

## MEMORANDUM

To: Mr. David Swisher Date: September 30, 2011  
Copy To: Jordin Barclay; Kevin Hawton; Cara Stapley File No.: NB101-390/2-A.01  
From: Ryan Weir Cont. No.: NB11-00468  
Re: Thor Lake Project - Pine Point Site Groundwater and Surface Water Quality Test Results

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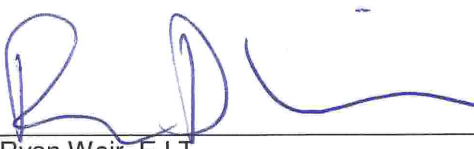
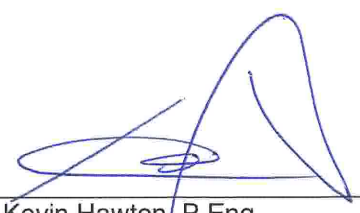
Five (5) of the six (6) groundwater monitoring wells and seven (7) surface water sites were sampled near the proposed hydrometallurgical facilities for the Thor Lake Project, near the historic town of Pine Point, NWT, for the purposes of collecting baseline water quality data. Monitoring well DH-2010-01 could not be sampled as it was observed to be dry. Figure 1 shows the locations of the monitoring wells and surface water sites.

A total of 12 water samples were sent to ALS Laboratory Group (ALS) in Yellowknife for completion of a complete suite of analytical tests, including:

- Physical tests
- Anions and nutrients
- Cyanides
- Total metals
- Dissolved metals (groundwater only)

The results from the laboratory testing are summarized on Table 1 with results from the previous sampling event. The laboratory certificates of analysis are included in Appendix A.

Planning for the next sampling event (fall event) will commence soon in preparation for the work to be carried out in October or November, 2011. Should you have any questions, please do not hesitate to contact us.

Signed:  Approved:   
Ryan Weir, E.I.T. Kevin Hawton, P.Eng.  
Geological Engineering Senior Engineer

Attachments:

Table 1 Rev 0 Water Sample Laboratory Test Results Summary  
Figure 1 Rev 0 Location of Wells and Surface Water Sampling Sites  
Appendix A Laboratory Certificates of Analysis

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TABLE 1  
AVALON RARE METALS INC.  
THOR LAKE PROJECT  
PINE POINT GROUNDWATER AND SURFACE WATER QUALITY  
WATER SAMPLE LABORATORY TEST RESULTS SUMMARY

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| GROUNDWATER          |                                    |        |         |            |           |             |            |             |            |            |            |            |           |            |            | SURFACE WATER |            |           |            |           |            |           |            |           |            |          |            |          |            |        |  |
|----------------------|------------------------------------|--------|---------|------------|-----------|-------------|------------|-------------|------------|------------|------------|------------|-----------|------------|------------|---------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|----------|------------|----------|------------|--------|--|
| Date Sampled         |                                    |        |         | 04-Mar-11  | 09-Aug-11 | 27-Feb-11   | 09-Aug-11  | 27-Feb-11   | 09-Aug-11  | 09-Aug-11  | 04-Mar-11  | 28-Feb-11  | 09-Aug-11 | 28-Feb-11  | 09-Aug-11  | 28-Feb-11     | 09-Aug-11  | 28-Feb-11 | 09-Aug-11  | 28-Feb-11 | 09-Aug-11  | 28-Feb-11 | 09-Aug-11  | 12-Mar-11 | 14-Aug-11  |          |            |          |            |        |  |
| Lab ID               |                                    |        |         | L983741    | -         | L982653     | L1042743-2 | L982653     | L1042743-1 | L982653    | L1042743-3 | L1042743-4 | L983741   | L2982653   | L1042743-5 | L2982653      | L1042722-1 | L2982653  | L1042722-2 | L2982653  | L1042722-3 | L2982653  | L1042722-4 | L2982653  | L1042722-5 | L2982653 | L1042722-6 | L987687  | L1058718-1 |        |  |
| Samples              | Sample Type                        | Units  | MDL     | DH-2010-01 |           | DH-2010-02S |            | DH-2010-02D |            | DH-2010-03 |            | DH-2010-04 |           | DH-2010-05 |            | SW1           |            | SW2       |            | SW3       |            | SW4       |            | SW5       |            | SW6      |            | SW7      |            |        |  |
| Physical Tests       | Colour, True                       | T.C.U. | 2.0     | -          | -         | -           | 4.2        | -           | 13.3       | -          | 2.2        | 2.1        | -         | -          | 3.0        | -             | 4.4        | -         | <2.0       | -         | <2.0       | -         | 2.1        | -         | 6.0        | -        | 2.6        | -        | <2.0       |        |  |
|                      | Conductivity                       | uS/cm  | 0.20    | 1080       | -         | 860         | 863        | 825         | 793        | 1030       | 1140       | 815        | 856       | 373        | 332        | 1510          | 1330       | 960       | 843        | 1550      | 1770       | 1660      | 1520       | 1520      | 1430       | 2810     | 2660       | 1610     | 1520       |        |  |
|                      | Hardness (as CaCO3)                | mg/L   | -       | 193        | -         | 491         | 510        | 436         | 449        | 586        | 715        | 486        | 544       | 212        | 189        | 940           | 831        | 530       | 440        | 919       | 1160       | 1080      | 968        | 935       | 877        | 2110     | 1920       | 973      | 855        |        |  |
|                      | pH                                 | pH     | 0.10    | 7.87       | -         | 7.81        | 7.96       | 7.85        | 7.98       | 7.77       | 7.91       | 8.02       | 8.01      | 8.08       | 8.23       | 8.07          | 8.41       | 8.00      | 8.30       | 7.71      | 8.19       | 8.03      | 8.31       | 8.08      | 8.34       | 7.92     | 8.20       | 8.08     | 8.19       |        |  |
|                      | Total Suspended Solids             | mg/L   | 3.0     | 61.0       | -         | 56.0        | 193        | 44.0        | 242        | 20.0       | 361        | 86.0       | 478       | 84.0       | 87.0       | <3.0          | <3.0       | <3.0      | <3.0       | <3.0      | 5.0        | <3.0      | <3.0       | 3.0       | <3.0       | 8.0      | <3.0       | <3.0     | <3.0       |        |  |
|                      | Total Dissolved Solids             | mg/L   | -       | 556        | -         | 537         | 541        | 508         | 479        | 661        | 782        | 524        | 566       | 203        | 179        | 1130          | 988        | 662       | 572        | 1110      | 1390       | 1310      | 1180       | 1150      | 1080       | 2560     | 2380       | 1210     | 1120       |        |  |
|                      | Turbidity                          | -      | 0.10    | 86.8       | -         | 94.2        | 115        | 36.4        | 111        | 12.9       | 439        | 59.7       | 564       | 131        | 58.9       | 0.11          | 0.22       | 0.24      | 0.48       | 0.21      | 0.44       | 0.55      | 1.07       | 0.59      | 0.46       | 1.14     | 0.51       | 0.48     | 0.79       |        |  |
| Anions and Nutrients | Acidity (as CaCO3)                 | mg/L   | 5.0     | -          | -         | -           | 6.1        | -           | 8.0        | -          | 11.3       | <5.0       | -         | -          | <5.0       | -             | <5.0       | -         | <5.0       | -         | <5.0       | -         | <5.0       | -         | <5.0       | -        | <5.0       | -        | <5.0       |        |  |
|                      | Alkalinity, Bicarbonate (as CaCO3) | mg/L   | 5.0     | 396        | -         | 372         | 372        | 344         | 372        | 418        | 417        | 307        | 322       | 232        | 206        | 242           | 196        | 159       | 129        | 458       | 313        | 219       | 180        | 208       | 183        | 211      | 204        | 252      | 201        |        |  |
|                      | Alkalinity, Carbonate (as CaCO3)   | mg/L   | 5.0     | <5.0       | -         | <5.0        | <5.0       | <5.0        | <5.0       | <5.0       | <5.0       | <5.0       | <5.0      | <5.0       | <5.0       | <5.0          | <5.0       | <5.0      | <5.0       | <5.0      | <5.0       | <5.0      | <5.0       | <5.0      | <5.0       | <5.0     | <5.0       | <5.0     | <5.0       |        |  |
|                      | Alkalinity, Hydroxide (as CaCO3)   | mg/L   | 5.0     | <5.0       | -         | <5.0        | <5.0       | <5.0        | <5.0       | <5.0       | <5.0       | <5.0       | <5.0      | <5.0       | <5.0       | <5.0          | <5.0       | <5.0      | <5.0       | <5.0      | <5.0       | <5.0      | <5.0       | <5.0      | <5.0       | <5.0     | <5.0       | <5.0     | <5.0       |        |  |
|                      | Alkalinity, Total (as CaCO3)       | mg/L   | 5.0     | 325        | -         | 305         | 305        | 282         | 305        | 343        | 342        | 251        | 264       | 190        | 169        | 198           | 168        | 130       | 106        | 375       | 257        | 180       | 149        | 170       | 153        | 173      | 167        | 206      | 165        |        |  |
|                      | Ammonia-N, Total                   | -      | -       | -          | -         | -           | <0.050     | -           | 0.152      | -          | <0.050     | <0.050     | -         | -          | <0.050     | <0.050        | <0.050     | <0.050    | <0.050     | <0.050    | <0.050     | <0.050    | <0.050     | <0.050    | <0.050     | <0.050   | <0.050     | <0.050   | <0.050     |        |  |
|                      | Bromide (Br)                       | -      | 1.0     | <1.0       | -         | <1.0        | <1.0       | <1.0        | <1.0       | <1.0       | <1.0       | <1.0       | <1.0      | <1.0       | <1.0       | <1.0          | <1.0       | <1.0      | <1.0       | <1.0      | <1.0       | <1.0      | <1.0       | <1.0      | <1.0       | <1.0     | <1.0       | <2.0     |            |        |  |
|                      | Chloride (Cl)                      | mg/L   | 0.50    | 3.23       | -         | 3.38        | 3.07       | 4.25        | 3.03       | 3.16       | 3.53       | 0.93       | 1.21      | <0.50      | <0.50      | 5.89          | 5.03       | 4.02      | 3.48       | 3.25      | 3.98       | 2.86      | 2.24       | 12.5      | 11.3       | 12.8     | 11.5       | 5.57     | 7.87       |        |  |
|                      | Nitrate (as N)                     | mg/L   | 0.050   | <0.050     | -         | <0.050      | <0.050     | <0.050      | <0.050     | <0.050     | <0.050     | <0.050     | <0.050    | <0.050     | 0.171      | 0.190         | <0.050     | <0.050    | <0.050     | 0.055     | <0.050     | <0.050    | <0.050     | <0.050    | <0.050     | <0.050   | <0.050     | <0.050   | <0.050     |        |  |
|                      | Nitrate and Nitrite as N           | mg/L   | 0.071   | <0.071     | -         | <0.071      | <0.071     | <0.071      | <0.071     | <0.071     | <0.071     | <0.071     | <0.071    | <0.071     | 0.171      | 0.190         | <0.071     | <0.071    | <0.071     | <0.071    | <0.071     | <0.071    | <0.071     | <0.071    | <0.071     | <0.071   | <0.071     | <0.071   | <0.071     |        |  |
|                      | Nitrite (as N)                     | mg/L   | 0.050   | <0.050     | -         | <0.050      | <0.050     | <0.050      | <0.050     | <0.050     | <0.050     | <0.050     | <0.050    | <0.050     | <0.050     | <0.050        | <0.050     | <0.050    | <0.050     | <0.050    | <0.050     | <0.050    | <0.050     | <0.050    | <0.050     | <0.050   | <0.050     | <0.050   | <0.050     | <0.050 |  |
|                      | Total Kjeldahl Nitrogen            | -      | -       | -          | -         | -           | <0.20      | -           | <0.20      | -          | <0.20      | <0.20      | -         | -          | <0.20      | <0.20         | <0.20      | <0.20     | <0.20      | <0.20     | <0.20      | <0.20     | <0.20      | <0.20     | <0.20      | <0.20    | <0.20      | <0.20    | <0.2       | <0.20  |  |
|                      | Total Nitrogen                     | -      | -       | -          | -         | -           | <0.21      | -           | <0.21      | -          | <0.21      | <0.21      | -         | -          | <0.21      | <0.20         | <0.21      | <0.20     | <0.21      | <0.20     | <0.21      | <0.20     | <0.21      | <0.20     | <0.21      | <0.20    | <0.21      | <0.21    | <0.21      | <0.21  |  |
|                      | Orthophosphate-Dissolved (as P)    | -      | 0.010   | <0.010     | -         | <0.010      | -          | <0.010      | -          | <0.010     | -          | -          | <0.01     | <0.0020    | -          | <0.010        | <0.010     | <0.010    | <0.010     | <0.010    | -          | <0.010    | -          | <0.010    | -          | <0.010   | -          | <0.010   | -          | <0.010 |  |
|                      | Total Phosphate as P               | -      | 0.020   | 0.021      | -         | <0.020      | <0.020     | <0.020      | <0.020     | <0.020     | <0.020     | 0.046      | <0.020    | 0.088      | <0.010     | <0.020        | -          | <0.020    | -          | <0.020    | -          | <0.020    | -          | <0.020    | -          | <0.020   | -          | <0.020   | -          | <0.020 |  |
|                      | Sulfate (SO4)                      | mg/L   | 0.50    | 292        | -         | 182         | 180        | 173         | 133        | 250        | 330        | 203        | 218       | 12.5       | 9.91       | 684           | 595        | 390       | 348        | 561       | 825        | 820       | 748        | 701       | 662        | 1730     | 1620       | 740      | 714        |        |  |
| Cyanides             | Cyanide, Total                     | mg/L   | 0.0020  | <0.0020    | -         | <0.0020     | <0.0050    | <0.0020     | <0.0050    | <0.0020    | <0.0050    | <0.0050    | <0.0020   | <0.0020    | <0.0050    | <0.0020       | <0.0050    | <0.0020   | <0.0050    | <0.0020   | <0.0050    | <0.0020   | <0.0050    | <0.0020   | <0.0050    | <0.0020  | <0.0050    | <0.0020  | <0.0050    |        |  |
| Total Metals         | Aluminum (Al)-Total                | mg/L   | 0.010   | 0.980      | -         | 0.713       | 0.474      | 0.492       | 0.462      | 0.052      | 0.763      | 0.377      | 5.79      | 1.10       | 0.160      | <0.010        | <0.010     | <0.010    | 0.024      | <0.010    | <0.010     | <0.010    | <0.010     | <0.010    | <0.010     | <0.010   | <0.010     | <0.010   | 0.011      |        |  |
|                      | Antimony (Sb)-Total                | mg/L   | 0.00040 | <0.00040   | -         | <0.00040    | <0.00080   | <0.00040    | <0.00080   | <0.00040   | <0.00080   | <0.00080   | 0.00043   | <0.00040   | <0.00080   | <0.00040      | <0.00080   | <0.00040  | <0.00080   | <0.00040  | <0.00080   | <0.00040  | <0.00080   | <0.00040  | <0.00080   | <0.00040 | <0.00080   | <0.00040 | <0.00080   |        |  |
|                      | Arsenic (As)-Total                 | mg/L   | 0.00040 | 0.00155    | -         | 0.00247     | 0.00111    | 0.00655     | 0.00468    | 0.00543    | 0.00474    | 0.00640    | 0.0114    | 0.00044    | <0.00080   | 0.00073       | <0.00080   | 0.00071   | <0.00080   | 0.0037    | <0.00080   | 0.00392   | <0.00080   | 0.00156   | <0.00080   | 0.00079  | <0.00080   | 0.00084  | <0.00080   |        |  |
|                      | Barium (Ba)-Total                  | mg/L   | 0.0030  | 0.0112     | -         | 0.0514      | 0.0498     | 0.0758      | 0.0858     | 0.0401     | 0.0491     | 0.0292     | 0.168     | 0.0685     | 0.0502     | 0.0147        | 0.0165     | 0.0789    | 0.0935     | 0.0127    | 0.0114     | 0.0195    | 0.0174     | 0.0355    | 0.0358     | 0.0161   | 0.0169     | 0.0344   | 0.0222     |        |  |
|                      | Beryllium (Be)-Total               | mg/L   | 0.0010  | <0.0010    | -         | <0.0010     | <0.0020    | <0.0010     | <0.0020    | <0.0010    | <0.0020    | <0.0020    | <0.0010   | <0.0010    | <0.0020    | <0.0010       | <0.0020    | <0.0010   | <0.0020    | <0.0010   | <0.0020    | <0.0010   | <0.0020    | <0.0010   | <0.0020    | <0.0010  | <0.0020    | <0.0010  | <0.0020    |        |  |
|                      | Boron (B)-Total                    | mg/L   | 0.050   | <0.050     | -         | <0.050      | <0.050     | <0.050      | <0.050     | <0.050     |            |            |           |            |            |               |            |           |            |           |            |           |            |           |            |          |            |          |            |        |  |

