installation:**
The existing conveyor would be removed by the Kreator. Conveyor must be in a Zero Energy State prior to Commencement of work.
Installation of all equipment listed above included

**Civil Works:**
Form and set rebar
Prepare for the pour
Manage the pour
Final finishing

*0*

**Electrical:**
All conveyors wired back to the control room
Installation of the cables
E stops
Switch gear and set up of the control room
The entire system with be equipped for a double light standard at most transfer points

**Control Room and Switch Gear Room:**
Two level switch gear room
Sea Can assembly c/w stairs connecting the two
Air conditioning in both
Tower to have a captain's chair and storage
Stairs from the ground
Painted and decaled to match the installation

**Conveyor Cross Overs (3) three units supplied:**
Stairs up both sides with a walkway across for access

---

*Thank you for this opportunity.*

Wm. Keith Miles President & C.E.O.
KREATOR Equipment & Services Inc
C 647 234 7378 T 519 941 7876 F 519 941 6240
TF 1 855 KREATOR (573 2867) www.kreatorequipment.com

The success of this project will be based on a well understood scope between both parties.
If anything is unclear please indicate what it is and we will send you and revision.
Thank you for the interest in our company.

## KREATOR Equipment & Services Inc. Standard Terms and Conditions of Sale

1. **OFFER AND ACCEPTANCE**. This order is accepted on and subject to the following terms and conditions. Seller's acceptance of any offer by Buyer to purchase the merchandise is expressly conditional upon the Buyer's assent to all of the terms and conditions herein, including any terms additional to or different from those contained in the offer to purchase. Seller hereby objects to any different or additional terms or conditions contained in any acceptance by Buyer of any offer made by Seller or in any other documents submitted by Buyer. If the merchandise set forth in the reverse hereof are being provided pursuant to a quotation in writing from Seller, the terms of such quotation shall apply to this sale as they differ from those general conditions of sale and, in all other respects, these general conditions of sale shall govern. The above applies even if Buyer previously submitted a purchase order or other document that limits acceptance by Seller to terms of that purchase order.

2. **TAXES**. Buyer shall pay all taxes and charges of any nature imposed by any federal, provincial, or local governmental authority by reason of the sale or delivery of the merchandise described herein whether levied or assessed against Seller, Buyer, or the merchandise. Such applicable taxes or charges, if not included in this invoice, shall be invoiced separately.

3. **LIMITATION OF LIABILITY AND REMEDY**. In no event, whether arising out of breach of contract, warranty or tort shall Seller be liable to Buyer, or to any third party, for any direct, indirect, consequential or incidental damages, including, but not limited to loss of profits or revenues, loss of use of equipment or services furnished by Seller, damage to associated equipment, costs of capital, substitute products, facilities, replacement power or down-tome costs. Buyer assumes all other risks and liabilities for any loss, damage or injury to persons, property, or the environment arising from the use of the equipment. Buyer agrees to identify and hold Seller harmless from all claims, actions, suits, demands, and judgments arising from actions brought under the occupational safety and health act or other governmental regulations or laws. Buyer expressly agrees that the remedies granted to it hereunder are Buyer's sole and exclusive remedies with respect to any claim of Buyer arising under this Contract.

The liability of seller shall not, whether for breach of contract, breach of warranty or any other circumstances exceed the purchase price of the products furnished.

4. **TERMINATION**. Buyer may cancel its order only with the written consent of Seller and upon terms that will indemnify Seller for any loss, damage and expense arising from such cancellation. Seller may terminate this contract as a result of an act of force majeure as defined in Paragraph 8 hereof, and in such event, Seller shall have no further liability to produce or ship any equipment hereunder and shall have no liability for damages to Buyer or others. If Seller terminates this contract, other than as result of an act of force majeure, Seller's sole liability shall be to use reasonable efforts to obtain similar products from another source at a price not to exceed Seller's quoted price for the equipment.

5. **TECHNICAL ADVICE**. Seller's warranty shall not be enlarged, and no obligation or liability shall arise out of Seller's rendering of technical advice, in connection with Buyer's order of the equipment. Any technical advice furnished, or recommendation made by Seller or any employee or representative of Seller, concerning any use or application of any equipment or parts furnished under this Contract is believed to be reliable, but Seller makes no warranty, express or implied, of results to be obtained. Buyer shall assume all responsibility for loss or damage resulting from the handling or use of any such equipment or parts in accordance with such technical advice.

