

## Bottom Ash Data

2019 Week 41

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The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on October 24, 2019. The data represents bottom ash composite results for week 41 of 2019 (October 6, 2019 to October 12, 2019).

The bottom ash meets the requirements of Metro Vancouver's Bottom Ash Management Plan and is suitable for disposal.



Covanta Burnaby R.E., ULC  
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Burnaby BC V3N 4V3

Date Received: 15-OCT-19  
Report Date: 24-OCT-19 15:53 (MT)  
Version: FINAL

Client Phone: 604-521-1025

## Certificate of Analysis

**Lab Work Order #:** L2365168  
**Project P.O. #:** VANCO-0000048466  
**Job Reference:**  
**C of C Numbers:**  
**Legal Site Desc:**

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Brent Mack, B.Sc.  
Account Manager

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## ALS ENVIRONMENTAL ANALYTICAL REPORT

|                        |                          | Sample ID    | L2365168-1 | L2365168-2 | L2365168-3 | L2365168-4 | L2365168-5 |
|------------------------|--------------------------|--------------|------------|------------|------------|------------|------------|
|                        |                          | Description  | Soil       | Soil       | Soil       | Soil       | Soil       |
|                        |                          | Sampled Date | 09-OCT-19  | 09-OCT-19  | 09-OCT-19  | 09-OCT-19  | 09-OCT-19  |
|                        |                          | Sampled Time | 09:00      | 09:00      | 09:00      | 09:00      | 09:00      |
|                        |                          | Client ID    | BA1941-A-1 | BA1941-A-2 | BA1941-A-3 | BA1941-A-4 | BA1941-A-5 |
| Grouping               | Analyte                  |              |            |            |            |            |            |
| <b>SOIL</b>            |                          |              |            |            |            |            |            |
| <b>Physical Tests</b>  | Moisture (%)             |              | 20.0       | 19.8       | 20.8       | 20.9       | 20.4       |
|                        | pH (1:2 soil:water) (pH) |              | 11.88      | 11.82      | 11.97      | 11.97      | 12.02      |
| <b>Metals</b>          | Aluminum (Al) (mg/kg)    |              | 33400      | 33200      | 31400      | 29200      | 31400      |
|                        | Antimony (Sb) (mg/kg)    |              | 105        | 138        | 116        | 105        | 97.3       |
|                        | Arsenic (As) (mg/kg)     |              | 30.1       | 39.6       | 34.1       | 35.7       | 24.8       |
|                        | Barium (Ba) (mg/kg)      |              | 623        | 654        | 569        | 508        | 699        |
|                        | Beryllium (Be) (mg/kg)   |              | 0.37       | 0.42       | 0.36       | 0.34       | 0.39       |
|                        | Bismuth (Bi) (mg/kg)     |              | 459        | 7.91       | 6.75       | 6.05       | 4.10       |
|                        | Boron (B) (mg/kg)        |              | 191        | 244        | 268        | 214        | 220        |
|                        | Cadmium (Cd) (mg/kg)     |              | 14.5       | 38.7       | 14.1       | 24.8       | 12.0       |
|                        | Calcium (Ca) (mg/kg)     |              | 113000     | 133000     | 120000     | 118000     | 118000     |
