# Appendix 6-1

| Groundwater Water Levels | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Well | Type | Total | Surface | Casing | 9/2/98 | | | 8/21/98 | | | 8/10/98 | | | 7/30/98 | | |
| | | Depth | Elevation | Stand-up | Stand-up | GL | Elev | Stand-up | GL | Elev | Stand-up | GL | Elev | Stand-up | GL | Elev |
| 1 | Qal | 50 | 9881.22 | 0.92 | 10.34 | 9.42 | 9871.8 | 10.08 | 9.16 | 9872.06 | 9.88 | 8.96 | 9872.26 | 9.67 | 8.75 | 9872.47 |
| 2 | Qal & P | 47.5 | 9865.1 | 2.88 | 14.77 | 11.89 | 9853.21 | 14.64 | 11.76 | 9853.34 | 14.43 | 11.55 | 9853.55 | 14.28 | 11.4 | 9853.7 |
| 3 | Qal | 55 | 9859.99 | 2.25 | 16.67 | 14.42 | 9845.57 | 16.61 | 14.36 | 9845.63 | 16.42 | 14.17 | 9845.82 | 16.26 | 14.01 | 9845.98 |
| 4 | Qal & Sh | 64 | 9879.19 | 1.42 | 10.61 | 9.19 | 9870 | 10.34 | 8.92 | 9870.27 | 10.15 | 8.73 | 9870.46 | 9.96 | 8.54 | 9870.65 |
| 5 | Qal & Sh | 55 | 9872.6 | 0.63 | 5.64 | 5.01 | 9867.59 | 5.42 | 4.79 | 9867.81 | 5.26 | 4.63 | 9867.97 | 5.03 | 4.4 | 9868.2 |
| 6 | Qal & Sh | 54 | 9865.8 | 2.17 | 18.26 | 16.09 | 9849.71 | 18.16 | 15.99 | 9849.81 | 17.98 | 15.81 | 9849.99 | 17.81 | 15.64 | 9850.16 |
| 7 | Qal | 52 | 9839.47 | 3.79 | 16.01 | 12.22 | 9827.25 | 16.01 | 12.22 | 9827.25 | 16.02 | 12.23 | 9827.24 | 15.97 | 12.18 | 9827.29 |
| 8 | Qal & Sh | 46 | 9881.91 | 2.08 | 12.91 | 10.83 | 9871.08 | 11.99 | 9.91 | 9872 | 12.97 | 10.89 | 9871.02 | 11.82 | 9.74 | 9872.17 |
| 9 | Qal & Sh | 54.5 | 9891.47 | 2.58 | 19.86 | 17.28 | 9874.19 | 19.81 | 17.23 | 9874.24 | 19.68 | 17.1 | 9874.37 | 19.57 | 16.99 | 9874.48 |
| 11 | Qal & Sh | 43 | 9906.92 | 2.25 | 30.08 | 27.83 | 9879.09 | 29.98 | 27.73 | 9879.19 | 29.78 | 27.53 | 9879.39 | 29.5 | 27.25 | 9879.67 |
| 12 | P | 46 | 9927.08 | 3.08 | 33.15 | 30.07 | 9897.01 | 32.71 | 29.63 | 9897.45 | 32.16 | 29.08 | 9898 | 31.25 | 28.17 | 9898.91 |
| 13 | Sh | 47 | 9902.38 | 2 | 30.77 | 28.77 | 9873.61 | 30.51 | 28.51 | 9873.87 | 30.32 | 28.32 | 9874.06 | 30.1 | 28.1 | 9874.28 |
| 14 | FLT-Sh | 278 | 9892.92 | 0.29 | 19.34 | 19.05 | 9873.87 | 19.07 | 18.78 | 9874.14 | 18.17 | 17.88 | 9875.04 | 18.66 | 18.37 | 9874.55 |