6. **ASSIGNMENT** Buyer shall not assign its rights or obligations under this Contract without Seller's prior written consent. Buyer shall not assert against any assignee of Seller of this Contract (or any part hereof) any claim or defense that it may have against Seller.

7. **GOVERNING LAW**. The validity, interpretation and performance of the terms and conditions of this Contract shall be governed and construed in accordance with the laws of the Province of Ontario, Canada.

8. **FORCE MAJEURE**. Seller does not assume the risk of and shall not be liable for failure to perform any obligation relating to the sale of the equipment caused by civil insurrection, war, fire, strike, labor stoppages or other labor disturbances, acts of God, acts or omission of Buyer, acts or omission of the Canadian Government, floods, epidemics, freight embargoes, shortages of fuel, energy or materials, failure of suppliers or subcontractors to satisfactorily meet scheduled deliveries, or any other cause beyond the control of Seller.

9. **TIME FOR CLAIMS**. Any action by Buyer based on a claim arising out of this Contract must be commenced within in year after the basis for such claim could reasonably have been discovered.

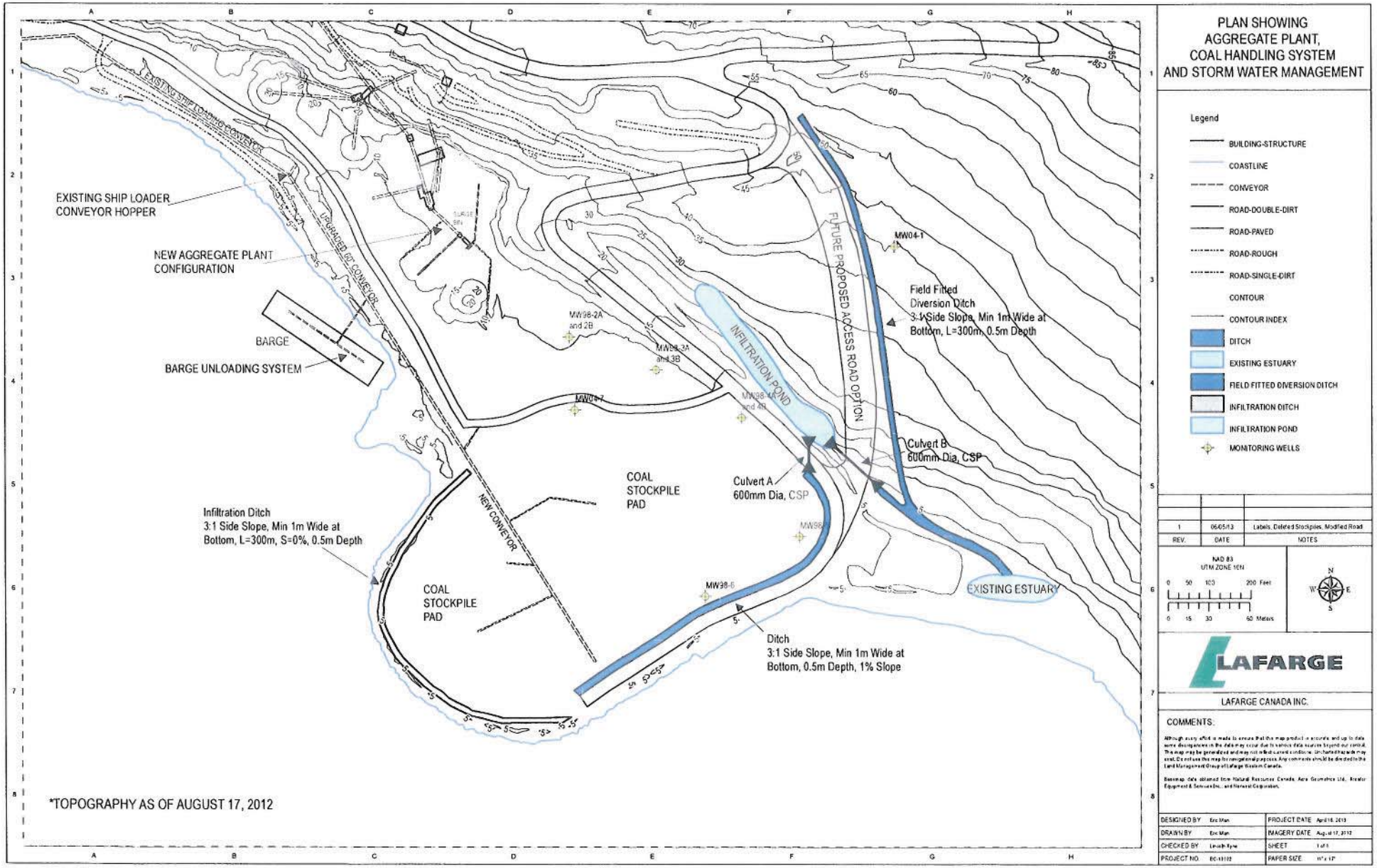
10. **ENTIRE AGREEMENT**. The terms set forth herein constitute the sole terms and conditions of the contract between Buyer and Seller. No other warranty term, condition or understanding, weather oral or written shall be binding upon Seller, unless hereafter made in writing and signed by Seller's authorized representative.