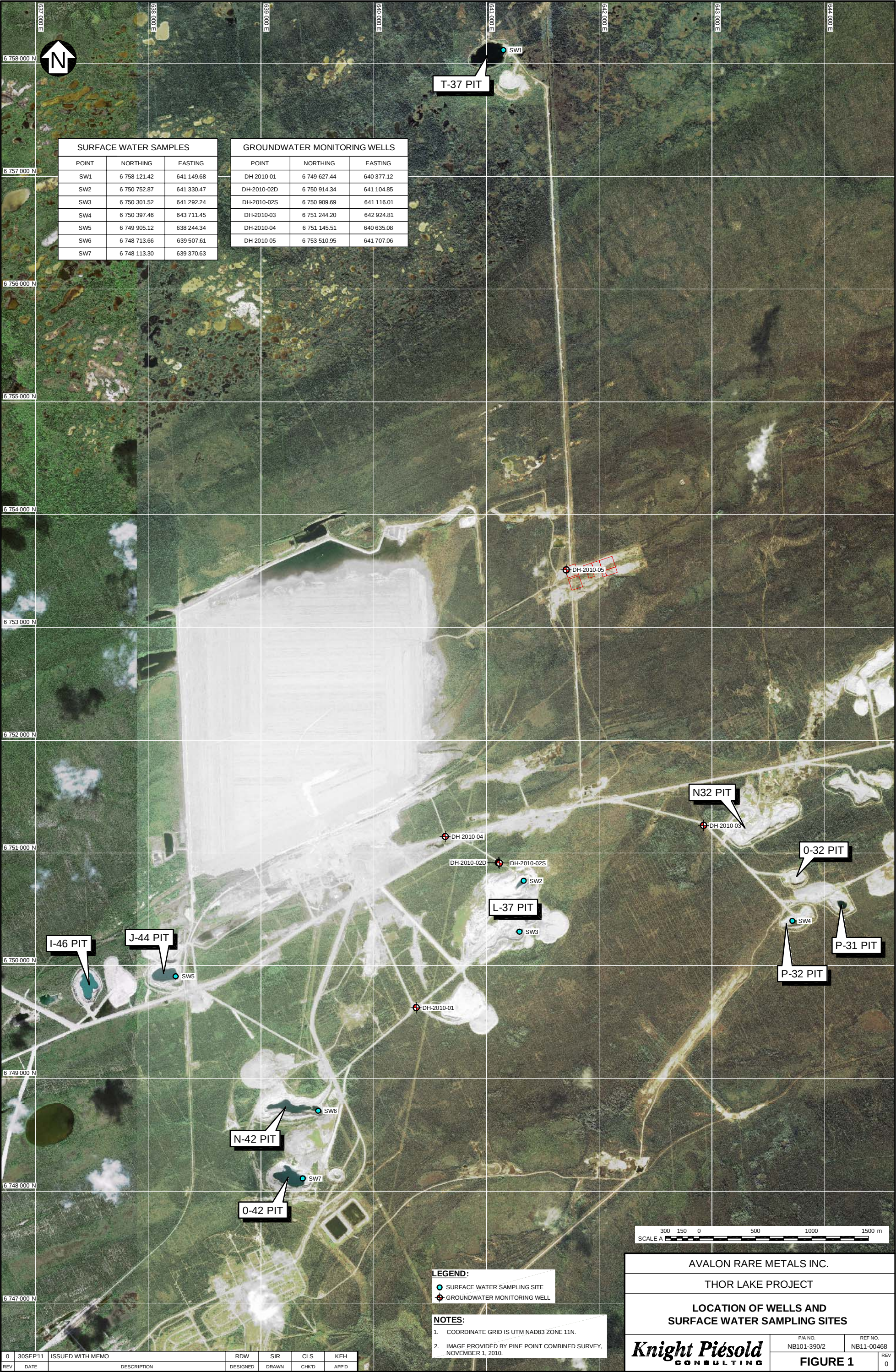
TABLE 1  
AVALON RARE METALS INC.  
THOR LAKE PROJECT  
PINE POINT GROUNDWATER AND SURFACE WATER QUALITY  
WATER SAMPLE LABORATORY TEST RESULTS SUMMARY