|                        | Chromium (Cr) (mg/kg)    |              | 155        | 165        | 133        | 176        | 146        |
|                        | Cobalt (Co) (mg/kg)      |              | 36.6       | 22.2       | 36.8       | 47.3       | 17.1       |
|                        | Copper (Cu) (mg/kg)      |              | 2580       | 7220       | 2240       | 18800      | 2990       |
|                        | Iron (Fe) (mg/kg)        |              | 52100      | 64600      | 48400      | 54500      | 58000      |
|                        | Lead (Pb) (mg/kg)        |              | 1380       | 1970       | 1190       | 5540       | 653        |
|                        | Lithium (Li) (mg/kg)     |              | 19.0       | 16.9       | 18.8       | 27.3       | 15.9       |
|                        | Magnesium (Mg) (mg/kg)   |              | 9150       | 10500      | 9270       | 8980       | 11200      |
|                        | Manganese (Mn) (mg/kg)   |              | 2870       | 898        | 712        | 761        | 649        |
|                        | Mercury (Hg) (mg/kg)     |              | <0.050     | <0.050     | <0.050     | <0.050     | <0.050     |
|                        | Molybdenum (Mo) (mg/kg)  |              | 32.3       | 36.2       | 30.6       | 25.4       | 30.2       |
|                        | Nickel (Ni) (mg/kg)      |              | 164        | 160        | 209        | 224        | 116        |
|                        | Phosphorus (P) (mg/kg)   |              | 9690       | 9670       | 10100      | 8100       | 9030       |
|                        | Potassium (K) (mg/kg)    |              | 4280       | 4100       | 4160       | 3670       | 4220       |
|                        | Selenium (Se) (mg/kg)    |              | 0.41       | 0.45       | 0.35       | 0.34       | 0.34       |
|                        | Silver (Ag) (mg/kg)      |              | 3.55       | 4.07       | 5.01       | 3.61       | 2.72       |
|                        | Sodium (Na) (mg/kg)      |              | 12700      | 11700      | 11900      | 11100      | 13200      |
|                        | Strontium (Sr) (mg/kg)   |              | 267        | 291        | 286        | 256        | 284        |
|                        | Sulfur (S) (mg/kg)       |              | 9800       | 10600      | 9500       | 9100       | 8100       |
| Thallium (Tl) (mg/kg)  |                          | 0.054        | 0.067      | 0.069      | 0.078      | 0.055      |            |
| Tin (Sn) (mg/kg)       |                          | 185          | 131        | 95.1       | 115        | 78.2       |            |
| Titanium (Ti) (mg/kg)  |                          | 653          | 1230       | 616        | 387        | 491        |            |
| Tungsten (W) (mg/kg)   |                          | 4.54         | 5.15       | 3.59       | 4.12       | 3.99       |            |
| Uranium (U) (mg/kg)    |                          | 5.33         | 5.42       | 5.14       | 4.70       | 4.68       |            |
| Vanadium (V) (mg/kg)   |                          | 51.4         | 58.5       | 56.3       | 46.9       | 52.6       |            |
| Zinc (Zn) (mg/kg)      |                          | 3520         | 6910       | 4100       | 4050       | 3620       |            |
| Zirconium (Zr) (mg/kg) |                          | 1.0          | 1.6        | 1.4        | 1.3        | 1.1        |            |