*THANK YOU,*

*THE KREATOR Team*



The success of this project will be based on a well understood scope between both parties.
If anything is unclear please indicate what it is and we will send you and revision.
Thank you for the interest in our company.


PLAN SHOWING
AGGREGATE PLANT,
COAL HANDLING SYSTEM
AND STORM WATER MANAGEMENT
Legend
BUILDING-STRUCTURE
COASTLINE
CONVEYOR
ROAD-DOUBLE-DIRT
ROAD-PAVED
ROAD-ROUGH
ROAD-SINGLE-DIRT
CONTOUR
CONTOUR INDEX
DITCH
EXISTING ESTUARY
FIELD FITTED DIVERSION DITCH
INFILTRATION DITCH
INFILTRATION POND
MONITORING WELLS
EXISTING SHIP LOADING CONVEYOR
EXISTING SHIP LOADER CONVEYOR HOPPER
NEW AGGREGATE PLANT CONFIGURATION
UPGRADED 60" CONVEYOR
BARGE
BARGE UNLOADING SYSTEM
MW98-2A and 2B
MW98-3A and 3B
MW04-7
MW98-4A and 4B
MW04-1
FUTURE PROPOSED ACCESS ROAD OPTION
Field Fitted Diversion Ditch 3:1 Side Slope, Min 1m Wide at Bottom, L=300m, 0.5m Depth
INFILTRATION POND
Culvert B 600mm Dia, CSP
Culvert A 600mm Dia, CSP
COAL STOCKPILE PAD
NEW CONVEYOR
Infiltration Ditch 3:1 Side Slope, Min 1m Wide at Bottom, L=300m, S=0%, 0.5m Depth
COAL STOCKPILE PAD
MW98-5
MW98-6
EXISTING ESTUARY
Ditch 3:1 Side Slope, Min 1m Wide at Bottom, 0.5m Depth, 1% Slope
*TOPOGRAPHY AS OF AUGUST 17, 2012
REV. 1 DATE 06/05/13 NOTES Labels, Deleted Stockpiles, Modified Road
NAD 83
UTM ZONE 10N
0 50 100 200 Feet
0 15 30 60 Meters
N W E S
LAFARGE
LAFARGE CANADA INC.
COMMENTS:
DESIGNED BY Eric Man
DRAWN BY Eric Man
CHECKED BY Lindsay Kyle
PROJECT NO. BC-13102
PROJECT DATE April 16, 2013
IMAGERY DATE Aug. of 17, 2012
SHEET 1 of 1
PAPER SIZE 11" x 17"

June 5, 1990 File: 14745-20

Ideal Cement Company Limited
P. O. Box 160
Vananda, B. C.
VON 3KO

Attention: P. M. Stiles, General Manager

Dear Sir:

Re: Barge and Ship Loading Facilities
Texada Island

Following a referral to other agencies of the proposed use of the existing Texada Mine shipping facility for storing and loading out coal to Panamex size vessels, listed below are some of the requirements.

1. The loading of ships with coal shall be carried out in such a manner as to prevent coal from entering the water or foreshore.

2. Dust suppression equipment such as sprinkling systems to be available to prevent coal or dust from leaving the stockpile area.

3. A berm of limestone or similar material to be installed around the foreshore side of the stockpile with a clear strip being left between the berm and base of the coal stockpile.

Your attention to the aforementioned requirements will be appreciated.