| GROUNDWATER               |                           |       |         |            |           |             |            |             |            |            |            |            |           |            |            |           |            |           |            |           |            |           |            |           |            |           |            | SURFACE WATER |            |  |  |  |  |  |  |  |  |  |  |  |  |
|---------------------------|---------------------------|-------|---------|------------|-----------|-------------|------------|-------------|------------|------------|------------|------------|-----------|------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|------------|--|--|--|--|--|--|--|--|--|--|--|--|
| Date Sampled              |                           |       |         | 04-Mar-11  | 09-Aug-11 | 27-Feb-11   | 09-Aug-11  | 27-Feb-11   | 09-Aug-11  | 27-Feb-11  | 09-Aug-11  | 27-Feb-11  | 09-Aug-11 | 27-Feb-11  | 09-Aug-11  | 28-Feb-11 | 09-Aug-11  | 28-Feb-11 | 09-Aug-11  | 28-Feb-11 | 09-Aug-11  | 28-Feb-11 | 09-Aug-11  | 28-Feb-11 | 09-Aug-11  | 12-Mar-11 | 14-Aug-11  |               |            |  |  |  |  |  |  |  |  |  |  |  |  |
| Lab ID                    |                           |       |         | L983741    | -         | L982653     | L1042743-2 | L982653     | L1042743-1 | L982653    | L1042743-3 | L1042743-4 | L983741   | L2982653   | L1042743-5 | L2982653  | L1042722-1 | L2982653  | L1042722-2 | L2982653  | L1042722-3 | L2982653  | L1042722-4 | L2982653  | L1042722-5 | L2982653  | L1042722-6 | L987687       | L1058718-1 |  |  |  |  |  |  |  |  |  |  |  |  |
| Samples                   | Sample Type               | Units | MDL     | DH-2010-01 |           | DH-2010-02S |            | DH-2010-02D |            | DH-2010-03 |            | DH-2010-04 |           | DH-2010-05 |            | SW1       |            | SW2       |            | SW3       |            | SW4       |            | SW5       |            | SW6       |            | SW7           |            |  |  |  |  |  |  |  |  |  |  |  |  |
| Dissolved Metals (cont'd) | Chromium (Cr)-Dissolved   | mg/L  | 0.0050  | <0.0050    | -         | <0.0050     | <0.0050    | <0.0050     | <0.0050    | <0.0050    | <0.0050    | <0.0050    | <0.0050   | <0.0050    | <0.0050    | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -             | -          |  |  |  |  |  |  |  |  |  |  |  |  |
|                           | Cobalt (Co)-Dissolved     | mg/L  | 0.0020  | <0.0020    | -         | <0.0020     | <0.0020    | <0.0020     | <0.0020    | <0.0020    | <0.0020    | <0.0020    | <0.0020   | <0.0020    | <0.0020    | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -             | -          |  |  |  |  |  |  |  |  |  |  |  |  |
|                           | Copper (Cu)-Dissolved     | mg/L  | 0.0010  | <0.0010    | -         | <0.0010     | <0.0010    | <0.0010     | <0.0010    | <0.0010    | <0.0010    | <0.0010    | <0.0010   | <0.0010    | 0.0015     | 0.0012    | -          | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -             | -          |  |  |  |  |  |  |  |  |  |  |  |  |
|                           | Iron (Fe)-Dissolved       | mg/L  | 0.010   | 0.248      | -         | <0.010      | 1.22       | <0.010      | 0.752      | <0.010     | <0.010     | 0.852      | 1.03      | 0.012      | <0.010     | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -             | -          |  |  |  |  |  |  |  |  |  |  |  |  |
|                           | Lead (Pb)-Dissolved       | mg/L  | 0.00010 | <0.00010   | -         | <0.00010    | <0.0050    | <0.00010    | <0.0050    | <0.00010   | <0.0050    | <0.0050    | 0.00125   | 0.00023    | <0.0050    | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -             | -          |  |  |  |  |  |  |  |  |  |  |  |  |
|                           | Lithium (Li)-Dissolved    | mg/L  | 0.0030  | <0.0030    | -         | 0.0041      | 0.0046     | 0.0047      | 0.0056     | <0.0030    | 0.0057     | 0.0096     | 0.0076    | <0.0030    | <0.0030    | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -             | -          |  |  |  |  |  |  |  |  |  |  |  |  |
|                           | Magnesium (Mg)-Dissolved  | mg/L  | 0.10    | 17.7       | -         | 48.2        | 49.8       | 42.9        | 45.3       | 57.4       | 74.9       | 47.8       | 54.0      | 17.3       | 16.1       | 97.9      | 88.9       | 40.8      | 34.8       | 79.4      | 91.9       | 93.9      | 82.3       | 90.6      | 85.6       | 217       | 197        | 87.2          | 76.0       |  |  |  |  |  |  |  |  |  |  |  |  |
|                           | Manganese (Mn)-Dissolved  | mg/L  | 0.0020  | 0.0071     | -         | <0.0020     | 0.0354     | 0.0239      | 0.0517     | 0.0105     | 0.0281     | 0.0167     | 0.0386    | <0.0020    | <0.0020    | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -             | -          |  |  |  |  |  |  |  |  |  |  |  |  |
|                           | Mercury (Hg)-Dissolved    | mg/L  | 0.00010 | <0.00010   | -         | <0.00010    | -          | <0.00010    | -          | <0.00010   | -          | -          | <0.00010  | <0.00010   | -          | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -             | -          |  |  |  |  |  |  |  |  |  |  |  |  |
|                           | Molybdenum (Mo)-Dissolved | mg/L  | 0.0050  | <0.0050    | -         | <0.0050     | <0.0050    | <0.0050     | <0.0050    | 0.0059     | <0.0050    | 0.0096     | 0.0120    | <0.0050    | <0.0050    | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -             | -          |  |  |  |  |  |  |  |  |  |  |  |  |
|                           | Nickel (Ni)-Dissolved     | mg/L  | 0.0020  | <0.0020    | -         | <0.0020     | <0.0020    | <0.0020     | <0.0020    | 0.0048     | 0.0039     | <0.0020    | 0.0048    | <0.0020    | <0.0020    | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -             | -          |  |  |  |  |  |  |  |  |  |  |  |  |
|                           | Potassium (K)-Dissolved   | mg/L  | 0.50    | <0.50      | -         | 1.01        | 0.72       | 2.75        | 1.99       | 1.32       | 1.54       | 1.30       | 1.46      | 0.63       | <0.50      | 3.09      | 2.81       | 2.2       | 1.75       | 1.84      | 1.91       | 1.85      | 1.23       | 3.44      | 3.07       | 3.59      | 3.19       | 3.13          | 2.36       |  |  |  |  |  |  |  |  |  |  |  |  |
|                           | Selenium (Se)-Dissolved   | mg/L  | 0.00040 | <0.00040   | -         | <0.00040    | <0.00080   | <0.00040    | <0.00080   | <0.00040   | <0.00080   | <0.00080   | <0.00040  | 0.00052    | <0.00080   | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -             | -          |  |  |  |  |  |  |  |  |  |  |  |  |
|                           | Silver (Ag)-Dissolved     | mg/L  | 0.00010 | <0.00010   | -         | <0.00010    | <0.0050    | <0.00010    | <0.0050    | <0.00010   | <0.0050    | <0.00010   | <0.00010  | <0.00010   | <0.0050    | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -             | -          |  |  |  |  |  |  |  |  |  |  |  |  |
|                           | Strontium (Sr)-Dissolved  | mg/L  | 0.00010 | 0.0238     | -         | 0.0699      | 0.0655     | 0.111       | 0.109      | 0.0844     | 0.103      | 0.128      | 0.120     | 0.0458     | 0.0378     | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -             | -          |  |  |  |  |  |  |  |  |  |  |  |  |
|                           | Sodium (Na)-Dissolved     | mg/L  | 1.0     | <1.0       | -         | 2.6         | 2.8        | 11.4        | 7.8        | 3.0        | 3.7        | 4.5        | 4.0       | 1.2        | 1.2        | 10.3      | 9.4        | 2.1       | 1.7        | 3.5       | 3.4        | 1.8       | 1.7        | 15.2      | 14.4       | 6.8       | 6.5        | 8.5           | 7.4        |  |  |  |  |  |  |  |  |  |  |  |  |
|                           | Thallium (Tl)-Dissolved   | mg/L  | 0.00010 | <0.00010   | -         | <0.00010    | <0.050     | <0.00010    | <0.050     | 0.00011    | <0.050     | <0.050     | <0.00010  | <0.00010   | <0.050     | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -             | -          |  |  |  |  |  |  |  |  |  |  |  |  |
|                           | Tin (Sn)-Dissolved        | mg/L  | 0.050   | <0.050     | -         | <0.050      | <0.050     | <0.050      | <0.050     | <0.050     | <0.050     | <0.050     | <0.050    | <0.050     | <0.050     | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -             | -          |  |  |  |  |  |  |  |  |  |  |  |  |
|                           | Titanium (Ti)-Dissolved   | mg/L  | 0.0010  | <0.0010    | -         | <0.0010     | <0.0010    | <0.0010     | <0.0010    | <0.0010    | <0.0010    | <0.0010    | 0.0044    | <0.0010    | <0.0010    | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -             | -          |  |  |  |  |  |  |  |  |  |  |  |  |
|                           | Uranium (U)-Dissolved     | mg/L  | 0.00010 | 0.00326    | -         | 0.00331     | 0.00273    | 0.0116      | 0.00577    | 0.0134     | 0.00841    | 0.0103     | 0.0159    | 0.00067    | 0.00057    | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -             | -          |  |  |  |  |  |  |  |  |  |  |  |  |
|                           | Vanadium (V)-Dissolved    | mg/L  | 0.0010  | <0.0010    | -         | <0.0010     | <0.0010    | <0.0010     | <0.0010    | <0.0010    | <0.0010    | <0.0010    | <0.0010   | <0.0010    | <0.0010    | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -             | -          |  |  |  |  |  |  |  |  |  |  |  |  |
|                           | Zinc (Zn)-Dissolved       | mg/L  | 0.0020  | 0.0968     | -         | 0.0126      | 0.0035     | 0.0108      | <0.0020    | 0.0718     | 0.0190     | <0.0020    | 0.0274    | 0.0200     | 0.0173     | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -             | -          |  |  |  |  |  |  |  |  |  |  |  |  |
| Other                     | Ion Balance               | %     | -       | 30.5       | -         | 99.6        | 104        | 99.2        | 105        | 97.8       | 105        | 107        | 113       | 106        | 107        | 105       | 108        | 99.1      | 94.3       | 96.3      | 105        | 105       | 105        | 106       | 107        | 107       | 104        | 101           | 95.0       |  |  |  |  |  |  |  |  |  |  |  |  |
|                           | Total Organic Carbon      | mg/L  | 1.0     | -          | -         | -           | -          | -           | -          | -          | -          | -          | -         | -          | -          | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -         | -          | -             | 1.8        |  |  |  |  |  |  |  |  |  |  |  |  |

I:\1101\00390\02\A\Correspondence\NB11-00468 - Pine Point Water Quality Results\Table.xls]1

**NOTES:**  
1. NO TEST RESULTS RECEIVED FOR WELL 2010-04; NO RECORD ON COC FORMS AND NO RECORD OF LABORATORY RECEIPT.

|     |         |                             |       |      |      |
|-----|---------|-----------------------------|-------|------|------|
| 0   | 30SEP11 | ISSUED WITH MEMO NB11-00468 | RDW   | KEH  | KEH  |
| REV | DATE    | DESCRIPTION                 | PREPD | CHKD | APPD |



|     |         |                  |          |       |       |       |
|-----|---------|------------------|----------|-------|-------|-------|
| 0   | 30SEP11 | ISSUED WITH MEMO | RDW      | SIR   | CLS   | KEH   |
| REV | DATE    | DESCRIPTION      | DESIGNED | DRAWN | CHK'D | APP'D |

**APPENDIX A**

LABORATORY CERTIFICATES OF ANALYSIS

(Pages A-1 to A-21)



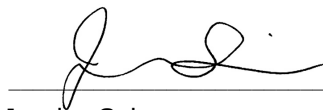
KNIGHT PIESOLD LTD.  
ATTN: RYAN WEIR / CARA STAPLEY /  
KEVIN HAWTON  
1650 Main Street West  
North Bay ON P1B 8G5

Date Received: 10-AUG-11  
Report Date: 26-AUG-11 14:09 (MT)  
Version: FINAL

Client Phone: 705-476-2165

## Certificate of Analysis

**Lab Work Order #:** L1042722  
**Project P.O. #:** AS PER AVALON  
**Job Reference:** NB101-39012  
**C of C Numbers:** 10-100976  
**Legal Site Desc:**



Jessica Spira  
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 9936-67 Avenue, Edmonton, AB T6E 0P5 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311  
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

## ALS ENVIRONMENTAL ANALYTICAL REPORT

26-AUG-11 14:09 (MT)

Version: FINAL

| Sample ID<br>Description<br>Sampled Date<br>Sampled Time<br>Client ID |                                     | L1042722-1<br>WATER<br>09-AUG-11<br>17:20<br>SW1 | L1042722-2<br>WATER<br>09-AUG-11<br>18:00<br>SW2 | L1042722-3<br>WATER<br>09-AUG-11<br>17:50<br>SW3 | L1042722-4<br>WATER<br>09-AUG-11<br>16:10<br>SW4 | L1042722-5<br>WATER<br>09-AUG-11<br>18:30<br>SW5 |
|-----------------------------------------------------------------------|-------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| Grouping                                                              | Analyte                             |                                                  |                                                  |                                                  |                                                  |                                                  |
| <b>WATER</b>                                                          |                                     |                                                  |                                                  |                                                  |                                                  |                                                  |
| <b>Physical Tests</b>                                                 | Color, True (T.C.U.)                | 4.4                                              | <2.0                                             | <2.0                                             | 2.1                                              | 6.0                                              |
|                                                                       | Total Suspended Solids (mg/L)       | <3.0                                             | <3.0                                             | 5.0                                              | <3.0                                             | <3.0                                             |
|                                                                       | Turbidity (NTU)                     | 0.22                                             | 0.48                                             | 0.44                                             | 1.07                                             | 0.46                                             |
| <b>Anions and Nutrients</b>                                           | Acidity (as CaCO3) (mg/L)           | <5.0                                             | <5.0                                             | <5.0                                             | <5.0                                             | <5.0                                             |
|                                                                       | Alkalinity, Total (as CaCO3) (mg/L) | 168                                              | 106                                              | 257                                              | 149                                              | 153                                              |
|                                                                       | Ammonia (as N) (mg/L)               | <0.050                                           | <0.050                                           | <0.050                                           | <0.050                                           | <0.050                                           |
|                                                                       | Bicarbonate (HCO3) (mg/L)           | 196                                              | 129                                              | 313                                              | 180                                              | 183                                              |
|                                                                       | Bromide (Br) (mg/L)                 | <1.0 <sup>DLM</sup>                              | <1.0 <sup>DLM</sup>                              | <1.0 <sup>DLM</sup>                              | <1.0 <sup>DLM</sup>                              | <1.0 <sup>DLM</sup>                              |
|                                                                       | Carbonate (CO3) (mg/L)              | <5.0                                             | <5.0                                             | <5.0                                             | <5.0                                             | <5.0                                             |
|                                                                       | Chloride (Cl) (mg/L)                | 5.03                                             | 3.48                                             | 3.98                                             | 2.24                                             | 11.3                                             |
|                                                                       | Conductivity (EC) (uS/cm)           | 1330                                             | 843                                              | 1770                                             | 1520                                             | 1430                                             |
|                                                                       | Hardness (as CaCO3) (mg/L)          | 831                                              | 440                                              | 1160                                             | 968                                              | 877                                              |
|                                                                       | Hydroxide (OH) (mg/L)               | <5.0                                             | <5.0                                             | <5.0                                             | <5.0                                             | <5.0                                             |
|                                                                       | Ion Balance (%)                     | 108                                              | 94.3                                             | 105                                              | 105                                              | 107                                              |
|                                                                       | Nitrate and Nitrite (as N) (mg/L)   | <0.071                                           | <0.071                                           | <0.071                                           | <0.071                                           | <0.071                                           |
|                                                                       | Nitrate (as N) (mg/L)               | <0.050                                           | <0.050                                           | <0.050                                           | <0.050                                           | <0.050                                           |
|                                                                       | Nitrite (as N) (mg/L)               | <0.050                                           | <0.050                                           | <0.050                                           | <0.050                                           | <0.050                                           |
|                                                                       | Total Kjeldahl Nitrogen (mg/L)      | <0.20                                            | <0.20                                            | <0.20                                            | <0.20                                            | <0.20                                            |
|                                                                       | Total Nitrogen (mg/L)               | <0.21                                            | <0.21                                            | <0.21                                            | <0.21                                            | <0.21                                            |
|                                                                       | pH (pH)                             | 8.41                                             | 8.30                                             | 8.19                                             | 8.31                                             | 8.34                                             |
|                                                                       | Phosphorus (P)-Total (mg/L)         | <0.020                                           | <0.020                                           | <0.020                                           | <0.020                                           | <0.020                                           |
|                                                                       | TDS (Calculated) (mg/L)             | 988                                              | 572                                              | 1390                                             | 1180                                             | 1080                                             |
|                                                                       | Sulfate (SO4) (mg/L)                | 595                                              | 348                                              | 825                                              | 748                                              | 662                                              |
| <b>Cyanides</b>                                                       | Cyanide, Total (mg/L)               | <0.0050                                          | <0.0050                                          | <0.0050                                          | <0.0050                                          | <0.0050                                          |
| <b>Total Metals</b>                                                   | Aluminum (Al)-Total (mg/L)          | <0.010                                           | 0.024                                            | <0.010                                           | <0.010                                           | <0.010                                           |
|                                                                       | Antimony (Sb)-Total (mg/L)          | <0.00080                                         | <0.00080                                         | <0.00080                                         | <0.00080                                         | <0.00080                                         |
|                                                                       | Arsenic (As)-Total (mg/L)           | <0.00080                                         | <0.00080                                         | <0.00080                                         | <0.00080                                         | <0.00080                                         |
|                                                                       | Barium (Ba)-Total (mg/L)            | 0.0165                                           | 0.0935                                           | 0.0114                                           | 0.0174                                           | 0.0358                                           |
|                                                                       | Beryllium (Be)-Total (mg/L)         | <0.0020                                          | <0.0020                                          | <0.0020                                          | <0.0020                                          | <0.0020                                          |
|                                                                       | Boron (B)-Total (mg/L)              | 0.125                                            | <0.050                                           | <0.050                                           | <0.050                                           | 0.109                                            |
|                                                                       | Cadmium (Cd)-Total (mg/L)           | <0.0010                                          | <0.0010                                          | <0.0010                                          | <0.0010                                          | <0.0010                                          |
|                                                                       | Calcium (Ca)-Total (mg/L)           | 167                                              | 120                                              | 285                                              | 232                                              | 188                                              |
|                                                                       | Chromium (Cr)-Total (mg/L)          | <0.0050                                          | <0.0050                                          | <0.0050                                          | <0.0050                                          | <0.0050                                          |
|                                                                       | Cobalt (Co)-Total (mg/L)            | <0.0020                                          | <0.0020                                          | <0.0020                                          | <0.0020                                          | <0.0020                                          |
|                                                                       | Copper (Cu)-Total (mg/L)            | <0.0010                                          | <0.0010                                          | <0.0010                                          | <0.0010                                          | <0.0010                                          |
|                                                                       | Iron (Fe)-Total (mg/L)              | <0.010                                           | 0.022                                            | 0.015                                            | 0.097                                            | <0.010                                           |
|                                                                       | Lead (Pb)-Total (mg/L)              | <0.0050                                          | 0.0055                                           | 0.0173                                           | 0.0219                                           | <0.0050                                          |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