\* Please refer to the Reference Information section for an explanation of any qualifiers detected.

## ALS ENVIRONMENTAL ANALYTICAL REPORT

24-OCT-19 15:53 (MT)

Version: FINAL

| Sample ID<br>Description<br>Sampled Date<br>Sampled Time<br>Client ID | L2365168-6<br>Soil<br>09-OCT-19<br>09:00<br>BA1941-A-6 | L2365168-7<br>Soil<br>09-OCT-19<br>09:00<br>BA1941-A-7 | L2365168-8<br>Soil<br>09-OCT-19<br>09:00<br>BA1941-A-8 | L2365168-9<br>Soil<br>09-OCT-19<br>09:00<br>BA1941-A-9 | L2365168-10<br>Soil<br>09-OCT-19<br>09:00<br>BA1941-A-10 |        |
|---|--|--|--|--|--|--------|
| Grouping  | Analyte  |  |  |  |  |        |
| <b>SOIL</b>   |  |  |  |  |  |        |
| <b>Physical Tests</b>   | Moisture (%)   | 20.6   | 19.4   | 19.8   | 19.7   | 20.2   |
|   | pH (1:2 soil:water) (pH)                               | 11.92  | 12.19  | 11.97  | 11.76  | 11.99  |
| <b>Metals</b>   | Aluminum (Al) (mg/kg)                                  | 34800  | 27500  | 29200  | 30600  | 29600  |
|   | Antimony (Sb) (mg/kg)                                  | 448  | 120  | 116  | 110  | 129    |
|   | Arsenic (As) (mg/kg)                                   | 51.6   | 35.7   | 30.4   | 37.3   | 45.3   |
|   | Barium (Ba) (mg/kg)                                    | 668  | 652  | 796  | 673  | 632    |
|   | Beryllium (Be) (mg/kg)                                 | 0.38   | 0.43   | 0.36   | 0.32   | 0.39   |
|   | Bismuth (Bi) (mg/kg)                                   | 8.28   | 6.15   | 5.20   | 5.83   | 6.89   |
|   | Boron (B) (mg/kg)                                      | 237  | 270  | 223  | 554  | 284    |
|   | Cadmium (Cd) (mg/kg)                                   | 13.9   | 17.0   | 12.5   | 36.8   | 17.5   |
|   | Calcium (Ca) (mg/kg)                                   | 125000   | 129000   | 115000   | 112000   | 128000 |
|   | Chromium (Cr) (mg/kg)                                  | 158  | 173  | 167  | 165  | 210    |
|   | Cobalt (Co) (mg/kg)                                    | 402  | 38.2   | 29.2   | 24.3   | 23.5   |
|   | Copper (Cu) (mg/kg)                                    | 5840   | 1290   | 2740   | 4180   | 2890   |
|   | Iron (Fe) (mg/kg)                                      | 61900  | 49700  | 69700  | 52400  | 59200  |
|   | Lead (Pb) (mg/kg)                                      | 17000  | 860  | 1470   | 752  | 397    |
|   | Lithium (Li) (mg/kg)                                   | 38.5   | 19.0   | 17.8   | 15.5   | 18.5   |
|   | Magnesium (Mg) (mg/kg)                                 | 9910   | 10800  | 9880   | 8720   | 9370   |
|   | Manganese (Mn) (mg/kg)                                 | 821  | 731  | 822  | 900  | 793    |
|   | Mercury (Hg) (mg/kg)                                   | <0.050   | <0.050   | <0.050   | <0.050   | <0.050 |
|   | Molybdenum (Mo) (mg/kg)                                | 30.1   | 31.1   | 31.7   | 26.3   | 33.8   |
|   | Nickel (Ni) (mg/kg)                                    | 178  | 111  | 123  | 103  | 123    |
|   | Phosphorus (P) (mg/kg)                                 | 9980   | 9120   | 8680   | 8580   | 9890   |
|   | Potassium (K) (mg/kg)                                  | 3840   | 4500   | 3910   | 3960   | 4210   |
|   | Selenium (Se) (mg/kg)                                  | 0.68   | 0.36   | 0.35   | 0.36   | 0.36   |
|   | Silver (Ag) (mg/kg)                                    | 3.22   | 2.84   | 5.51   | 6.81   | 13.1   |
|   | Sodium (Na) (mg/kg)                                    | 11000  | 13100  | 12400  | 11600  | 12500  |
|   | Strontium (Sr) (mg/kg)                                 | 258  | 329  | 263  | 272  | 291    |
|   | Sulfur (S) (mg/kg)                                     | 9400   | 10100  | 8500   | 8700   | 10100  |
|   | Thallium (Tl) (mg/kg)                                  | 0.094  | 0.056  | <0.050   | 0.052  | 0.057  |
|   | Tin (Sn) (mg/kg)                                       | 182  | 173  | 117  | 217  | 171    |
|   | Titanium (Ti) (mg/kg)                                  | 557  | 458  | 910  | 713  | 688    |
|   | Tungsten (W) (mg/kg)                                   | 4.30   | 3.63   | 4.12   | 4.22   | 5.00   |
|   | Uranium (U) (mg/kg)                                    | 5.04   | 5.61   | 4.69   | 4.70   | 5.50   |
|   | Vanadium (V) (mg/kg)                                   | 53.7   | 63.3   | 47.1   | 51.9   | 55.2   |
|   | Zinc (Zn) (mg/kg)                                      | 4570   | 3280   | 2750   | 4040   | 5440   |
|   | Zirconium (Zr) (mg/kg)                                 | 1.0  | <1.0   | <1.0   | <1.0   | 1.2    |

\* Please refer to the Reference Information section for an explanation of any qualifiers detected.