| 15 | Sh | 46 | 9893.5 | 1.5 | 25.75 | 24.25 | 9869.25 | 25.65 | 24.15 | 9869.35 | 25.34 | 23.84 | 9869.66 | 25.13 | 23.63 | 9869.87 |
| 16 | Sh | 91 | 9880.81 | 0.83 | 11.79 | 10.96 | 9869.85 | 11.54 | 10.71 | 9870.1 | 11.35 | 10.52 | 9870.29 | 11.15 | 10.32 | 9870.49 |
| 17 | Sh | 93 | 9881.11 | 1.3 | 12.22 | 10.92 | 9870.19 | 11.97 | 10.67 | 9870.44 | 11.78 | 10.48 | 9870.63 | 11.55 | 10.25 | 9870.86 |
| 18 | Qal | 43 | 9881.89 | 2.4 | 13.08 | 10.68 | 9871.21 | 12.8 | 10.4 | 9871.49 | 12.62 | 10.22 | 9871.67 | 12.41 | 10.01 | 9871.88 |
| 19 | Qal & Sh | 110 | 9876.26 | 2.83 | 10.85 | 8.02 | 9868.24 | 10.61 | 7.78 | 9868.48 | 10.39 | 7.56 | 9868.7 | 10.23 | 7.4 | 9868.86 |
| 20 | Qal | 50 | 9844.32 | 2.29 | 5.39 | 3.1 | 9841.22 | 5.42 | 3.13 | 9841.19 | 5.23 | 2.94 | 9841.38 | 5.05 | 2.76 | 9841.56 |
| RW-3 | Mine | 110 | 9882.28 | 1 | 10.37 | 9.37 | 9872.91 | 10.08 | 9.08 | 9873.2 | 9.41 | 8.41 | 9873.87 | 9.68 | 8.68 | 9873.6 |
| #3Shaft | Mine | 110 | 9881.63 | 2.23 | 10.95 | 8.72 | 9872.91 | 10.61 | 8.38 | 9873.25 | 10.1 | 7.87 | 9873.76 | 10.01 | 7.78 | 9873.85 |
| Oro | Mine | 600 | 9958.59 | 0 | 84.79 | 84.79 | 9873.8 | 84.54 | 84.54 | 9874.05 | 84.35 | 84.35 | 9874.24 | 84.13 | 84.13 | 9874.46 |
| WRO-1 | Roaster F. | 18.1 | 9895.25 | 0.97 | 17 | 16.03 | 9879.22 | 17.43 | 16.46 | 9878.79 | 17.23 | 16.26 | 9878.99 | 17.28 | 16.31 | 9878.94 |
| WRO-2 | Roaster F. | 16.6 | 9896.08 | 0.74 | nd | #VALUE! | #VALUE! | nd | #VALUE! | #VALUE! | nd | #VALUE! | #VALUE! | nd | #VALUE! | #VALUE! |
| WTU-1 | U.Mill Tail | 13.5 | 9870.61 | 1.6 | nd | #VALUE! | #VALUE! | nd | #VALUE! | #VALUE! | nd | #VALUE! | #VALUE! | nd | #VALUE! | #VALUE! |
| WTU-2 | U.Mill Tail | 8 | 9870.46 | 0.82 | nd | #VALUE! | #VALUE! | nd | #VALUE! | #VALUE! | nd | #VALUE! | #VALUE! | nd | #VALUE! | #VALUE! |
| WTL-2 | L.Mill Tail | 19.5 | 9864.77 | 0.83 | 11.61 | 10.78 | 9853.99 | 11.43 | 10.6 | 9854.17 | 11.26 | 10.43 | 9854.34 | 11.12 | 10.29 | 9854.48 |
| EXO-1 | | 15 | 9964.26 | 1.86 | nd | #VALUE! | #VALUE! | nd | #VALUE! | #VALUE! | nd | #VALUE! | #VALUE! | nd | #VALUE! | #VALUE! |
| SBRF-3 | Roaster F. | 13 | 9886.15 | 2 | 10.1 | 8.1 | 9878.05 | 9.54 | 7.54 | 9878.61 | 9.41 | 7.41 | 9878.74 | 9.42 | 7.42 | 9878.73 |