|                             |                                     | Sample ID<br>Description<br>Sampled Date<br>Sampled Time<br>Client ID |  |  |  |  |
|-----------------------------|-------------------------------------|-----------------------------------------------------------------------|--|--|--|--|
|                             |                                     | L1042722-6<br>WATER<br>09-AUG-11<br>18:55<br>SW6                      |  |  |  |  |
| Grouping                    | Analyte                             |                                                                       |  |  |  |  |
| <b>WATER</b>                |                                     |                                                                       |  |  |  |  |
| <b>Physical Tests</b>       | Color, True (T.C.U.)                | 2.6                                                                   |  |  |  |  |
|                             | Total Suspended Solids (mg/L)       | <3.0                                                                  |  |  |  |  |
|                             | Turbidity (NTU)                     | 0.51                                                                  |  |  |  |  |
| <b>Anions and Nutrients</b> | Acidity (as CaCO3) (mg/L)           | <5.0                                                                  |  |  |  |  |
|                             | Alkalinity, Total (as CaCO3) (mg/L) | 167                                                                   |  |  |  |  |
|                             | Ammonia (as N) (mg/L)               | <0.050                                                                |  |  |  |  |
|                             | Bicarbonate (HCO3) (mg/L)           | 204                                                                   |  |  |  |  |
|                             | Bromide (Br) (mg/L)                 | <1.0 <sup>DLM</sup>                                                   |  |  |  |  |
|                             | Carbonate (CO3) (mg/L)              | <5.0                                                                  |  |  |  |  |
|                             | Chloride (Cl) (mg/L)                | 11.5                                                                  |  |  |  |  |
|                             | Conductivity (EC) (uS/cm)           | 2660                                                                  |  |  |  |  |
|                             | Hardness (as CaCO3) (mg/L)          | 1920                                                                  |  |  |  |  |
|                             | Hydroxide (OH) (mg/L)               | <5.0                                                                  |  |  |  |  |
|                             | Ion Balance (%)                     | 104                                                                   |  |  |  |  |
|                             | Nitrate and Nitrite (as N) (mg/L)   | <0.071                                                                |  |  |  |  |
|                             | Nitrate (as N) (mg/L)               | <0.050                                                                |  |  |  |  |
|                             | Nitrite (as N) (mg/L)               | <0.050                                                                |  |  |  |  |
|                             | Total Kjeldahl Nitrogen (mg/L)      | <0.20                                                                 |  |  |  |  |
|                             | Total Nitrogen (mg/L)               | <0.21                                                                 |  |  |  |  |
|                             | pH (pH)                             | 8.20                                                                  |  |  |  |  |
|                             | Phosphorus (P)-Total (mg/L)         | <0.020                                                                |  |  |  |  |
|                             | TDS (Calculated) (mg/L)             | 2380                                                                  |  |  |  |  |
|                             | Sulfate (SO4) (mg/L)                | 1620 <sup>DLM</sup>                                                   |  |  |  |  |
| <b>Cyanides</b>             | Cyanide, Total (mg/L)               | <0.0050                                                               |  |  |  |  |
| <b>Total Metals</b>         | Aluminum (Al)-Total (mg/L)          | <0.010                                                                |  |  |  |  |
|                             | Antimony (Sb)-Total (mg/L)          | <0.00080                                                              |  |  |  |  |
|                             | Arsenic (As)-Total (mg/L)           | <0.00080                                                              |  |  |  |  |
|                             | Barium (Ba)-Total (mg/L)            | 0.0169                                                                |  |  |  |  |
|                             | Beryllium (Be)-Total (mg/L)         | <0.0020                                                               |  |  |  |  |
|                             | Boron (B)-Total (mg/L)              | <0.050                                                                |  |  |  |  |
|                             | Cadmium (Cd)-Total (mg/L)           | <0.0010                                                               |  |  |  |  |
|                             | Calcium (Ca)-Total (mg/L)           | 414                                                                   |  |  |  |  |
|                             | Chromium (Cr)-Total (mg/L)          | <0.0050                                                               |  |  |  |  |
|                             | Cobalt (Co)-Total (mg/L)            | <0.0020                                                               |  |  |  |  |
|                             | Copper (Cu)-Total (mg/L)            | <0.0010                                                               |  |  |  |  |
|                             | Iron (Fe)-Total (mg/L)              | 0.028                                                                 |  |  |  |  |
|                             | Lead (Pb)-Total (mg/L)              | 0.0118                                                                |  |  |  |  |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Sample ID<br>Description<br>Sampled Date<br>Sampled Time<br>Client ID |                                 | L1042722-1<br>WATER<br>09-AUG-11<br>17:20<br>SW1 | L1042722-2<br>WATER<br>09-AUG-11<br>18:00<br>SW2 | L1042722-3<br>WATER<br>09-AUG-11<br>17:50<br>SW3 | L1042722-4<br>WATER<br>09-AUG-11<br>16:10<br>SW4 | L1042722-5<br>WATER<br>09-AUG-11<br>18:30<br>SW5 |
|-----------------------------------------------------------------------|---------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| Grouping                                                              | Analyte                         |                                                  |                                                  |                                                  |                                                  |                                                  |
| <b>WATER</b>                                                          |                                 |                                                  |                                                  |                                                  |                                                  |                                                  |
| <b>Total Metals</b>                                                   | Lithium (Li)-Total (mg/L)       | 0.019                                            | <0.010                                           | <0.010                                           | <0.010                                           | 0.017                                            |
|                                                                       | Magnesium (Mg)-Total (mg/L)     | 80.0                                             | 34.0                                             | 83.9                                             | 75.9                                             | 77.8                                             |
|                                                                       | Manganese (Mn)-Total (mg/L)     | <0.0020                                          | <0.0020                                          | 0.0555                                           | 0.0189                                           | <0.0020                                          |
|                                                                       | Molybdenum (Mo)-Total (mg/L)    | <0.0050                                          | <0.0050                                          | <0.0050                                          | <0.0050                                          | <0.0050                                          |
|                                                                       | Nickel (Ni)-Total (mg/L)        | <0.0020                                          | <0.0020                                          | 0.0245                                           | 0.0110                                           | 0.0052                                           |
|                                                                       | Potassium (K)-Total (mg/L)      | 2.44                                             | 1.75                                             | 1.81                                             | 1.34                                             | 2.72                                             |
|                                                                       | Selenium (Se)-Total (mg/L)      | <0.00080                                         | <0.00080                                         | <0.00080                                         | <0.00080                                         | <0.00080                                         |
|                                                                       | Silver (Ag)-Total (mg/L)        | <0.0050                                          | <0.0050                                          | <0.0050                                          | <0.0050                                          | <0.0050                                          |
|                                                                       | Sodium (Na)-Total (mg/L)        | 8.1                                              | 1.6                                              | 2.9                                              | 1.4                                              | 12.5                                             |
|                                                                       | Strontium (Sr)-Total (mg/L)     | 1.88                                             | 0.216                                            | 0.486                                            | 0.115                                            | 4.02                                             |
|                                                                       | Thallium (Tl)-Total (mg/L)      | <0.050                                           | <0.050                                           | <0.050                                           | <0.050                                           | <0.050                                           |
|                                                                       | Tin (Sn)-Total (mg/L)           | <0.050                                           | <0.050                                           | <0.050                                           | <0.050                                           | <0.050                                           |
|                                                                       | Titanium (Ti)-Total (mg/L)      | <0.0010                                          | <0.0010                                          | <0.0010                                          | <0.0010                                          | 0.0019                                           |
|                                                                       | Uranium (U)-Total (mg/L)        | 0.00128                                          | 0.00377                                          | 0.00867                                          | 0.00502                                          | 0.00344                                          |
|                                                                       | Vanadium (V)-Total (mg/L)       | <0.0010                                          | <0.0010                                          | <0.0010                                          | <0.0010                                          | <0.0010                                          |
|                                                                       | Zinc (Zn)-Total (mg/L)          | 0.0857                                           | 0.213                                            | 4.04                                             | 1.32                                             | 0.779                                            |
| <b>Dissolved Metals</b>                                               | Calcium (Ca)-Dissolved (mg/L)   | 186                                              | 119                                              | 314                                              | 252                                              | 210                                              |
|                                                                       | Magnesium (Mg)-Dissolved (mg/L) | 88.9                                             | 34.8                                             | 91.9                                             | 82.3                                             | 85.6                                             |
|                                                                       | Potassium (K)-Dissolved (mg/L)  | 2.81                                             | 1.75                                             | 1.91                                             | 1.23                                             | 3.07                                             |
|                                                                       | Sodium (Na)-Dissolved (mg/L)    | 9.4                                              | 1.7                                              | 3.4                                              | 1.7                                              | 14.4                                             |