Yours truly,

R. Bone, P. Eng.,
District Inspector of Mines and
Resident Engineer

RB\gp

Government of Canada
Fisheries and Oceans

Gouvernement du Canada
Pêches et Océans

Fisheries Branch
South Coast Division
3225 Stephenson Pt. Rd.
Nanaimo, B.C. V9T 1K3
(604) 756-7270
Fax (604) 758-9600



Your file Votre référence

Our file Notre référence

5795-1-PE

May 16, 1990

Mr. R. Bone, P. Eng.
Inspector of Mines
Ministry of Energy, Mines and Petroleum Resources
1 A 3411 Shenton Road
Namaimo, B.C.
V9T 2H1

Dear Sir:

**RE; BARGE AND SHIP LOADING FACILITIES**
IDEAL CEMENT-TEXADA ISLAND

The Department of Fisheries and Oceans reviewed your memo and accompanying letters from Ideal Cement reguarding the above subject and we have no objections to this proposal.

However we request that the following conditions be adhered to:

1: The loading of ships with coal shall be carried out in such a manner to prevent coal from entering the water or foreshore.

2: Dust suppresion equipment such as a sprinkling system should be available to prevent coal or dust from leaving the stockpile area.

Should you require any clarification please call the undersigned at 756-7266.

Yours truly,

B. Lawley

Barry Lawley
Habitat Technician

cc F.O. i/c Powell River

FILE NO.

To: All Vancouver Island Mine
Development Review Committee Members

May 10, 1990

File: 11000-01
204-20

Bob Bone, Eng. & Insp. Branch, Nanaimo
Eric Beresford, Eng. & Insp. Branch, Nanaimo
Jorge Alvarez, Eng. & Insp. Branch, Nanaimo
Paul Pashnik, MOF, Port Alberni
Ted Oldham, Waste Man. Branch, MOE, Nanaimo
Paul Wilton, Applied Geol. Branch, Victoria
Bill Hollingshead, Water Man. Branch, MOE, Nanaimo
Doug Morrison, Fish & Wildlife Branch, MOE, Nanaimo
Darcy Yule, MOF, Campbell River
Gerry Kaspryk, Pol. Analysis, MOAF, Victoria
Barry Lawley, Dept. of Fisheries & Oceans, Nanaimo
Keith Ferguson, Env. Prot. Service, Vancouver
Rik Simmons, MOP, Vancouver Island Region (Parks)
Doug Berry, Vancouver Island Region, MOCL, Victoria
Terry Pollock, Dept. of Highways

RE: Barge and Ship Loading Facilities - Ideal Cement, Texada Island

Please find attached letters from P.M. Stiles regarding transhipment of coal.

The stockpile area is within the mining Permit #M-66 still in existence for the underground mine belonging originally to Texada Mines. The permit does allow for the storing and handling of other products and is specifically stated in the conditions of the permit. However, would you please inform me if you have any comments regarding the proposal.

The loading facility originally handled copper and magnetite concentrates. If you can think of any conditions that may be appropriate please call. I will be requesting that a low-grade limestone berm be erected around the seaward side of the stockpile as a containment structure.

Your prompt reply will be appreciated.

Yours truly,

R. Bone, P. Eng.
Chairman
Vancouver Island MDRC

RB/km

enc.

Ideal Cement Company
Limited

P.O. Box 160
Vananda, British Columbia V0N 3K0
604 689-7627

IDEAL

May 8th, 1990

Mr. R. Bone
Inspector of Mines & Resident Engineer
Ministry of Energy, Mines, & Petroleum Resources
1A, 3411 Shenton Road
NANAIMO, B. C.
V9T 2H1

Re: Reclamation Permit No. M-66

Dear Sir:

I wish to make application under an existing reclamation permit - M-66 - to extend the terms of that permit to include the transhipment of coal. Coal will be received on barges, unloaded at the existing barge ramp and stockpiled. The stockpiled coal will be reclaimed and loaded on ships with the existing ship loader. Repairs of the dock structure, shiploader, and shore facilities are in progress.

The coal stockpile area has been covered with a layer of white limestone which will have three functions:-

1. to act as an indicator when reclaiming coal for shipment,
2. to act as an acid drainage neutralizer should there be any need,
3. to assist in clean-up after the coal handling has ceased. The mixture of limestone and coal remaining will be shipped to a cement plant.

The stockpile is situated on the former Texada Iron Mines tailings pile, more particularly on Lots 606 and 575. It is well removed from private dwellings and private property. The terms of the water lot allow for the "storing of other products as may be handled" hence allowing the handling of coal.