## ALS ENVIRONMENTAL ANALYTICAL REPORT

|                        |                          | Sample ID    | L2365168-11 | L2365168-12 |  |  |
|------------------------|--------------------------|--------------|-------------|-------------|--|--|
|                        |                          | Description  | Soil        | Soil        |  |  |
|                        |                          | Sampled Date | 09-OCT-19   | 09-OCT-19   |  |  |
|                        |                          | Sampled Time | 09:00       | 09:00       |  |  |
|                        |                          | Client ID    | BA1941-A-11 | BA1941-A-12 |  |  |
| Grouping               | Analyte                  |              |             |             |  |  |
| <b>SOIL</b>            |                          |              |             |             |  |  |
| <b>Physical Tests</b>  | Moisture (%)             | 21.3         | 20.3        |             |  |  |
|                        | pH (1:2 soil:water) (pH) | 11.90        | 11.84       |             |  |  |
| <b>Metals</b>          | Aluminum (Al) (mg/kg)    | 31500        | 40800       |             |  |  |
|                        | Antimony (Sb) (mg/kg)    | 106          | 127         |             |  |  |
|                        | Arsenic (As) (mg/kg)     | 27.4         | 34.2        |             |  |  |
|                        | Barium (Ba) (mg/kg)      | 534          | 598         |             |  |  |
|                        | Beryllium (Be) (mg/kg)   | 0.35         | 0.39        |             |  |  |
|                        | Bismuth (Bi) (mg/kg)     | 6.40         | 8.10        |             |  |  |
|                        | Boron (B) (mg/kg)        | 209          | 225         |             |  |  |
|                        | Cadmium (Cd) (mg/kg)     | 15.6         | 18.1        |             |  |  |
|                        | Calcium (Ca) (mg/kg)     | 121000       | 140000      |             |  |  |
|                        | Chromium (Cr) (mg/kg)    | 139          | 181         |             |  |  |
|                        | Cobalt (Co) (mg/kg)      | 35.8         | 36.0        |             |  |  |
|                        | Copper (Cu) (mg/kg)      | 2640         | 2110        |             |  |  |
|                        | Iron (Fe) (mg/kg)        | 61100        | 60700       |             |  |  |
|                        | Lead (Pb) (mg/kg)        | 572          | 464         |             |  |  |
|                        | Lithium (Li) (mg/kg)     | 20.4         | 19.3        |             |  |  |
|                        | Magnesium (Mg) (mg/kg)   | 9930         | 11300       |             |  |  |
|                        | Manganese (Mn) (mg/kg)   | 1360         | 992         |             |  |  |
|                        | Mercury (Hg) (mg/kg)     | <0.050       | <0.050      |             |  |  |
|                        | Molybdenum (Mo) (mg/kg)  | 28.3         | 36.9        |             |  |  |
|                        | Nickel (Ni) (mg/kg)      | 120          | 112         |             |  |  |
|                        | Phosphorus (P) (mg/kg)   | 8240         | 10900       |             |  |  |
|                        | Potassium (K) (mg/kg)    | 4050         | 4510        |             |  |  |
|                        | Selenium (Se) (mg/kg)    | 0.38         | 0.40        |             |  |  |
|                        | Silver (Ag) (mg/kg)      | 3.28         | 8.79        |             |  |  |
|                        | Sodium (Na) (mg/kg)      | 11800        | 12700       |             |  |  |
|                        | Strontium (Sr) (mg/kg)   | 303          | 309         |             |  |  |
|                        | Sulfur (S) (mg/kg)       | 9700         | 10900       |             |  |  |
|                        | Thallium (Tl) (mg/kg)    | 0.054        | 0.060       |             |  |  |
|                        | Tin (Sn) (mg/kg)         | 102          | 241         |             |  |  |
|                        | Titanium (Ti) (mg/kg)    | 629          | 817         |             |  |  |
|                        | Tungsten (W) (mg/kg)     | 3.91         | 5.60        |             |  |  |
|                        | Uranium (U) (mg/kg)      | 5.24         | 6.27        |             |  |  |
|                        | Vanadium (V) (mg/kg)     | 63.8         | 58.7        |             |  |  |
| Zinc (Zn) (mg/kg)      | 3650                     | 4080         |             |             |  |  |
| Zirconium (Zr) (mg/kg) | 1.2                      | 1.8          |             |             |  |  |

\* Please refer to the Reference Information section for an explanation of any qualifiers detected.