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Sample ID<br>Description<br>Sampled Date<br>Sampled Time<br>Client ID |                                 | L1042722-6<br>WATER<br>09-AUG-11<br>18:55<br>SW6 |  |  |  |  |
|-----------------------------------------------------------------------|---------------------------------|--------------------------------------------------|--|--|--|--|
| Grouping                                                              | Analyte                         |                                                  |  |  |  |  |
| <b>WATER</b>                                                          |                                 |                                                  |  |  |  |  |
| <b>Total Metals</b>                                                   | Lithium (Li)-Total (mg/L)       | <0.010                                           |  |  |  |  |
|                                                                       | Magnesium (Mg)-Total (mg/L)     | 174                                              |  |  |  |  |
|                                                                       | Manganese (Mn)-Total (mg/L)     | 0.0492                                           |  |  |  |  |
|                                                                       | Molybdenum (Mo)-Total (mg/L)    | <0.0050                                          |  |  |  |  |
|                                                                       | Nickel (Ni)-Total (mg/L)        | 0.0148                                           |  |  |  |  |
|                                                                       | Potassium (K)-Total (mg/L)      | 2.67                                             |  |  |  |  |
|                                                                       | Selenium (Se)-Total (mg/L)      | <0.00080                                         |  |  |  |  |
|                                                                       | Silver (Ag)-Total (mg/L)        | <0.0050                                          |  |  |  |  |
|                                                                       | Sodium (Na)-Total (mg/L)        | 5.4                                              |  |  |  |  |
|                                                                       | Strontium (Sr)-Total (mg/L)     | 0.307                                            |  |  |  |  |
|                                                                       | Thallium (Tl)-Total (mg/L)      | <0.050                                           |  |  |  |  |
|                                                                       | Tin (Sn)-Total (mg/L)           | <0.050                                           |  |  |  |  |
|                                                                       | Titanium (Ti)-Total (mg/L)      | <0.0010                                          |  |  |  |  |
|                                                                       | Uranium (U)-Total (mg/L)        | 0.0261                                           |  |  |  |  |
|                                                                       | Vanadium (V)-Total (mg/L)       | <0.0010                                          |  |  |  |  |
|                                                                       | Zinc (Zn)-Total (mg/L)          | 3.13                                             |  |  |  |  |
| <b>Dissolved Metals</b>                                               | Calcium (Ca)-Dissolved (mg/L)   | 444                                              |  |  |  |  |
|                                                                       | Magnesium (Mg)-Dissolved (mg/L) | 197                                              |  |  |  |  |
|                                                                       | Potassium (K)-Dissolved (mg/L)  | 3.19                                             |  |  |  |  |
|                                                                       | Sodium (Na)-Dissolved (mg/L)    | 6.5                                              |  |  |  |  |

## Reference Information

### Qualifiers for Individual Parameters Listed:

| Qualifier | Description                                                                                        |
|-----------|----------------------------------------------------------------------------------------------------|
| DLM       | Detection Limit Adjusted For Sample Matrix Effects                                                 |
| E         | Matrix Spike recovery outside ALS DQO due to analyte background in sample.                         |
| 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>ACIDITY-ED</b>                                                                                                                                                                                                                        | Water  | Acidity (as CaCO <sub>3</sub> )       | APHA 2310 B - Potentiometric Titration |
| <b>BR-IC-ED</b>                                                                                                                                                                                                                          | Water  | Bromide by IC                         | APHA 4110 B-ION CHROMATOGRAPHY         |
| <b>CL-IC-ED</b>                                                                                                                                                                                                                          | Water  | Chloride by IC                        | APHA 4110 B-ION CHROMATOGRAPHY         |
| <b>CN-T-MID-HH-COL-VA</b>                                                                                                                                                                                                                | Water  | Total Cyanide by HH Distillation      | APHA 4500-CN Cyanide                   |
| This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method. |        |                                       |                                        |
| <b>COL-TRU-ED</b>                                                                                                                                                                                                                        | Water  | Color, True                           | APHA 2120                              |
| The reported color applies to the pH of the sample as submitted unless otherwise noted on the report.                                                                                                                                    |        |                                       |                                        |
| <b>IONBALANCE-ED</b>                                                                                                                                                                                                                     | Water  | Ion Balance Calculation               | APHA 1030E                             |
| <b>MET-D-ICP-ED</b>                                                                                                                                                                                                                      | Water  | Dissolved Metals in Water by ICPOES   | APHA 3120 B-ICP-OES                    |
| <b>MET-T-L-ICP-ED</b>                                                                                                                                                                                                                    | Water  | Total Metals in Water by ICPOES (Low) | APHA 3120 B-ICP-OES                    |
| <b>MET-T-MS-ED</b>                                                                                                                                                                                                                       | Water  | Total Metals in Water by ICPMS        | SW 846 - 6020-ICPMS                    |
| <b>N-T-CALC-ED</b>                                                                                                                                                                                                                       | Water  | Total Nitrogen (Calculation)          | APHA 4500 N-Calculated                 |
| Total Nitrogen is a calculated parameter. Total Nitrogen = Total Kjeldahl Nitrogen + [Nitrate and Nitrite (as N)]                                                                                                                        |        |                                       |                                        |
| <b>NH3-CFA-ED</b>                                                                                                                                                                                                                        | Water  | Ammonia in Water by Colour            | APHA 4500 NH3-NITROGEN (AMMONIA)       |
| This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.                                                            |        |                                       |                                        |
| <b>NO2+NO3-CALC-ED</b>                                                                                                                                                                                                                   | Water  | Nitrate+Nitrite                       | CALCULATION                            |
| <b>NO2-IC-ED</b>                                                                                                                                                                                                                         | Water  | Nitrite as N by IC                    | APHA 4110 B-ION CHROMATOGRAPHY         |
| <b>NO3-IC-ED</b>                                                                                                                                                                                                                         | Water  | Nitrate as N by IC                    | APHA 4110 B-ION CHROMATOGRAPHY         |
| <b>P-T-COL-ED</b>                                                                                                                                                                                                                        | Water  | Total P in Water by Colour            | APHA 4500-P PHOSPHORUS                 |
| This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.                                                  |        |                                       |                                        |
| <b>PH/EC/ALK-ED</b>                                                                                                                                                                                                                      | Water  | pH, Conductivity and Total Alkalinity | APHA 4500-H, 2510, 2320                |
| All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)                                  |        |                                       |                                        |
| <b>SO4-IC-ED</b>                                                                                                                                                                                                                         | Water  | Sulfate by IC                         | APHA 4110 B-ION CHROMATOGRAPHY         |
| <b>SOLIDS-TOTSUS-ED</b>                                                                                                                                                                                                                  | Water  | Total Suspended Solids                | APHA 2540 D-Gravimetric                |
| <b>TKN-CFA-ED</b>                                                                                                                                                                                                                        | Water  | TKN in Water by Colour                | APHA 4500-NORG (TKN)                   |
| This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 celcius with analysis using an automated colourimetric finish.   |        |                                       |                                        |
| <b>TURBIDITY-ED</b>                                                                                                                                                                                                                      | Water  | Turbidity                             | APHA 2130 B-Nephelometer               |

\*\* 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, BC, CANADA     |

### Chain of Custody Numbers:

10-100976

## 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 ww* - 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.*





KNIGHT PIESOLD LTD.  
ATTN: RYAN WEIR / CARA STAPLEY /  
KEVIN HAWTON  
1650 Main Street West  
North Bay ON P1B 8G5

Date Received: 10-AUG-11  
Report Date: 24-AUG-11 11:09 (MT)  
Version: FINAL

Client Phone: 705-476-2165

## Certificate of Analysis

**Lab Work Order #:** L1042743  
**Project P.O. #:** NOT SUBMITTED  
**Job Reference:** NB101-39012  
**C of C Numbers:** 10-100975  
**Legal Site Desc:**

  
\_\_\_\_\_  
Jessica Spira  
Senior Account Manager

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ADDRESS: 9936-67 Avenue, Edmonton, AB T6E 0P5 Canada | Phone: +1 780 413 5227 | Fax: +1 780 437 2311  
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

## ALS ENVIRONMENTAL ANALYTICAL REPORT

24-AUG-11 11:09 (MT)

Version: FINAL

| Sample ID<br>Description<br>Sampled Date<br>Sampled Time<br>Client ID |                                                  | L1042743-1<br>WATER<br>09-AUG-11<br>12:50<br>DH-2010-02D | L1042743-2<br>WATER<br>09-AUG-11<br>13:40<br>DH-2010-02S | L1042743-3<br>WATER<br>09-AUG-11<br>15:50<br>DH-2010-03 | L1042743-4<br>WATER<br>09-AUG-11<br>14:55<br>DH-2010-04 | L1042743-5<br>WATER<br>09-AUG-11<br>16:50<br>DH-2010-05 |
|-----------------------------------------------------------------------|--------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|
| Grouping                                                              | Analyte                                          |                                                          |                                                          |                                                         |                                                         |                                                         |
| <b>WATER</b>                                                          |                                                  |                                                          |                                                          |                                                         |                                                         |                                                         |
| <b>Physical Tests</b>                                                 | Color, True (T.C.U.)                             | 13.3                                                     | 4.2                                                      | 2.2                                                     | 2.1                                                     | 3.0                                                     |
|                                                                       | Total Suspended Solids (mg/L)                    | 242                                                      | 193                                                      | 361                                                     | 86.0                                                    | 87.0                                                    |
|                                                                       | Turbidity (NTU)                                  | 111                                                      | 115                                                      | 439                                                     | 59.7                                                    | 58.9                                                    |
| <b>Anions and Nutrients</b>                                           | Acidity (as CaCO <sub>3</sub> ) (mg/L)           | 8.0                                                      | 6.1                                                      | 11.3                                                    | <5.0                                                    | <5.0                                                    |
|                                                                       | Alkalinity, Total (as CaCO <sub>3</sub> ) (mg/L) | 305                                                      | 305                                                      | 342                                                     | 251                                                     | 169                                                     |
|                                                                       | Ammonia (as N) (mg/L)                            | 0.152                                                    | <0.050                                                   | <0.050                                                  | <0.050                                                  | <0.050                                                  |
|                                                                       | Bicarbonate (HCO <sub>3</sub> ) (mg/L)           | 372                                                      | 372                                                      | 417                                                     | 307                                                     | 206                                                     |
|                                                                       | Bromide (Br) (mg/L)                              | <0.10                                                    | <0.10                                                    | <1.0 <sup>DLM</sup>                                     | <1.0 <sup>DLM</sup>                                     | <0.10                                                   |
|                                                                       | Carbonate (CO <sub>3</sub> ) (mg/L)              | <5.0                                                     | <5.0                                                     | <5.0                                                    | <5.0                                                    | <5.0                                                    |
|                                                                       | Chloride (Cl) (mg/L)                             | 3.03                                                     | 3.07                                                     | 3.53                                                    | 0.93                                                    | <0.50                                                   |
|                                                                       | Conductivity (EC) (uS/cm)                        | 793                                                      | 863                                                      | 1140                                                    | 815                                                     | 332                                                     |
|                                                                       | Hardness (as CaCO <sub>3</sub> ) (mg/L)          | 449                                                      | 510                                                      | 715                                                     | 486                                                     | 189                                                     |
|                                                                       | Hydroxide (OH) (mg/L)                            | <5.0                                                     | <5.0                                                     | <5.0                                                    | <5.0                                                    | <5.0                                                    |
|                                                                       | Ion Balance (%)                                  | 105                                                      | 104                                                      | 105                                                     | 107                                                     | 107                                                     |
|                                                                       | Nitrate and Nitrite (as N) (mg/L)                | <0.071                                                   | <0.071                                                   | <0.071                                                  | <0.071                                                  | 0.190                                                   |
|                                                                       | Nitrate (as N) (mg/L)                            | <0.050                                                   | <0.050                                                   | <0.050                                                  | <0.050                                                  | 0.190                                                   |
|                                                                       | Nitrite (as N) (mg/L)                            | <0.050                                                   | <0.050                                                   | <0.050                                                  | <0.050                                                  | <0.050                                                  |
|                                                                       | Total Kjeldahl Nitrogen (mg/L)                   | <0.20                                                    | <0.20                                                    | <0.20                                                   | <0.20                                                   | <0.20                                                   |
|                                                                       | Total Nitrogen (mg/L)                            | <0.21                                                    | <0.21                                                    | <0.21                                                   | <0.21                                                   | <0.21                                                   |
|                                                                       | pH (pH)                                          | 7.98                                                     | 7.96                                                     | 7.91                                                    | 8.02                                                    | 8.23                                                    |
|                                                                       | Phosphorus (P)-Total (mg/L)                      | <0.020                                                   | <0.020                                                   | 0.046                                                   | <0.020                                                  | <0.020                                                  |
|                                                                       | TDS (Calculated) (mg/L)                          | 479                                                      | 541                                                      | 782                                                     | 524                                                     | 179                                                     |
|                                                                       | Sulfate (SO <sub>4</sub> ) (mg/L)                | 133                                                      | 180                                                      | 330                                                     | 203                                                     | 9.91                                                    |
| <b>Cyanides</b>                                                       | Cyanide, Total (mg/L)                            | <0.0050                                                  | <0.0050                                                  | <0.0050                                                 | <0.0050                                                 | <0.0050                                                 |
| <b>Total Metals</b>                                                   | Aluminum (Al)-Total (mg/L)                       | 0.462                                                    | 0.474                                                    | 0.763                                                   | 0.377                                                   | 0.160                                                   |
|                                                                       | Antimony (Sb)-Total (mg/L)                       | <0.00080                                                 | <0.00080                                                 | <0.00080                                                | <0.00080                                                | <0.00080                                                |
|                                                                       | Arsenic (As)-Total (mg/L)                        | 0.00468                                                  | 0.00111                                                  | 0.00474                                                 | 0.00640                                                 | <0.00080                                                |
|                                                                       | Barium (Ba)-Total (mg/L)                         | 0.0858                                                   | 0.0498                                                   | 0.0491                                                  | 0.0292                                                  | 0.0502                                                  |
|                                                                       | Beryllium (Be)-Total (mg/L)                      | <0.0020                                                  | <0.0020                                                  | <0.0020                                                 | <0.0020                                                 | <0.0020                                                 |
|                                                                       | Boron (B)-Total (mg/L)                           | <0.050                                                   | <0.050                                                   | <0.050                                                  | <0.050                                                  | <0.050                                                  |
|                                                                       | Cadmium (Cd)-Total (mg/L)                        | <0.0010                                                  | <0.0010                                                  | <0.0010                                                 | <0.0010                                                 | <0.0010                                                 |
|                                                                       | Calcium (Ca)-Total (mg/L)                        | 135                                                      | 136                                                      | 194                                                     | 116                                                     | 55.8                                                    |
|                                                                       | Chromium (Cr)-Total (mg/L)                       | <0.0050                                                  | 0.0074                                                   | 0.0117                                                  | <0.0050                                                 | <0.0050                                                 |
|                                                                       | Cobalt (Co)-Total (mg/L)                         | <0.0020                                                  | <0.0020                                                  | <0.0020                                                 | <0.0020                                                 | <0.0020                                                 |
|                                                                       | Copper (Cu)-Total (mg/L)                         | 0.0014                                                   | 0.0061                                                   | 0.0029                                                  | <0.0010                                                 | 0.0031                                                  |
|                                                                       | Iron (Fe)-Total (mg/L)                           | 1.54                                                     | 2.24                                                     | 3.39                                                    | 1.24                                                    | 0.313                                                   |
|                                                                       | Lead (Pb)-Total (mg/L)                           | 0.0079                                                   | 0.0226                                                   | 0.0490                                                  | <0.0050                                                 | 0.0283                                                  |