# Appendix 6-1

| Groundwater Water | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Well | Type | 7/23/98 | | | 7/16/98 | | | 7/8/98 | | | 7/2/98 | | | 6/24/98 | | |
| | | Stand-up | GL | Elev | Stand-up | GL | Elev | Stand-up | GL | Elev | Stand-up | GL | Elev | Stand-up | GL | Elev |
| 1 | Qal | 9.61 | 8.69 | 9872.53 | 9.48 | 8.56 | 9872.66 | 9.38 | 8.46 | 9872.76 | 9.31 | 8.39 | 9872.83 | 9.31 | 8.39 | 9872.83 |
| 2 | Qal & P | 14.3 | 11.42 | 9853.68 | 14.23 | 11.35 | 9853.75 | 14.14 | 11.26 | 9853.84 | 14.03 | 11.15 | 9853.95 | 14.14 | 11.26 | 9853.84 |
| 3 | Qal | 16.28 | 14.03 | 9845.96 | 16.18 | 13.93 | 9846.06 | 16.15 | 13.9 | 9846.09 | 16.03 | 13.78 | 9846.21 | 16.16 | 13.91 | 9846.08 |
| 4 | Qal & Sh | 9.92 | 8.5 | 9870.69 | 9.78 | 8.36 | 9870.83 | 9.69 | 8.27 | 9870.92 | 9.61 | 8.19 | 9871 | 9.63 | 8.21 | 9870.98 |
| 5 | Qal & Sh | 5.03 | 4.4 | 9868.2 | 4.89 | 4.26 | 9868.34 | 4.81 | 4.18 | 9868.42 | 4.72 | 4.09 | 9868.51 | 4.76 | 4.13 | 9868.47 |
| 6 | Qal & Sh | 17.88 | 15.71 | 9850.09 | 17.79 | 15.62 | 9850.18 | 16.58 | 14.41 | 9851.39 | 17.58 | 15.41 | 9850.39 | 17.68 | 15.51 | 9850.29 |
| 7 | Qal | 15.99 | 12.2 | 9827.27 | 15.95 | 12.16 | 9827.31 | 15.93 | 12.14 | 9827.33 | 15.97 | 12.18 | 9827.29 | 15.95 | 12.16 | 9827.31 |
| 8 | Qal & Sh | 11.41 | 9.33 | 9872.58 | 11.28 | 9.2 | 9872.71 | 10.83 | 8.75 | 9873.16 | 11.11 | 9.03 | 9872.88 | 11.57 | 9.49 | 9872.42 |
| 9 | Qal & Sh | 19.51 | 16.93 | 9874.54 | 19.46 | 16.88 | 9874.59 | 19.35 | 16.77 | 9874.7 | 19.26 | 16.68 | 9874.79 | 19.28 | 16.7 | 9874.77 |
| 11 | Qal & Sh | 29.42 | 27.17 | 9879.75 | 29.37 | 27.12 | 9879.8 | 29.17 | 26.92 | 9880 | 28.97 | 26.72 | 9880.2 | 29.01 | 26.76 | 9880.16 |
| 12 | P | 32.36 | 29.28 | 9897.8 | 32.07 | 28.99 | 9898.09 | 31.98 | 28.9 | 9898.18 | 31.81 | 28.73 | 9898.35 | 31.71 | 28.63 | 9898.45 |
| 13 | Sh | 30 | 28 | 9874.38 | 29.87 | 27.87 | 9874.51 | 29.74 | 27.74 | 9874.64 | 29.69 | 27.69 | 9874.69 | 29.68 | 27.68 | 9874.7 |
| 14 | FLT-Sh | 18.55 | 18.26 | 9874.66 | 18.41 | 18.12 | 9874.8 | 18.29 | 18 | 9874.92 | ? | #VALUE! | #VALUE! | 18.23 | 17.94 | 9874.98 |
| 15 | Sh | 25.08 | 23.58 | 9869.92 | 25.06 | 23.56 | 9869.94 | 24.91 | 23.41 | 9870.09 | 24.71 | 23.21 | 9870.29 | 24.42 | 22.92 | 9870.58 |
| 16 | Sh | 11.11 | 10.28 | 9870.53 | 10.96 | 10.13 | 9870.68 | 10.87 | 10.04 | 9870.77 | 10.79 | 9.96 | 9870.85 | 10.81 | 9.98 | 9870.83 |
| 17 | Sh | 11.49 | 10.19 | 9870.92 | 11.36 | 10.06 | 9871.05 | 11.29 | 9.99 | 9871.12 | 11.22 | 9.92 | 9871.19 | 11.21 | 9.91 | 9871.2 |
| 18 | Qal | 12.36 | 9.96 | 9871.93 | 12.21 | 9.81 | 9872.08 | 12.12 | 9.72 | 9872.17 | 12.02 | 9.62 | 9872.27 | 12.04 | 9.64 | 9872.25 |
| 19 | Qal & Sh | 10.21 | 7.38 | 9868.88 | 10.07 | 7.24 | 9869.02 | 9.97 | 7.14 | 9869.12 | 9.91 | 7.08 | 9869.18 | 9.93 | 7.1 | 9869.16 |
| 20 | Qal | 5.01 | 2.72 | 9841.6 | 5.16 | 2.87 | 9841.45 | 5.06 | 2.77 | 9841.55 | 4.99 | 2.7 | 9841.62 | 5 | 2.71 | 9841.61 |
| RW-3 | Mine | 9.61 | 8.61 | 9873.67 | 9.47 | 8.47 | 9873.81 | 9.89 | 8.89 | 9873.39 | 9.29 | 8.29 | 9873.99 | 9.29 | 8.29 | 9873.99 |
| #3Shaft | Mine | 9.97 | 7.74 | 9873.89 | 9.91 | 7.68 | 9873.95 | 9.89 | 7.66 | 9873.97 | 9.89 | 7.66 | 9873.97 | 9.92 | 7.69 | 9873.94 |
| Oro | Mine | 83.99 | 83.99 | 9874.6 | 83.79 | 83.79 | 9874.8 | 83.35 | 83.35 | 9875.24 | 83.61 | 83.61 | 9874.98 | 83.61 | 83.61 | 9874.98 |
| WRO-1 | Roaster F. | 17.41 | 16.44 | 9878.81 | 18.32 | 17.35 | 9877.9 | 17.21 | 16.24 | 9879.01 | 17.09 | 16.12 | 9879.13 | 16.93 | 15.96 | 9879.29 |
| WRO-2 | Roaster F. | nd | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! |
| WTU-1 | U.Mill Tail | nd | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! |
| WTU-2 | U.Mill Tail | nd | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! |
| WTL-2 | L.Mill Tail | 11.12 | 10.29 | 9854.48 | 11.02 | 10.19 | 9854.58 | 10.96 | 10.13 | 9854.64 | 10.83 | 10 | 9854.77 | 10.99 | 10.16 | 9854.61 |
| EXO-1 | | nd | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! |
| SBRF-3 | Roaster F. | 9.38 | 7.38 | 9878.77 | 9.36 | 7.36 | 9878.79 | 9.21 | 7.21 | 9878.94 | 9.21 | 7.21 | 9878.94 | 9.05 | 7.05 | 9879.1 |