## ALS ENVIRONMENTAL ANALYTICAL REPORT

| Sample ID               | Description                         | Sampled Date | Sampled Time | Client ID  | L2365168-1 | L2365168-2 | L2365168-3 | L2365168-4 | L2365168-5 |
|-------------------------|-------------------------------------|--------------|--------------|------------|------------|------------|------------|------------|------------|
|                         |                                     |              |              |            | Soil       | Soil       | Soil       | Soil       | Soil       |
|                         |                                     | 09-OCT-19    | 09:00        | BA1941-A-1 | 09-OCT-19  | 09:00      | 09-OCT-19  | 09:00      | 09-OCT-19  |
|                         |                                     |              |              |            | BA1941-A-1 | BA1941-A-2 | BA1941-A-3 | BA1941-A-4 | BA1941-A-5 |
| Grouping                | Analyte                             |              |              |            |            |            |            |            |            |
| <b>SOIL</b>             |                                     |              |              |            |            |            |            |            |            |
| <b>Speciated Metals</b> | Hexavalent Chromium (mg/kg)         |              |              |            | <0.10      |            |            |            |            |
| <b>TCLP Metals</b>      | 1st Preliminary pH (pH)             |              |              |            | 11.96      | 11.97      | 11.97      | 11.94      | 11.94      |
|                         | 2nd Preliminary pH (pH)             |              |              |            | 9.68       | 9.71       | 9.97       | 9.62       | 9.60       |
|                         | Final pH (pH)                       |              |              |            | 5.88       | 6.08       | 6.04       | 6.06       | 6.27       |
|                         | Extraction Solution Initial pH (pH) |              |              |            | 2.88       | 2.88       | 2.88       | 2.88       | 2.88       |
|                         | Antimony (Sb)-Leachable (mg/L)      |              |              |            | <1.0       | <1.0       | <1.0       | <1.0       | <1.0       |
|                         | Arsenic (As)-Leachable (mg/L)       |              |              |            | <1.0       | <1.0       | <1.0       | <1.0       | <1.0       |
|                         | Barium (Ba)-Leachable (mg/L)        |              |              |            | <2.5       | <2.5       | <2.5       | <2.5       | <2.5       |
|                         | Beryllium (Be)-Leachable (mg/L)     |              |              |            | <0.025     | <0.025     | <0.025     | <0.025     | <0.025     |
|                         | Boron (B)-Leachable (mg/L)          |              |              |            | 3.30       | 3.87       | 3.39       | 3.97       | 3.74       |
|                         | Cadmium (Cd)-Leachable (mg/L)       |              |              |            | 0.267      | 0.483      | 0.238      | 0.285      | 0.276      |
|                         | Calcium (Ca)-Leachable (mg/L)       |              |              |            | 1890       | 2120       | 1870       | 2000       | 2050       |
|                         | Chromium (Cr)-Leachable (mg/L)      |              |              |            | <0.25      | <0.25      | <0.25      | <0.25      | <0.25      |
|                         | Cobalt (Co)-Leachable (mg/L)        |              |              |            | 0.367      | 0.476      | 0.658      | 0.891      | 0.952      |
|                         | Copper (Cu)-Leachable (mg/L)        |              |              |            | 0.902      | 1.16       | 0.928      | 0.919      | 0.628      |
|                         | Iron (Fe)-Leachable (mg/L)          |              |              |            | <5.0       | <5.0       | <5.0       | <5.0       | <5.0       |
|                         | Lead (Pb)-Leachable (mg/L)          |              |              |            | <0.25      | <0.25      | <0.25      | <0.25      | <0.25      |
|                         | Magnesium (Mg)-Leachable (mg/L)     |              |              |            | 122        | 152        | 127        | 135        | 145        |
|                         | Mercury (Hg)-Leachable (mg/L)       |              |              |            | <0.0010    | <0.0010    | <0.0010    | <0.0010    | <0.0010    |
|                         | Nickel (Ni)-Leachable (mg/L)        |              |              |            | 0.52       | 0.53       | 0.60       | 1.16       | 0.57       |
|                         | Selenium (Se)-Leachable (mg/L)      |              |              |            | <0.10      | <0.10      | <0.10      | <0.10      | <0.10      |
|                         | Silver (Ag)-Leachable (mg/L)        |              |              |            | <0.050     | <0.050     | <0.050     | <0.050     | <0.050     |
|                         | Thallium (Tl)-Leachable (mg/L)      |              |              |            | <1.0       | <1.0       | <1.0       | <1.0       | <1.0       |
|                         | Vanadium (V)-Leachable (mg/L)       |              |              |            | <0.15      | <0.15      | <0.15      | <0.15      | <0.15      |
|                         | Zinc (Zn)-Leachable (mg/L)          |              |              |            | 69.9       | 45.2       | 45.0       | 51.3       | 46.0       |

\* Please refer to the Reference Information section for an explanation of any qualifiers detected.