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

24-AUG-11 11:09 (MT)

Version: FINAL

| Sample ID<br>Description<br>Sampled Date<br>Sampled Time<br>Client ID |                                  | L1042743-1<br>WATER<br>09-AUG-11<br>12:50<br>DH-2010-02D | L1042743-2<br>WATER<br>09-AUG-11<br>13:40<br>DH-2010-02S | L1042743-3<br>WATER<br>09-AUG-11<br>15:50<br>DH-2010-03 | L1042743-4<br>WATER<br>09-AUG-11<br>14:55<br>DH-2010-04 | L1042743-5<br>WATER<br>09-AUG-11<br>16:50<br>DH-2010-05 |
|-----------------------------------------------------------------------|----------------------------------|----------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|
| Grouping                                                              | Analyte                          |                                                          |                                                          |                                                         |                                                         |                                                         |
| WATER                                                                 |                                  |                                                          |                                                          |                                                         |                                                         |                                                         |
| Total Metals                                                          | Lithium (Li)-Total (mg/L)        | <0.010                                                   | <0.010                                                   | <0.010                                                  | <0.010                                                  | <0.010                                                  |
|                                                                       | Magnesium (Mg)-Total (mg/L)      | 61.2                                                     | 57.7                                                     | 94.2                                                    | 48.8                                                    | 16.6                                                    |
|                                                                       | Manganese (Mn)-Total (mg/L)      | 0.103                                                    | 0.0845                                                   | 0.108                                                   | 0.0348                                                  | 0.0097                                                  |
|                                                                       | Molybdenum (Mo)-Total (mg/L)     | <0.0050                                                  | <0.0050                                                  | <0.0050                                                 | 0.0096                                                  | <0.0050                                                 |
|                                                                       | Nickel (Ni)-Total (mg/L)         | 0.0021                                                   | 0.0028                                                   | 0.0062                                                  | 0.0022                                                  | 0.0021                                                  |
|                                                                       | Potassium (K)-Total (mg/L)       | 2.30                                                     | 1.09                                                     | 1.66                                                    | 1.60                                                    | 0.49                                                    |
|                                                                       | Selenium (Se)-Total (mg/L)       | <0.00080                                                 | <0.00080                                                 | <0.00080                                                | <0.00080                                                | <0.00080                                                |
|                                                                       | Silver (Ag)-Total (mg/L)         | <0.0050                                                  | <0.0050                                                  | <0.0050                                                 | <0.0050                                                 | <0.0050                                                 |
|                                                                       | Sodium (Na)-Total (mg/L)         | 7.1                                                      | 2.5                                                      | 3.3                                                     | 4.1                                                     | 1.1                                                     |
|                                                                       | Strontium (Sr)-Total (mg/L)      | 0.112                                                    | 0.0687                                                   | 0.107                                                   | 0.126                                                   | 0.0422                                                  |
|                                                                       | Thallium (Tl)-Total (mg/L)       | <0.050                                                   | <0.050                                                   | <0.050                                                  | <0.050                                                  | <0.050                                                  |
|                                                                       | Tin (Sn)-Total (mg/L)            | <0.050                                                   | <0.050                                                   | <0.050                                                  | <0.050                                                  | <0.050                                                  |
|                                                                       | Titanium (Ti)-Total (mg/L)       | 0.0115                                                   | 0.0110                                                   | 0.0238                                                  | 0.0087                                                  | 0.0053                                                  |
|                                                                       | Uranium (U)-Total (mg/L)         | 0.00651                                                  | 0.00303                                                  | 0.00863                                                 | 0.0110                                                  | 0.00060                                                 |
|                                                                       | Vanadium (V)-Total (mg/L)        | <0.0010                                                  | 0.0012                                                   | 0.0020                                                  | <0.0010                                                 | <0.0010                                                 |
|                                                                       | Zinc (Zn)-Total (mg/L)           | 0.0155                                                   | 0.0529                                                   | 0.156                                                   | 0.0120                                                  | 0.0485                                                  |
| Dissolved Metals                                                      | Aluminum (Al)-Dissolved (mg/L)   | <0.010                                                   | <0.010                                                   | <0.010                                                  | <0.010                                                  | <0.010                                                  |
|                                                                       | Antimony (Sb)-Dissolved (mg/L)   | <0.00080                                                 | <0.00080                                                 | <0.00080                                                | <0.00080                                                | <0.00080                                                |
|                                                                       | Arsenic (As)-Dissolved (mg/L)    | 0.00418                                                  | <0.00080                                                 | 0.00202                                                 | 0.00612                                                 | <0.00080                                                |
|                                                                       | Barium (Ba)-Dissolved (mg/L)     | 0.0823                                                   | 0.0450                                                   | 0.0355                                                  | 0.0213                                                  | 0.0534                                                  |
|                                                                       | Beryllium (Be)-Dissolved (mg/L)  | <0.0010                                                  | <0.0010                                                  | <0.0010                                                 | <0.0010                                                 | <0.0010                                                 |
|                                                                       | Boron (B)-Dissolved (mg/L)       | <0.050                                                   | <0.050                                                   | <0.050                                                  | <0.050                                                  | <0.050                                                  |
|                                                                       | Cadmium (Cd)-Dissolved (mg/L)    | <0.0010                                                  | <0.0010                                                  | <0.0010                                                 | <0.0010                                                 | <0.0010                                                 |
|                                                                       | Calcium (Ca)-Dissolved (mg/L)    | 105                                                      | 122                                                      | 163                                                     | 116                                                     | 49.3                                                    |
|                                                                       | Chromium (Cr)-Dissolved (mg/L)   | <0.0050                                                  | <0.0050                                                  | <0.0050                                                 | <0.0050                                                 | <0.0050                                                 |
|                                                                       | Cobalt (Co)-Dissolved (mg/L)     | <0.0020                                                  | <0.0020                                                  | <0.0020                                                 | <0.0020                                                 | <0.0020                                                 |
|                                                                       | Copper (Cu)-Dissolved (mg/L)     | <0.0010                                                  | <0.0010                                                  | <0.0010                                                 | <0.0010                                                 | 0.0012                                                  |
|                                                                       | Iron (Fe)-Dissolved (mg/L)       | 0.752                                                    | 1.22                                                     | <0.010                                                  | 0.852                                                   | <0.010                                                  |
|                                                                       | Lead (Pb)-Dissolved (mg/L)       | <0.0050                                                  | <0.0050                                                  | <0.0050                                                 | <0.0050                                                 | <0.0050                                                 |
|                                                                       | Lithium (Li)-Dissolved (mg/L)    | 0.0056                                                   | 0.0046                                                   | 0.0057                                                  | 0.0096                                                  | <0.0030                                                 |
|                                                                       | Magnesium (Mg)-Dissolved (mg/L)  | 45.3                                                     | 49.8                                                     | 74.9                                                    | 47.8                                                    | 16.1                                                    |
|                                                                       | Manganese (Mn)-Dissolved (mg/L)  | 0.0517                                                   | 0.0354                                                   | 0.0281                                                  | 0.0167                                                  | <0.0020                                                 |
|                                                                       | Molybdenum (Mo)-Dissolved (mg/L) | <0.0050                                                  | <0.0050                                                  | <0.0050                                                 | 0.0096                                                  | <0.0050                                                 |
|                                                                       | Nickel (Ni)-Dissolved (mg/L)     | <0.0020                                                  | <0.0020                                                  | 0.0039                                                  | <0.0020                                                 | <0.0020                                                 |
|                                                                       | Potassium (K)-Dissolved (mg/L)   | 1.99                                                     | 0.72                                                     | 1.54                                                    | 1.30                                                    | <0.50                                                   |
|                                                                       | Selenium (Se)-Dissolved (mg/L)   | <0.00080                                                 | <0.00080                                                 | <0.00080                                                | <0.00080                                                | <0.00080                                                |
|                                                                       | Silver (Ag)-Dissolved (mg/L)     | <0.0050                                                  | <0.0050                                                  | <0.0050                                                 | <0.0050                                                 | <0.0050                                                 |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Sample ID<br>Description<br>Sampled Date<br>Sampled Time<br>Client ID |                                 | L1042743-1<br>WATER<br>09-AUG-11<br>12:50<br>DH-2010-02D | L1042743-2<br>WATER<br>09-AUG-11<br>13:40<br>DH-2010-02S | L1042743-3<br>WATER<br>09-AUG-11<br>15:50<br>DH-2010-03 | L1042743-4<br>WATER<br>09-AUG-11<br>14:55<br>DH-2010-04 | L1042743-5<br>WATER<br>09-AUG-11<br>16:50<br>DH-2010-05 |
|-----------------------------------------------------------------------|---------------------------------|----------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|
| Grouping                                                              | Analyte                         |                                                          |                                                          |                                                         |                                                         |                                                         |
| <b>WATER</b>                                                          |                                 |                                                          |                                                          |                                                         |                                                         |                                                         |
| <b>Dissolved Metals</b>                                               | Sodium (Na)-Dissolved (mg/L)    | 7.8                                                      | 2.8                                                      | 3.7                                                     | 4.5                                                     | 1.2                                                     |
|                                                                       | Strontium (Sr)-Dissolved (mg/L) | 0.109                                                    | 0.0655                                                   | 0.103                                                   | 0.128                                                   | 0.0378                                                  |
|                                                                       | Thallium (Tl)-Dissolved (mg/L)  | <0.050                                                   | <0.050                                                   | <0.050                                                  | <0.050                                                  | <0.050                                                  |
|                                                                       | Tin (Sn)-Dissolved (mg/L)       | <0.050                                                   | <0.050                                                   | <0.050                                                  | <0.050                                                  | <0.050                                                  |
|                                                                       | Titanium (Ti)-Dissolved (mg/L)  | <0.0010                                                  | <0.0010                                                  | <0.0010                                                 | <0.0010                                                 | <0.0010                                                 |
|                                                                       | Uranium (U)-Dissolved (mg/L)    | 0.00577                                                  | 0.00273                                                  | 0.00841                                                 | 0.0103                                                  | 0.00057                                                 |
|                                                                       | Vanadium (V)-Dissolved (mg/L)   | <0.0010                                                  | <0.0010                                                  | <0.0010                                                 | <0.0010                                                 | <0.0010                                                 |
|                                                                       | Zinc (Zn)-Dissolved (mg/L)      | <0.0020                                                  | 0.0035                                                   | 0.0190                                                  | <0.0020                                                 | 0.0173                                                  |

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

## Reference Information

### Qualifiers for Individual Samples Listed:

| Sample Number | Client Sample ID | Qualifier | Description                                           |
|---------------|------------------|-----------|-------------------------------------------------------|
| L1042743-3    | DH-2010-03       | SP        | Sample was Preserved at the laboratory - TP, TKN, NH3 |