# Appendix 6-1

| Groundwater Water | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Well | Type | 6/17/98 | | | 6/10/98 | | | 6/2/98 | | | 5/27/98 | | | 5/19/98 | | |
| | | Stand-up | GL | Elev | Stand-up | GL | Elev | Stand-up | GL | Elev | Stand-up | GL | Elev | Stand-up | GL | Elev |
| 1 | Qal | 9.35 | 8.43 | 9872.79 | 9.41 | 8.49 | 9872.73 | 9.53 | 8.61 | 9872.61 | 10.72 | 9.8 | 9871.42 | 9.96 | 9.04 | 9872.18 |
| 2 | Qal & P | 14.15 | 11.27 | 9853.83 | 14.18 | 11.3 | 9853.8 | 14.09 | 11.21 | 9853.89 | 14.34 | 11.46 | 9853.64 | 14.42 | 11.54 | 9853.56 |
| 3 | Qal | 16.17 | 13.92 | 9846.07 | 16.2 | 13.95 | 9846.04 | 16.09 | 13.84 | 9846.15 | 16.4 | 14.15 | 9845.84 | 16.39 | 14.14 | 9845.85 |
| 4 | Qal & Sh | 9.69 | 8.27 | 9870.92 | 9.73 | 8.31 | 9870.88 | 9.82 | 8.4 | 9870.79 | 10.01 | 8.59 | 9870.6 | 10.24 | 8.82 | 9870.37 |
| 5 | Qal & Sh | 4.83 | 4.2 | 9868.4 | 4.82 | 4.19 | 9868.41 | 4.89 | 4.26 | 9868.34 | 5.11 | 4.48 | 9868.12 | 5.29 | 4.66 | 9867.94 |
| 6 | Qal & Sh | 17.76 | 15.59 | 9850.21 | 17.72 | 15.55 | 9850.25 | 17.61 | 15.44 | 9850.36 | 17.91 | 15.74 | 9850.06 | 17.95 | 15.78 | 9850.02 |
| 7 | Qal | 15.92 | 12.13 | 9827.34 | 15.93 | 12.14 | 9827.33 | 15.93 | 12.14 | 9827.33 | 15.93 | 12.14 | 9827.33 | 15.95 | 12.16 | 9827.31 |
| 8 | Qal & Sh | 11.72 | 9.64 | 9872.27 | 11.75 | 9.67 | 9872.24 | 11.96 | 9.88 | 9872.03 | 12.15 | 10.07 | 9871.84 | 12.32 | 10.24 | 9871.67 |
| 9 | Qal & Sh | 19.3 | 16.72 | 9874.75 | 19.32 | 16.74 | 9874.73 | 19.27 | 16.69 | 9874.78 | 19.28 | 16.7 | 9874.77 | 19.46 | 16.88 | 9874.59 |
| 11 | Qal & Sh | 29.09 | 26.84 | 9880.08 | 29.14 | 26.89 | 9880.03 | 29.06 | 26.81 | 9880.11 | 29.21 | 26.96 | 9879.96 | 29.75 | 27.5 | 9879.42 |
| 12 | P | 31.48 | 28.4 | 9898.68 | 31.29 | 28.21 | 9898.87 | 30.95 | 27.87 | 9899.21 | 29.93 | 26.85 | 9900.23 | 31.24 | 28.16 | 9898.92 |
| 13 | Sh | 29.79 | 27.79 | 9874.59 | 29.8 | 27.8 | 9874.58 | 29.97 | 27.97 | 9874.41 | 30.15 | 28.15 | 9874.23 | 30.42 | 28.42 | 9873.96 |
| 14 | FLT-Sh | 18.29 | 18 | 9874.92 | 18.42 | 18.13 | 9874.79 | 18.57 | 18.28 | 9874.64 | 19.72 | 19.43 | 9873.49 | 19.05 | 18.76 | 9874.16 |