## ALS ENVIRONMENTAL ANALYTICAL REPORT

|                         |                                     | Sample ID    | L2365168-6 | L2365168-7 | L2365168-8 | L2365168-9 | L2365168-10 |
|-------------------------|-------------------------------------|--------------|------------|------------|------------|------------|-------------|
|                         |                                     | Description  | Soil       | Soil       | Soil       | Soil       | Soil        |
|                         |                                     | Sampled Date | 09-OCT-19  | 09-OCT-19  | 09-OCT-19  | 09-OCT-19  | 09-OCT-19   |
|                         |                                     | Sampled Time | 09:00      | 09:00      | 09:00      | 09:00      | 09:00       |
|                         |                                     | Client ID    | BA1941-A-6 | BA1941-A-7 | BA1941-A-8 | BA1941-A-9 | BA1941-A-10 |
| Grouping                | Analyte                             |              |            |            |            |            |             |
| <b>SOIL</b>             |                                     |              |            |            |            |            |             |
| <b>Speciated Metals</b> | Hexavalent Chromium (mg/kg)         |              |            |            |            |            |             |
| <b>TCLP Metals</b>      | 1st Preliminary pH (pH)             | 11.87        | 11.93      | 11.94      | 11.97      | 12.01      |             |
|                         | 2nd Preliminary pH (pH)             | 8.58         | 8.19       | 8.46       | 8.85       | 9.21       |             |
|                         | Final pH (pH)                       | 6.17         | 5.85       | 5.85       | 6.22       | 6.21       |             |
|                         | Extraction Solution Initial pH (pH) | 2.88         | 2.88       | 2.88       | 2.88       | 2.88       |             |
|                         | Antimony (Sb)-Leachable (mg/L)      | <1.0         | <1.0       | <1.0       | <1.0       | <1.0       |             |
|                         | Arsenic (As)-Leachable (mg/L)       | <1.0         | <1.0       | <1.0       | <1.0       | <1.0       |             |
|                         | Barium (Ba)-Leachable (mg/L)        | <2.5         | <2.5       | <2.5       | <2.5       | <2.5       |             |
|                         | Beryllium (Be)-Leachable (mg/L)     | <0.025       | <0.025     | <0.025     | <0.025     | <0.025     |             |
|                         | Boron (B)-Leachable (mg/L)          | 3.51         | 3.18       | 3.06       | 3.28       | 3.28       |             |
|                         | Cadmium (Cd)-Leachable (mg/L)       | 0.209        | 0.486      | 0.274      | 0.238      | 0.337      |             |
|                         | Calcium (Ca)-Leachable (mg/L)       | 1960         | 1850       | 1820       | 1860       | 1900       |             |
|                         | Chromium (Cr)-Leachable (mg/L)      | <0.25        | <0.25      | <0.25      | <0.25      | <0.25      |             |
|                         | Cobalt (Co)-Leachable (mg/L)        | 1.16         | 0.470      | 0.610      | 0.362      | 0.562      |             |
|                         | Copper (Cu)-Leachable (mg/L)        | 0.925        | 0.987      | 0.809      | 0.845      | 0.715      |             |
|                         | Iron (Fe)-Leachable (mg/L)          | <5.0         | <5.0       | <5.0       | <5.0       | <5.0       |             |
|                         | Lead (Pb)-Leachable (mg/L)          | <0.25        | <0.25      | <0.25      | <0.25      | <0.25      |             |
|                         | Magnesium (Mg)-Leachable (mg/L)     | 131          | 126        | 121        | 128        | 130        |             |
|                         | Mercury (Hg)-Leachable (mg/L)       | <0.0010      | <0.0010    | <0.0010    | <0.0010    | <0.0010    |             |
|                         | Nickel (Ni)-Leachable (mg/L)        | 0.76         | 0.53       | 0.46       | 0.69       | 0.59       |             |
|                         | Selenium (Se)-Leachable (mg/L)      | <0.10        | <0.10      | <0.10      | <0.10      | <0.10      |             |
|                         | Silver (Ag)-Leachable (mg/L)        | <0.050       | <0.050     | <0.050     | <0.050     | <0.050     |             |
|                         | Thallium (Tl)-Leachable (mg/L)      | <1.0         | <1.0       | <1.0       | <1.0       | <1.0       |             |
|                         | Vanadium (V)-Leachable (mg/L)       | <0.15        | <0.15      | <0.15      | <0.15      | <0.15      |             |
|                         | Zinc (Zn)-Leachable (mg/L)          | 37.5         | 34.9       | 36.4       | 41.8       | 43.0       |             |

\* Please refer to the Reference Information section for an explanation of any qualifiers detected.