### Qualifiers for Individual Parameters Listed:

| Qualifier | Description                                                                                                                             |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------|
| B         | Method Blank exceeds ALS DQO. All associated sample results are at least 5 times greater than blank levels and are considered reliable. |
| DLM       | Detection Limit Adjusted For Sample Matrix Effects                                                                                      |

### Test Method References:

| ALS Test Code                                                                                                                                                                                                                            | Matrix | Test Description                      | Method Reference**                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------------------------------------|----------------------------------------|
| <b>ACIDITY-ED</b>                                                                                                                                                                                                                        | Water  | Acidity (as CaCO <sub>3</sub> )       | APHA 2310 B - Potentiometric Titration |
| <b>BR-IC-ED</b>                                                                                                                                                                                                                          | Water  | Bromide by IC                         | APHA 4110 B-ION CHROMATOGRAPHY         |
| <b>CL-IC-ED</b>                                                                                                                                                                                                                          | Water  | Chloride by IC                        | APHA 4110 B-ION CHROMATOGRAPHY         |
| <b>CN-T-MID-HH-COL-VA</b>                                                                                                                                                                                                                | Water  | Total Cyanide by HH Distillation      | APHA 4500-CN Cyanide                   |
| This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method. |        |                                       |                                        |
| <b>COL-TRU-ED</b>                                                                                                                                                                                                                        | Water  | Color, True                           | APHA 2120                              |
| The reported color applies to the pH of the sample as submitted unless otherwise noted on the report.                                                                                                                                    |        |                                       |                                        |
| <b>IONBALANCE-ED</b>                                                                                                                                                                                                                     | Water  | Ion Balance Calculation               | APHA 1030E                             |
| <b>MET-D-L-ICP-ED</b>                                                                                                                                                                                                                    | Water  | Diss. Metals in Water by ICPOES (Low) | APHA 3120 B-ICP-OES                    |
| <b>MET-D-MS-ED</b>                                                                                                                                                                                                                       | Water  | Dissolved Metals in Water by ICPMS    | SW 846 - 6020-ICPMS                    |
| <b>MET-T-L-ICP-ED</b>                                                                                                                                                                                                                    | Water  | Total Metals in Water by ICPOES (Low) | APHA 3120 B-ICP-OES                    |
| <b>MET-T-MS-ED</b>                                                                                                                                                                                                                       | Water  | Total Metals in Water by ICPMS        | SW 846 - 6020-ICPMS                    |
| <b>N-T-CALC-ED</b>                                                                                                                                                                                                                       | Water  | Total Nitrogen (Calculation)          | APHA 4500 N-Calculated                 |
| Total Nitrogen is a calculated parameter. Total Nitrogen = Total Kjeldahl Nitrogen + [Nitrate and Nitrite (as N)]                                                                                                                        |        |                                       |                                        |
| <b>NH3-CFA-ED</b>                                                                                                                                                                                                                        | Water  | Ammonia in Water by Colour            | APHA 4500 NH3-NITROGEN (AMMONIA)       |
| This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.                                                            |        |                                       |                                        |
| <b>NO2+NO3-CALC-ED</b>                                                                                                                                                                                                                   | Water  | Nitrate+Nitrite                       | CALCULATION                            |
| <b>NO2-IC-ED</b>                                                                                                                                                                                                                         | Water  | Nitrite as N by IC                    | APHA 4110 B-ION CHROMATOGRAPHY         |
| <b>NO3-IC-ED</b>                                                                                                                                                                                                                         | Water  | Nitrate as N by IC                    | APHA 4110 B-ION CHROMATOGRAPHY         |
| <b>P-T-COL-ED</b>                                                                                                                                                                                                                        | Water  | Total P in Water by Colour            | APHA 4500-P PHOSPHORUS                 |
| This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.                                                  |        |                                       |                                        |
| <b>PH/EC/ALK-ED</b>                                                                                                                                                                                                                      | Water  | pH, Conductivity and Total Alkalinity | APHA 4500-H, 2510, 2320                |
| All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)                                  |        |                                       |                                        |
| <b>SO4-IC-ED</b>                                                                                                                                                                                                                         | Water  | Sulfate by IC                         | APHA 4110 B-ION CHROMATOGRAPHY         |
| <b>SOLIDS-TOTSUS-ED</b>                                                                                                                                                                                                                  | Water  | Total Suspended Solids                | APHA 2540 D-Gravimetric                |
| <b>TKN-CFA-ED</b>                                                                                                                                                                                                                        | Water  | TKN in Water by Colour                | APHA 4500-NORG (TKN)                   |
| This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 celcius with analysis using an automated colourimetric finish.   |        |                                       |                                        |
| <b>TURBIDITY-ED</b>                                                                                                                                                                                                                      | Water  | Turbidity                             | APHA 2130 B-Nephelometer               |

\*\* 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, BC, CANADA     |

## Reference Information

### Chain of Custody Numbers:

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10-100975

#### 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 ww* - milligrams per kilogram based on wet weight of sample.

*mg/kg lw* - 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.*

|                                                                                      |                                                                              |                                                                                                                                                                    |                        |                                                                                                                                              |                                                                                                                                       |                    |
|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| <b>Report To</b>                                                                     |                                                                              | <b>Report Format / Distribution</b>                                                                                                                                |                        | <b>Service Request</b> (Rush subject to availability - Contact ALS to confirm TAT)                                                           |                                                                                                                                       |                    |
| Company: <u>Knight Piesold Ltd.</u>                                                  |                                                                              | Standard: <input checked="" type="checkbox"/> Other (specify):                                                                                                     |                        | <input checked="" type="checkbox"/> Regular (Standard Turnaround Times - Business Days)                                                      |                                                                                                                                       |                    |
| Contact: <u>Ryan Weir, Lara Stapley, Kevin Houston</u>                               |                                                                              | Select: PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax <input checked="" type="checkbox"/> |                        | Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT                                                                      |                                                                                                                                       |                    |
| Address: <u>1650 Main Street West</u>                                                |                                                                              | Email 1: <u>rweir@knightpiesold.com</u>                                                                                                                            |                        | Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT                                                                    |                                                                                                                                       |                    |
| <u>North Bay ON, P1B 8G95</u>                                                        |                                                                              | Email 2: <u>lstapley@knightpiesold.com</u>                                                                                                                         |                        | Same Day or Weekend Emergency - Contact ALS to confirm TAT                                                                                   |                                                                                                                                       |                    |
| Phone: <u>705 476 2165</u> Fax: <u>705 474 8095</u>                                  |                                                                              | Email 3: <u>khouston@knightpiesold.com</u>                                                                                                                         |                        |                                                                                                                                              |                                                                                                                                       |                    |
| <b>Invoice To</b> Same as Report? (circle) Yes or <u>No</u> (if No, provide details) |                                                                              | <b>Client / Project Information</b>                                                                                                                                |                        | <b>Analysis Request</b>                                                                                                                      |                                                                                                                                       |                    |
| Copy of Invoice with Report? (circle) Yes or <u>No</u>                               |                                                                              | Job #: <u>NP101-390/2</u>                                                                                                                                          |                        | (Indicate Filtered or Preserved, F/P)                                                                                                        |                                                                                                                                       |                    |
| Company: <u>Avalon Rare Metals Inc.</u>                                              |                                                                              | PO / AFE: <u>As per Avalon</u>                                                                                                                                     |                        |                                                                                                                                              |                                                                                                                                       |                    |
| Contact: <u>—</u>                                                                    |                                                                              | LSD: <u>—</u>                                                                                                                                                      |                        |                                                                                                                                              |                                                                                                                                       |                    |
| Address: <u>—</u>                                                                    |                                                                              | Quote #: <u>Q30599</u>                                                                                                                                             |                        |                                                                                                                                              |                                                                                                                                       |                    |
| Phone: <u>—</u> Fax: <u>—</u>                                                        |                                                                              | ALS Contact:                                                                                                                                                       |                        |                                                                                                                                              |                                                                                                                                       |                    |
| <b>Lab Work Order # (lab use only)</b>                                               |                                                                              | <b>Sampler:</b>                                                                                                                                                    |                        | <div style="float: right; writing-mode: vertical-rl; transform: rotate(180deg);">Number of Containers</div> <div style="clear: both;"></div> |                                                                                                                                       |                    |
| <b>Sample #</b>                                                                      | <b>Sample Identification</b><br>(This description will appear on the report) | <b>Date</b><br>(dd-mmm-yy)                                                                                                                                         | <b>Time</b><br>(hh:mm) |                                                                                                                                              |                                                                                                                                       | <b>Sample Type</b> |
|                                                                                      | DH-2010-02D                                                                  | 09-Aug-11                                                                                                                                                          | 12:50                  |                                                                                                                                              |                                                                                                                                       | Water              |
|                                                                                      | DH-2010-02S                                                                  | 09-Aug-11                                                                                                                                                          | 13:40                  |                                                                                                                                              |                                                                                                                                       | Water              |
|                                                                                      | DH-2010-03                                                                   | 09-Aug-11                                                                                                                                                          | 15:50                  |                                                                                                                                              |                                                                                                                                       | Water              |
|                                                                                      | DH-2010-04                                                                   | 09-Aug-11                                                                                                                                                          | 14:55                  |                                                                                                                                              |                                                                                                                                       | Water              |
|                                                                                      | DH-2010-05                                                                   | 09-Aug-11                                                                                                                                                          | 16:30                  |                                                                                                                                              |                                                                                                                                       | Water              |
|                                                                                      |                                                                              |                                                                                                                                                                    |                        |                                                                                                                                              |                                                                                                                                       |                    |
|                                                                                      |                                                                              |                                                                                                                                                                    |                        |                                                                                                                                              |                                                                                                                                       |                    |
|                                                                                      |                                                                              |                                                                                                                                                                    |                        |                                                                                                                                              |                                                                                                                                       |                    |
|   |                                                                              |                                                                                                                                                                    |                        |                                                                                                                                              | * As per quote Q30599<br>** Dissolved metals and nutrients field filtered.<br>*** cyanide, metals <sup>V</sup> and nitrogen preserved |                    |
|                                                                                      |                                                                              |                                                                                                                                                                    |                        |                                                                                                                                              |                                                                                                                                       |                    |
| Special Instructions / Regulations / Hazardous Details                               |                                                                              |                                                                                                                                                                    |                        |                                                                                                                                              |                                                                                                                                       |                    |

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

| SHIPMENT RELEASE (client use)                                                      |           |       | SHIPMENT RECEPTION (lab use only) |       |       |              | SHIPMENT VERIFICATION (lab use only) |       |       |                              |
|------------------------------------------------------------------------------------|-----------|-------|-----------------------------------|-------|-------|--------------|--------------------------------------|-------|-------|------------------------------|
| Released by:                                                                       | Date:     | Time: | Received by:                      | Date: | Time: | Temperature: | Verified by:                         | Date: | Time: | Observations:                |
|  | 10-Aug-11 | 0700h |                                   |       |       | °C           |                                      |       |       | Yes / No ?<br>If Yes add SIF |

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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YELLOW - CLIENT COPY

GENF 18.01 Front



KNIGHT PIESOLD LTD.  
ATTN: RYAN WEIR / CARA STAPLEY /  
KEVIN HAWTON  
1650 Main Street West  
North Bay ON P1B 8G5

Date Received: 15-SEP-11  
Report Date: 28-SEP-11 16:39 (MT)  
Version: FINAL

Client Phone: 705-476-2165

## Certificate of Analysis

**Lab Work Order #:** L1058718  
**Project P.O. #:** NOT SUBMITTED  
**Job Reference:** NB101-390/2  
**C of C Numbers:** 1  
**Legal Site Desc:**