| 15 | Sh | 23.55 | 22.05 | 9871.45 | 23.8 | 22.3 | 9871.2 | 23.77 | 22.27 | 9871.23 | 22.67 | 21.17 | 9872.33 | 22.75 | 21.25 | 9872.25 |
| 16 | Sh | 10.86 | 10.03 | 9870.78 | 10.93 | 10.1 | 9870.71 | 11 | 10.17 | 9870.64 | 11.19 | 10.36 | 9870.45 | 11.41 | 10.58 | 9870.23 |
| 17 | Sh | 11.29 | 9.99 | 9871.12 | 11.3 | 10 | 9871.11 | 11.42 | 10.12 | 9870.99 | 11.89 | 10.59 | 9870.52 | 11.81 | 10.51 | 9870.6 |
| 18 | Qal | 12.07 | 9.67 | 9872.22 | 12.15 | 9.75 | 9872.14 | 12.26 | 9.86 | 9872.03 | 12.45 | 10.05 | 9871.84 | 12.37 | 9.97 | 9871.92 |
| 19 | Qal & Sh | 9.97 | 7.14 | 9869.12 | 10.02 | 7.19 | 9869.07 | 10.08 | 7.25 | 9869.01 | 10.29 | 7.46 | 9868.8 | 10.48 | 7.65 | 9868.61 |
| 20 | Qal | 4.94 | 2.65 | 9841.67 | 4.86 | 2.57 | 9841.75 | 4.5 | 2.21 | 9842.11 | 4.41 | 2.12 | 9842.2 | 4.24 | 1.95 | 9842.37 |
| RW-3 | Mine | 9.33 | 8.33 | 9873.95 | 9.46 | 8.46 | 9873.82 | 9.55 | 8.55 | 9873.73 | 9.73 | 8.73 | 9873.55 | 9.99 | 8.99 | 9873.29 |
| #3Shaft | Mine | 9.93 | 7.7 | 9873.93 | 10.1 | 7.87 | 9873.76 | 11.2 | 8.97 | 9872.66 | 11.39 | 9.16 | 9872.47 | 11.41 | 9.18 | 9872.45 |
| Oro | Mine | 83.56 | 83.56 | 9875.03 | 83.74 | 83.74 | 9874.85 | 84.02 | 84.02 | 9874.57 | 84.56 | 84.56 | 9874.03 | 84.91 | 84.91 | 9873.68 |
| WRO-1 | Roaster F. | 16.59 | 15.62 | 9879.63 | 16.57 | 15.6 | 9879.65 | 16.27 | 15.3 | 9879.95 | 15.99 | 15.02 | 9880.23 | 15.4 | 14.43 | 9880.82 |
| WRO-2 | Roaster F. | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! |
| WTU-1 | U.Mill Tail | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! |
| WTU-2 | U.Mill Tail | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! |
| WTL-2 | L.Mill Tail | 10.97 | 10.14 | 9854.63 | 10.97 | 10.14 | 9854.63 | 10.93 | 10.1 | 9854.67 | 11.16 | 10.33 | 9854.44 | 11.1 | 10.27 | 9854.5 |
| EXO-1 | | dry | #VALUE! | #VALUE! | 15.04 | 13.18 | 9951.08 | 14.41 | 12.55 | 9951.71 | 13.36 | 11.5 | 9952.76 | 11.42 | 9.56 | 9954.7 |
| SBRF-3 | Roaster F. | 8.99 | 6.99 | 9879.16 | 8.75 | 6.75 | 9879.4 | 8.6 | 6.6 | 9879.55 | 8.43 | 6.43 | 9879.72 | 8.2 | 6.2 | 9879.95 |