## ALS ENVIRONMENTAL ANALYTICAL REPORT

|                         |                                     | Sample ID    | L2365168-11 | L2365168-12 |  |  |
|-------------------------|-------------------------------------|--------------|-------------|-------------|--|--|
|                         |                                     | Description  | Soil        | Soil        |  |  |
|                         |                                     | Sampled Date | 09-OCT-19   | 09-OCT-19   |  |  |
|                         |                                     | Sampled Time | 09:00       | 09:00       |  |  |
|                         |                                     | Client ID    | BA1941-A-11 | BA1941-A-12 |  |  |
| Grouping                | Analyte                             |              |             |             |  |  |
| <b>SOIL</b>             |                                     |              |             |             |  |  |
| <b>Speciated Metals</b> | Hexavalent Chromium (mg/kg)         |              |             |             |  |  |
| <b>TCLP Metals</b>      | 1st Preliminary pH (pH)             | 11.89        | 11.88       |             |  |  |
|                         | 2nd Preliminary pH (pH)             | 8.65         | 8.90        |             |  |  |
|                         | Final pH (pH)                       | 6.03         | 5.92        |             |  |  |
|                         | Extraction Solution Initial pH (pH) | 2.88         | 2.88        |             |  |  |
|                         | Antimony (Sb)-Leachable (mg/L)      | <1.0         | <1.0        |             |  |  |
|                         | Arsenic (As)-Leachable (mg/L)       | <1.0         | <1.0        |             |  |  |
|                         | Barium (Ba)-Leachable (mg/L)        | <2.5         | <2.5        |             |  |  |
|                         | Beryllium (Be)-Leachable (mg/L)     | <0.025       | <0.025      |             |  |  |
|                         | Boron (B)-Leachable (mg/L)          | 3.57         | 3.59        |             |  |  |
|                         | Cadmium (Cd)-Leachable (mg/L)       | 0.364        | 0.681       |             |  |  |
|                         | Calcium (Ca)-Leachable (mg/L)       | 2120         | 2120        |             |  |  |
|                         | Chromium (Cr)-Leachable (mg/L)      | <0.25        | <0.25       |             |  |  |
|                         | Cobalt (Co)-Leachable (mg/L)        | 0.683        | 0.533       |             |  |  |
|                         | Copper (Cu)-Leachable (mg/L)        | 0.474        | 1.49        |             |  |  |
|                         | Iron (Fe)-Leachable (mg/L)          | <5.0         | <5.0        |             |  |  |
|                         | Lead (Pb)-Leachable (mg/L)          | <0.25        | <0.25       |             |  |  |
|                         | Magnesium (Mg)-Leachable (mg/L)     | 149          | 146         |             |  |  |
|                         | Mercury (Hg)-Leachable (mg/L)       | <0.0010      | <0.0010     |             |  |  |
|                         | Nickel (Ni)-Leachable (mg/L)        | 0.64         | 0.62        |             |  |  |
|                         | Selenium (Se)-Leachable (mg/L)      | <0.10        | <0.10       |             |  |  |
|                         | Silver (Ag)-Leachable (mg/L)        | <0.050       | <0.050      |             |  |  |
|                         | Thallium (Tl)-Leachable (mg/L)      | <1.0         | <1.0        |             |  |  |
|                         | Vanadium (V)-Leachable (mg/L)       | <0.15        | <0.15       |             |  |  |
|                         | Zinc (Zn)-Leachable (mg/L)          | 51.0         | 44.2        |             |  |  |

\* Please refer to the Reference Information section for an explanation of any qualifiers detected.



## Reference Information

### QC Samples with Qualifiers & Comments:

| QC Type Description | Parameter              | Qualifier | Applies to Sample Number(s)                               |
|---------------------|------------------------|-----------|---|
| Matrix Spike        | Cadmium (Cd)-Leachable | MS-B      | L2365168-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9 |
| Matrix Spike        | Calcium (Ca)-Leachable | MS-B      | L2365168-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9 |
| Matrix Spike        | Cobalt (Co)-Leachable  | MS-B      | L2365168-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9 |
| Matrix Spike        | Zinc (Zn)-Leachable    | MS-B      | L2365168-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9 |