  
\_\_\_\_\_  
Jessica Spira  
Senior Account Manager

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# ALS ENVIRONMENTAL ANALYTICAL REPORT

| Sample ID<br>Description<br>Sampled Date<br>Sampled Time<br>Client ID |                                     | L1058718-1<br>WATER<br>14-SEP-11<br>12:20<br>SW-7 (0-42 PIT) |  |  |  |  |
|-----------------------------------------------------------------------|-------------------------------------|--------------------------------------------------------------|--|--|--|--|
| Grouping                                                              | Analyte                             |                                                              |  |  |  |  |
| <b>WATER</b>                                                          |                                     |                                                              |  |  |  |  |
| <b>Physical Tests</b>                                                 | Color, True (T.C.U.)                | <2.0                                                         |  |  |  |  |
|                                                                       | Total Suspended Solids (mg/L)       | <3.0                                                         |  |  |  |  |
|                                                                       | Turbidity (NTU)                     | 0.79                                                         |  |  |  |  |
| <b>Anions and Nutrients</b>                                           | Acidity (as CaCO3) (mg/L)           | <5.0                                                         |  |  |  |  |
|                                                                       | Alkalinity, Total (as CaCO3) (mg/L) | 165 <sup>RRV</sup>                                           |  |  |  |  |
|                                                                       | Ammonia (as N) (mg/L)               | <0.050                                                       |  |  |  |  |
|                                                                       | Bicarbonate (HCO3) (mg/L)           | 201 <sup>RRV</sup>                                           |  |  |  |  |
|                                                                       | Bromide (Br) (mg/L)                 | <2.0 <sup>DLM</sup>                                          |  |  |  |  |
|                                                                       | Carbonate (CO3) (mg/L)              | <5.0 <sup>RRV</sup>                                          |  |  |  |  |
|                                                                       | Chloride (Cl) (mg/L)                | 7.87                                                         |  |  |  |  |
|                                                                       | Conductivity (EC) (uS/cm)           | 1520 <sup>RRV</sup>                                          |  |  |  |  |
|                                                                       | Hardness (as CaCO3) (mg/L)          | 855                                                          |  |  |  |  |
|                                                                       | Hydroxide (OH) (mg/L)               | <5.0 <sup>RRV</sup>                                          |  |  |  |  |
|                                                                       | Ion Balance (%)                     | 95.0                                                         |  |  |  |  |
|                                                                       | Nitrate and Nitrite (as N) (mg/L)   | <0.071                                                       |  |  |  |  |
|                                                                       | Nitrate (as N) (mg/L)               | <0.050                                                       |  |  |  |  |
|                                                                       | Nitrite (as N) (mg/L)               | <0.050                                                       |  |  |  |  |
|                                                                       | Total Kjeldahl Nitrogen (mg/L)      | <0.20                                                        |  |  |  |  |
|                                                                       | Total Nitrogen (mg/L)               | <0.21 <sup>RRV</sup>                                         |  |  |  |  |
|                                                                       | pH (pH)                             | 8.19                                                         |  |  |  |  |
|                                                                       | Phosphorus (P)-Total (mg/L)         | <0.020                                                       |  |  |  |  |
|                                                                       | TDS (Calculated) (mg/L)             | 1120                                                         |  |  |  |  |
|                                                                       | Sulfate (SO4) (mg/L)                | 714                                                          |  |  |  |  |
| <b>Cyanides</b>                                                       | Cyanide, Total (mg/L)               | <0.0050                                                      |  |  |  |  |
| <b>Organic / Inorganic Carbon</b>                                     | Total Organic Carbon (mg/L)         | 1.8                                                          |  |  |  |  |
| <b>Total Metals</b>                                                   | Aluminum (Al)-Total (mg/L)          | 0.011                                                        |  |  |  |  |
|                                                                       | Antimony (Sb)-Total (mg/L)          | <0.00080                                                     |  |  |  |  |
|                                                                       | Arsenic (As)-Total (mg/L)           | <0.00080                                                     |  |  |  |  |
|                                                                       | Barium (Ba)-Total (mg/L)            | 0.0222                                                       |  |  |  |  |
|                                                                       | Beryllium (Be)-Total (mg/L)         | <0.0020                                                      |  |  |  |  |
|                                                                       | Boron (B)-Total (mg/L)              | 0.051                                                        |  |  |  |  |
|                                                                       | Cadmium (Cd)-Total (mg/L)           | <0.0010                                                      |  |  |  |  |
|                                                                       | Calcium (Ca)-Total (mg/L)           | 225                                                          |  |  |  |  |
|                                                                       | Chromium (Cr)-Total (mg/L)          | <0.0050                                                      |  |  |  |  |
|                                                                       | Cobalt (Co)-Total (mg/L)            | <0.0020                                                      |  |  |  |  |
|                                                                       | Copper (Cu)-Total (mg/L)            | <0.0010                                                      |  |  |  |  |

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

|                         |                                 | Sample ID<br>Description<br>Sampled Date<br>Sampled Time<br>Client ID |  |  |  |  |
|-------------------------|---------------------------------|-----------------------------------------------------------------------|--|--|--|--|
|                         |                                 | L1058718-1<br>WATER<br>14-SEP-11<br>12:20<br>SW-7 (0-42 PIT)          |  |  |  |  |
| Grouping                | Analyte                         |                                                                       |  |  |  |  |
| <b>WATER</b>            |                                 |                                                                       |  |  |  |  |
| <b>Total Metals</b>     | Iron (Fe)-Total (mg/L)          | <0.010                                                                |  |  |  |  |
|                         | Lead (Pb)-Total (mg/L)          | <0.0050                                                               |  |  |  |  |
|                         | Lithium (Li)-Total (mg/L)       | 0.019                                                                 |  |  |  |  |
|                         | Magnesium (Mg)-Total (mg/L)     | 84.3                                                                  |  |  |  |  |
|                         | Manganese (Mn)-Total (mg/L)     | 0.0079                                                                |  |  |  |  |
|                         | Molybdenum (Mo)-Total (mg/L)    | <0.0050                                                               |  |  |  |  |
|                         | Nickel (Ni)-Total (mg/L)        | 0.0081                                                                |  |  |  |  |
|                         | Potassium (K)-Total (mg/L)      | 2.50                                                                  |  |  |  |  |
|                         | Selenium (Se)-Total (mg/L)      | <0.00080                                                              |  |  |  |  |
|                         | Silver (Ag)-Total (mg/L)        | <0.0050                                                               |  |  |  |  |
|                         | Sodium (Na)-Total (mg/L)        | 7.4                                                                   |  |  |  |  |
|                         | Strontium (Sr)-Total (mg/L)     | 0.875                                                                 |  |  |  |  |
|                         | Thallium (Tl)-Total (mg/L)      | <0.050                                                                |  |  |  |  |
|                         | Tin (Sn)-Total (mg/L)           | <0.050                                                                |  |  |  |  |
|                         | Titanium (Ti)-Total (mg/L)      | <0.0010                                                               |  |  |  |  |
|                         | Uranium (U)-Total (mg/L)        | 0.00559                                                               |  |  |  |  |
|                         | Vanadium (V)-Total (mg/L)       | <0.0010                                                               |  |  |  |  |
|                         | Zinc (Zn)-Total (mg/L)          | 0.451                                                                 |  |  |  |  |
| <b>Dissolved Metals</b> | Calcium (Ca)-Dissolved (mg/L)   | 217                                                                   |  |  |  |  |
|                         | Magnesium (Mg)-Dissolved (mg/L) | 76.0                                                                  |  |  |  |  |
|                         | Potassium (K)-Dissolved (mg/L)  | 2.36                                                                  |  |  |  |  |
|                         | Sodium (Na)-Dissolved (mg/L)    | 7.4                                                                   |  |  |  |  |

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

## Reference Information

## Qualifiers for Individual Samples Listed:

| Sample Number | Client Sample ID | Qualifier | Description                                                                                                                                                                                         |
|---------------|------------------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| L1058718-1    | SW-7 (0-42 PIT)  | SP<br>LPM | Sample was Preserved at the laboratory - TOC, TP, TKN, NH3<br>Lab Preserved for Metals. Received with pH > 2, preserved at the lab and held for 16 hours in accordance with EPA 200.8 - TOTAL_METAL |

## QC Samples with Qualifiers &amp; Comments:

| QC Type Description | Parameter                | Qualifier | Applies to Sample Number(s) |
|---------------------|--------------------------|-----------|-----------------------------|
| Matrix Spike        | Calcium (Ca)-Dissolved   | E         | L1058718-1                  |
| Matrix Spike        | Magnesium (Mg)-Dissolved | E         | L1058718-1                  |
| Matrix Spike        | Chloride (Cl)            | MS-B      | L1058718-1                  |
| Matrix Spike        | Sulfate (SO4)            | MS-B      | L1058718-1                  |
| Matrix Spike        | Phosphorus (P)-Total     | MS-B      | L1058718-1                  |
| Matrix Spike        | Phosphorus (P)-Total     | MS-B      | L1058718-1                  |
| Matrix Spike        | Total Organic Carbon     | MS-B      | L1058718-1                  |

## Qualifiers for Individual Parameters Listed:

| Qualifier | Description                                                                                        |
|-----------|----------------------------------------------------------------------------------------------------|
| DLM       | Detection Limit Adjusted For Sample Matrix Effects                                                 |
| E         | Matrix Spike recovery outside ALS DQO due to analyte background in sample.                         |
| MS-B      | Matrix Spike recovery could not be accurately calculated due to high analyte background in sample. |
| RRV       | Reported Result Verified By Repeat Analysis                                                        |

## Test Method References:

| ALS Test Code                                                                                                                                                                                                                            | Matrix | Test Description                      | Method Reference**                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------------------------------------|----------------------------------------|
| <b>ACIDITY-ED</b>                                                                                                                                                                                                                        | Water  | Acidity (as CaCO3)                    | APHA 2310 B - Potentiometric Titration |
| <b>BR-IC-ED</b>                                                                                                                                                                                                                          | Water  | Bromide by IC                         | APHA 4110 B-ION CHROMATOGRAPHY         |
| <b>C-TOT-ORG-ED</b>                                                                                                                                                                                                                      | Water  | Total Organic Carbon                  | APHA 5310 B-Instrumental               |
| <b>CL-IC-ED</b>                                                                                                                                                                                                                          | Water  | Chloride by IC                        | APHA 4110 B-ION CHROMATOGRAPHY         |
| <b>CN-T-MID-HH-COL-VA</b>                                                                                                                                                                                                                | Water  | Total Cyanide by HH Distillation      | APHA 4500-CN Cyanide                   |
| This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method. |        |                                       |                                        |
| <b>COL-TRU-ED</b>                                                                                                                                                                                                                        | Water  | Color, True                           | APHA 2120                              |
| The reported color applies to the pH of the sample as submitted unless otherwise noted on the report.                                                                                                                                    |        |                                       |                                        |
| <b>IONBALANCE-ED</b>                                                                                                                                                                                                                     | Water  | Ion Balance Calculation               | APHA 1030E                             |
| <b>MET-D-ICP-ED</b>                                                                                                                                                                                                                      | Water  | Dissolved Metals in Water by ICPOES   | APHA 3120 B-ICP-OES                    |
| <b>MET-T-L-ICP-ED</b>                                                                                                                                                                                                                    | Water  | Total Metals in Water by ICPOES (Low) | APHA 3120 B-ICP-OES                    |
| <b>MET-T-MS-ED</b>                                                                                                                                                                                                                       | Water  | Total Metals in Water by ICPMS        | SW 846 - 6020-ICPMS                    |
| <b>N-T-CALC-ED</b>                                                                                                                                                                                                                       | Water  | Total Nitrogen (Calculation)          | APHA 4500 N-Calculated                 |
| Total Nitrogen is a calculated parameter. Total Nitrogen = Total Kjeldahl Nitrogen + [Nitrate and Nitrite (as N)]                                                                                                                        |        |                                       |                                        |
| <b>NH3-CFA-ED</b>                                                                                                                                                                                                                        | Water  | Ammonia in Water by Colour            | APHA 4500 NH3-NITROGEN (AMMONIA)       |
| This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.                                                            |        |                                       |                                        |
| <b>NO2+NO3-CALC-ED</b>                                                                                                                                                                                                                   | Water  | Nitrate+Nitrite                       | CALCULATION                            |
| <b>NO2-IC-ED</b>                                                                                                                                                                                                                         | Water  | Nitrite as N by IC                    | APHA 4110 B-ION CHROMATOGRAPHY         |
| <b>NO3-IC-ED</b>                                                                                                                                                                                                                         | Water  | Nitrate as N by IC                    | APHA 4110 B-ION CHROMATOGRAPHY         |
| <b>P-T-COL-ED</b>                                                                                                                                                                                                                        | Water  | Total P in Water by Colour            | APHA 4500-P PHOSPHORUS                 |
| This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.                                                  |        |                                       |                                        |
| <b>PH/EC/ALK-ED</b>                                                                                                                                                                                                                      | Water  | pH, Conductivity and Total Alkalinity | APHA 4500-H, 2510, 2320                |
| All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)                                  |        |                                       |                                        |
| <b>SO4-IC-ED</b>                                                                                                                                                                                                                         | Water  | Sulfate by IC                         | APHA 4110 B-ION CHROMATOGRAPHY         |
|                                                                                                                                                                                                                                          |        | Total Suspended Solids                | APHA 2540 D-Gravimetric                |

## Reference Information

**SOLIDS-TOTSUS-ED** Water

**TKN-CFA-ED** Water TKN in Water by Colour APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 celcius with analysis using an automated colourimetric finish.

**TURBIDITY-ED** Water Turbidity APHA 2130 B-Nephelometer

\*\* 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, BC, CANADA     |

### Chain of Custody Numbers:

1

### 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 ww - 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.*