# Appendix 6-1

| Groundwater Water | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Well | Type | 5/12/98 | | | 5/7/98 | | | 4/28/98 | | | 4/21/98 | | | 4/14/98 | | |
| | | Stand-up | GL | Elev | Stand-up | GL | Elev | Stand-up | GL | Elev | Stand-up | GL | Elev | Stand-up | GL | Elev |
| 1 | Qal | 10.03 | 9.11 | 9872.11 | 10.21 | 9.29 | 9871.93 | 11.04 | 10.12 | 9871.1 | 12.66 | 11.74 | 9869.48 | 11.92 | 11 | 9870.22 |
| 2 | Qal & P | 14.39 | 11.51 | 9853.59 | 14.43 | 11.55 | 9853.55 | 14.91 | 12.03 | 9853.07 | 15.31 | 12.43 | 9852.67 | 15.29 | 12.41 | 9852.69 |
| 3 | Qal | 16.39 | 14.14 | 9845.85 | 16.47 | 14.22 | 9845.77 | 16.79 | 14.54 | 9845.45 | 17.11 | 14.86 | 9845.13 | 17.18 | 14.93 | 9845.06 |
| 4 | Qal & Sh | 10.34 | 8.92 | 9870.27 | 10.51 | 9.09 | 9870.1 | 11.3 | 9.88 | 9869.31 | 11.82 | 10.4 | 9868.79 | 12.01 | 10.59 | 9868.6 |
| 5 | Qal & Sh | 5.34 | 4.71 | 9867.89 | 5.52 | 4.89 | 9867.71 | 6.24 | 5.61 | 9866.99 | 6.76 | 6.13 | 9866.47 | 6.93 | 6.3 | 9866.3 |
| 6 | Qal & Sh | 17.91 | 15.74 | 9850.06 | 17.94 | 15.77 | 9850.03 | 18.32 | 16.15 | 9849.65 | 18.69 | 16.52 | 9849.28 | 18.76 | 16.59 | 9849.21 |
| 7 | Qal | 15.95 | 12.16 | 9827.31 | 15.97 | 12.18 | 9827.29 | 16 | 12.21 | 9827.26 | 15.98 | 12.19 | 9827.28 | 16.03 | 12.24 | 9827.23 |
| 8 | Qal & Sh | 12.56 | 10.48 | 9871.43 | 12.78 | 10.7 | 9871.21 | 13.55 | 11.47 | 9870.44 | 13.87 | 11.79 | 9870.12 | 14.05 | 11.97 | 9869.94 |
| 9 | Qal & Sh | 20.01 | 17.43 | 9874.04 | 20.23 | 17.65 | 9873.82 | 20.49 | 17.91 | 9873.56 | 20.61 | 18.03 | 9873.44 | 20.61 | 18.03 | 9873.44 |
| 11 | Qal & Sh | 29.97 | 27.72 | 9879.2 | 31.29 | 29.04 | 9877.88 | 31.8 | 29.55 | 9877.37 | 32.24 | 29.99 | 9876.93 | | | |
| 12 | P | 29.94 | 26.86 | 9900.22 | 27.61 | 24.53 | 9902.55 | 24.99 | 21.91 | 9905.17 | 29.5 | 26.42 | 9900.66 | 25.61 | 22.53 | 9904.55 |
| 13 | Sh | 30.61 | 28.61 | 9873.77 | 30.86 | 28.86 | 9873.52 | 31.78 | 29.78 | 9872.6 | 32.29 | 30.29 | 9872.09 | 32.59 | 30.59 | 9871.79 |
| 14 | FLT-Sh | 19.28 | 18.99 | 9873.93 | 19.54 | 19.25 | 9873.67 | 20.48 | 20.19 | 9872.73 | 26.92 | 26.63 | 9866.29 | 21.25 | 20.96 | 9871.96 |
| 15 | Sh | 24.17 | 22.67 | 9870.83 | 25.38 | 23.88 | 9869.62 | 26.56 | 25.06 | 9868.44 | 26.88 | 25.38 | 9868.12 | 26.83 | 25.33 | 9868.17 |
| 16 | Sh | 12.49 | 11.66 | 9869.15 | 11.68 | 10.85 | 9869.96 | 12.46 | 11.63 | 9869.18 | 13.01 | 12.18 | 9868.63 | 13.21 | 12.38 | 9868.43 |
| 17 | Sh | 12 | 10.7 | 9870.41 | 12.11 | 10.81 | 9870.3 | 12.91 | 11.61 | 9869.5 | nd | #VALUE! | #VALUE! | 13.16 | 11.86 | 9869.25 |
| 18 | Qal | 12.76 | 10.36 | 9871.53 | 12.92 | 10.52 | 9871.37 | 13.73 | 11.33 | 9870.56 | nd | #VALUE! | #VALUE! | 14.29 | 11.89 | 9870 |
| 19 | Qal & Sh | 10.54 | 7.71 | 9868.55 | 10.7 | 7.87 | 9868.39 | 11.43 | 8.6 | 9867.66 | 12.01 | 9.18 | 9867.08 | 12.11 | 9.28 | 9866.98 |
| 20 | Qal | 4.39 | 2.1 | 9842.22 | 4.59 | 2.3 | 9842.02 | 5.11 | 2.82 | 9841.5 | 5.59 | 3.3 | 9841.02 | 5.31 | 3.02 | 9841.3 |
| RW-3 | Mine | 10.13 | 9.13 | 9873.15 | 10.21 | 9.21 | 9873.07 | 11.04 | 10.04 | 9872.24 | 11.75 | 10.75 | 9871.53 | 12.09 | 11.09 | 9871.19 |
| #3Shaft | Mine | 11.94 | 9.71 | 9871.92 | 12.31 | 10.08 | 9871.55 | 12.83 | 10.6 | 9871.03 | nd | #VALUE! | #VALUE! | 13.72 | 11.49 | 9870.14 |
| Oro | Mine | nd | #VALUE! | #VALUE! | 85.43 | 85.43 | 9873.16 | 85.85 | 85.85 | 9872.74 | nd | #VALUE! | #VALUE! | 86.67 | 86.67 | 9871.92 |
| WRO-1 | Roaster F. | 14.57 | 13.6 | 9881.65 | 14.19 | 13.22 | 9882.03 | 14.58 | 13.61 | 9881.64 | 15.81 | 14.84 | 9880.41 | 16.92 | 15.95 | 9879.3 |
| WRO-2 | Roaster F. | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! |
| WTU-1 | U.Mill Tail | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! |
| WTU-2 | U.Mill Tail | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! |
| WTL-2 | L.Mill Tail | 11.07 | 10.24 | 9854.53 | 11.23 | 10.4 | 9854.37 | nd | #VALUE! | #VALUE! | nd | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! |
| EXO-1 | | 9.41 | 7.55 | 9956.71 | 8.02 | 6.16 | 9958.1 | 9.41 | 7.55 | 9956.71 | 12.86 | 11 | 9953.26 | dry | | |
| SBRF-3 | Roaster F. | 7.76 | 5.76 | 9880.39 | 6.67 | 4.67 | 9881.48 | 8.24 | 6.24 | 9879.91 | 8.51 | 6.51 | 9879.64 | 8.75 | 6.75 | 9879.4 |