### Qualifiers for Individual Parameters Listed:

| Qualifier | Description  |
|-----------|--|
| MS-B      | Matrix Spike recovery could not be accurately calculated due to high analyte background in sample. |

### Test Method References:

| ALS Test Code             | Matrix | Test Description   | Method Reference**                      |
|---------------------------|--------|--|---|
| <b>AG-200.2-A-CCMS-VA</b> | Soil   | Elevated Ag in Soil by CRC ICPMS<br>Soil/sediment is dried, disaggregated, and sieved (2 mm). Strong Acid Leachable Metals in the <2mm fraction are solubilized by heated digestion with nitric and hydrochloric acids. Instrumental analysis is by Collision / Reaction Cell ICPMS.   | EPA 200.2/6020A                         |
| <b>CR-CR6-3060-ED</b>     | Soil   | Chromium, Hexavalent (Cr +6)<br>Field moist samples are digested with a sodium hydroxide/sodium carbonate solution. After cooling and filtration, the rinsate is adjusted to pH 9, and injected on an ion chromatograph to separate the hexavalent chromium ion. A post column color reaction with diphenylcarbohydrazide and absorbance measurement at 530 nm completes the quantitation.   | APHA 3500-CR C, EPA 3060A ALKALINE      |
| <b>HG-200.2-CVAF-VA</b>   | Soil   | Mercury in Soil by CVAAS<br>Soil samples are digested with hot nitric and hydrochloric acids, followed by CVAAS analysis. This method is fully compliant with the BC SALM strong acid leachable metals digestion method.   | EPA 200.2/1631E (mod)                   |
| <b>HG-TCLP-CVAFS-VA</b>   | Soil   | Mercury by CVAAS (TCLP)<br>This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter and analysed using atomic absorption spectrophotometry (EPA 245.7).   | EPA 1311/245.7                          |
| <b>MET-200.2-CCMS-VA</b>  | Soil   | Metals in Soil by CRC ICPMS<br>Soil/sediment is dried, disaggregated, and sieved (2 mm). Strong Acid Leachable Metals in the <2mm fraction are solubilized by heated digestion with nitric and hydrochloric acids. Instrumental analysis is by Collision / Reaction Cell ICPMS.<br><br>Limitations: This method is intended to liberate environmentally available metals. Silicate minerals are not solubilized. Some metals may be only partially recovered (matrix dependent), including Al, Ba, Be, Cr, S, Sr, Ti, Tl, V, W, and Zr. Elemental Sulfur may be poorly recovered by this method. Volatile forms of sulfur (e.g. sulfide, H <sub>2</sub> S) may be excluded if lost during sampling, storage, or digestion.   | EPA 200.2/6020A (mod)                   |
| <b>MET-TCLP-CCMS-VA</b>   | Soil   | Metals by ICPMS (TCLP)<br>This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A). | EPA 1311/6020A                          |
| <b>MOISTURE-VA</b>        | Soil   | Moisture content<br>This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of two hours.   | CCME PHC in Soil - Tier 1 (mod)         |
| <b>PH-1:2-VA</b>          | Soil   | pH in Soil (1:2 Soil:Water Extraction)<br>This analysis is carried out in accordance with procedures described in "pH, Electrometric in Soil and Sediment - Prescriptive Method", Rev. 2005, Section B Physical, Inorganic and Misc. Constituents, BC Environmental Laboratory Manual. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.  | BC WLAP METHOD: PH, ELECTROMETRIC, SOIL |

\*\* ALS test methods may incorporate modifications from specified reference methods to improve performance.

*The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:*

| Laboratory Definition Code | Laboratory Location                                     |
|----------------------------|---|
| ED                         | ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA           |
| VA                         | ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA |

### Chain of Custody Numbers:

## Reference Information

### GLOSSARY OF REPORT TERMS

*Surrogate* - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

*mg/kg* - milligrams per kilogram based on dry weight of sample.

*mg/kg wwt* - milligrams per kilogram based on wet weight of sample.

*mg/kg lwt* - milligrams per kilogram based on lipid-adjusted weight of sample.

*mg/L* - milligrams per litre.

*<* - Less than.

*D.L.* - The reported Detection Limit, also known as the Limit of Reporting (LOR).

*N/A* - Result not available. Refer to qualifier code and definition for explanation.

*Test results reported relate only to the samples as received by the laboratory.*

*UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.*

*Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.*