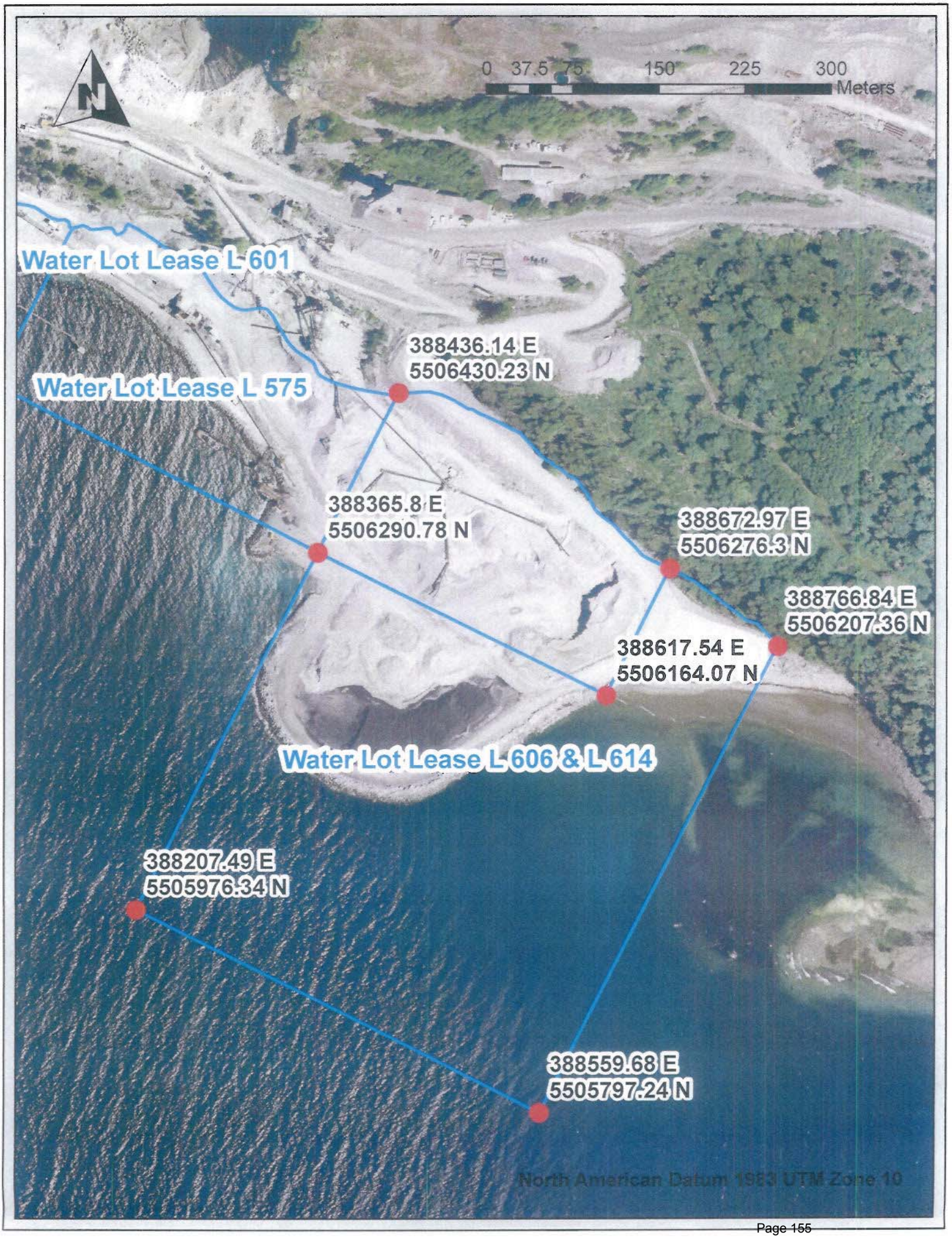
Your attention to this application will be much appreciated, particularly with the time constraints we find ourselves under.

Yours truly,
IDEAL CEMENT COMPANY LTD.

P. M. Stiles
General Manager

PMS:mcs

cc: Mr. R.W. McGinn
Chief Insp of Mines


N
0 37.5 75 150 225 300
Meters
Water Lot Lease L 601
388436.14 E
5506430.23 N
Water Lot Lease L 575
388365.8 E
5506290.78 N
388672.97 E
5506276.3 N
388766.84 E
5506207.36 N
388617.54 E
5506164.07 N
Water Lot Lease L 606 & L 614
388207.49 E
5505976.34 N
388559.68 E
5505797.24 N
North American Datum 1983 UTM Zone 10