| Groundwater Water | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Well | Type | 4/6/98 | | | 3/30/98 | | | 3/26/98 | | | 3/24/98 | | | 3/12/97 | | |
| | | Stand-up | GL | Elev | Stand-up | GL | Elev | Stand-up | GL | Elev | Stand-up | GL | Elev | Stand-up | GL | Elev |
| 1 | Qal | 12.19 | 11.27 | 9869.95 | 12.33 | 11.41 | 9869.81 | | | | 12.76 | 11.84 | 9869.38 | 12.99 | 12.07 | 9869.15 |
| 2 | Qal & P | 15.32 | 12.44 | 9852.66 | 15.34 | 12.46 | 9852.64 | | | | 15.47 | 12.59 | 9852.51 | 15.28 | 12.4 | 9852.7 |
| 3 | Qal | 17.13 | 14.88 | 9845.11 | 17.07 | 14.82 | 9845.17 | | | | 17.17 | 14.92 | 9845.07 | 16.78 | 14.53 | 9845.46 |
| 4 | Qal & Sh | 11.94 | 10.52 | 9868.67 | 12.43 | 11.01 | 9868.18 | | | | 12.81 | 11.39 | 9867.8 | 12.92 | 11.5 | 9867.69 |
| 5 | Qal & Sh | 7.17 | 6.54 | 9866.06 | 7.27 | 6.64 | 9865.96 | | | | ND | #VALUE! | #VALUE! | 7.79 | 7.16 | 9865.44 |
| 6 | Qal & Sh | 18.81 | 16.64 | 9849.16 | 18.73 | 16.56 | 9849.24 | | | | 18.94 | 16.77 | 9849.03 | 18.96 | 16.79 | 9849.01 |
| 7 | Qal | 16.02 | 12.23 | 9827.24 | 16.01 | 12.22 | 9827.25 | | | | 16.03 | 12.24 | 9827.23 | 16.11 | 12.32 | 9827.15 |
| 8 | Qal & Sh | 14.21 | 12.13 | 9869.78 | 14.29 | 12.21 | 9869.7 | | | | 14.64 | 12.56 | 9869.35 | 15.13 | 13.05 | 9868.86 |
| 9 | Qal & Sh | 20.68 | 18.1 | 9873.37 | 20.71 | 18.13 | 9873.34 | | | | 20.77 | 18.19 | 9873.28 | 20.99 | 18.41 | 9873.06 |
| 11 | Qal & Sh | 31.49 | 29.24 | 9877.68 | 31.78 | 29.53 | 9877.39 | | | | 32.53 | 30.28 | 9876.64 | nd | #VALUE! | #VALUE! |
| 12 | P | 27.25 | 24.17 | 9902.91 | 29.43 | 26.35 | 9900.73 | | | | 27.39 | 24.31 | 9902.77 | 26.26 | 23.18 | 9903.9 |
| 13 | Sh | 32.55 | 30.55 | 9871.83 | 32.98 | 30.98 | 9871.4 | | | | 33.34 | 31.34 | 9871.04 | 33.65 | 31.65 | 9870.73 |
| 14 | FLT-Sh | 21.5 | 21.21 | 9871.71 | 21.68 | 21.39 | 9871.53 | | | | 22.04 | 21.75 | 9871.17 | | | 9870.81 |
| 15 | Sh | 26.89 | 25.39 | 9868.11 | 26.94 | 25.44 | 9868.06 | | | | 26.97 | 25.47 | 9868.03 | 26.92 | 25.42 | 9868.08 |
| 16 | Sh | 13.47 | 12.64 | 9868.17 | 13.59 | 12.76 | 9868.05 | | | | 14 | 13.17 | 9867.64 | 14.19 | 13.36 | 9867.45 |
| 17 | Sh | ND | #VALUE! | #VALUE! | ND | #VALUE! | #VALUE! | 13.88 | 12.58 | 9868.53 | 14.11 | 12.81 | 9868.3 | | | 9868.4 |
| 18 | Qal | nd | #VALUE! | #VALUE! | ND | #VALUE! | #VALUE! | 14.9 | 12.5 | 9869.39 | 15.16 | 12.76 | 9869.13 | | | 9869.2 |
| 19 | Qal & Sh | 12.37 | 9.54 | 9866.72 | 12.46 | 9.63 | 9866.63 | | | | 12.83 | 10 | 9866.26 | 12.96 | 10.13 | 9866.13 |
| 20 | Qal | 5.51 | 3.22 | 9841.1 | 5.55 | 3.26 | 9841.06 | | | | 5.64 | 3.35 | 9840.97 | 5.81 | 3.52 | 9840.8 |
| RW-3 | Mine | 12.32 | 11.32 | 9870.96 | 12.37 | 11.37 | 9870.91 | 12.65 | 11.65 | 9870.63 | ND | #VALUE! | #VALUE! | 13.24 | 12.24 | 9870.04 |
| #3Shaft | Mine | nd | #VALUE! | #VALUE! | nd | #VALUE! | #VALUE! | 12.77 | 10.54 | 9871.09 | 12.64 | 10.41 | 9871.22 | 14 | 11.77 | 9869.86 |
| Oro | Mine | nd | #VALUE! | #VALUE! | 87.03 | 87.03 | 9871.56 | | | | 87.38 | 87.38 | 9871.21 | 87.14 | 87.14 | 9871.45 |
| WRO-1 | Roaster F. | 17.15 | 16.18 | 9879.07 | 18.38 | 17.41 | 9877.84 | | | | DRY | | | | | |
| WRO-2 | Roaster F. | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | | | | DRY | | | | | |
| WTU-1 | U.Mill Tail | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | | | | DRY | | | | | |
| WTU-2 | U.Mill Tail | dry | #VALUE! | #VALUE! | dry | #VALUE! | #VALUE! | | | | DRY | | | | | |
| WTL-2 | L.Mill Tail | nd | #VALUE! | #VALUE! | nd | #VALUE! | #VALUE! | | | | ND | | | | | |
| EXO-1 | | | | | | | | | | | | | | | | |
| SBRF-3 | Roaster F. | 9.78 | 7.78 | 9878.37 | 11.85 | 9.85 | 9876.3 | | | | 13.93 | 11.93 | 9874.22 | 10.93 | 8.93 | 9877.22 |

ABATEMENT SYSTEMS, INC.

# Geophysical Logging, Water Quality Evaluation and Stable Isotope Study of the Oro Shaft and Selected Monitoring Wells at the Wellington-Oro Mine Complex, French Gulch, Colorado

## Phase I Report - Low Flow Conditions

Prepared by

Radon Abatement Systems, Inc.

February, 1997

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ATEMENT SYSTEMS, INC.

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ATEMENT SYSTEMS, INC.

# Geophysical Logging, Water Quality Evaluation and Stable Isotope Study of the Oro Shaft and Selected Monitoring Wells at the Wellington-Oro Mine Complex, French Gulch, Colorado

Phase I Report - Low Flow Conditions

## *Introduction*

In January of 1997 URS Operating Services contracted Radon Abatement Systems (RAS), Inc. to conduct flow and water quality evaluations, and a stable isotope study at the Wellington-Oro Mine and Mill Complex in French Gulch near Breckenridge, Colorado. This contract was authorized by Johanna Miller, the EPA Region VIII French Gulch site coordinator. The work involved geophysical logging and water sampling of the Oro Shaft and selected monitoring wells. The purpose of the Oro Shaft geophysical logging was to evaluate underground mine water and the physical conditions of the shaft. The logging included a Video Log (camera), Water Quality Log (temperature, fluid electrical conductivity, pH and oxidation-reduction potential), Discrete Point Downhole Fluid Sampler, and a Heat Pulse flowmeter. Groundwater flow evaluations were also conducted on selected monitoring wells with the Heat Pulse flowmeter. The water quality evaluation was originally planned to include the roaster fines and mill tailings monitoring wells recently installed by the Bureau of Reclamation. The roaster fines wells were dry in January. Consequently, only the new mill tailings monitoring well (WTL02) was sampled and analyzed. RAS, Inc. subcontracted to COLOG, Inc. to conduct the mine shaft Video Log, Water Quality Log and Discrete Point Fluid Sampler. RAS, Inc. personnel supervised the mine logging and collected water samples from the COLOG, Inc. Discrete Point Fluid Sampler and the WTL02 Mill Tailings monitoring well. Prior to sampling WTL02, RAS, Inc. had to develop the new well by bailing and pumping multiple casing volumes of water until the drilling mud and fines were removed. RAS, Inc. also rented the COLOG, Inc. Heat Pulse flowmeter, data logger, laptop computer and MGX Digital Logging System to conduct the flow evaluations on the Oro Shaft and selected monitoring wells. Water Quality analyses were subcontracted to HydroLogic Laboratories, Inc. and the stable isotope analyses were subcontracted to Isotope Solutions, Inc.. The fieldwork for this study was conducted from January 20 to 22, 1997. This report summarizes the results of the studies on the Oro Shaft and selected monitoring wells.

## Flow Evaluation

### *Background*

Flowmeter logging techniques have been used for many years to measure the vertical distribution of flow in boreholes. The Heat Pulse Flowmeter (HPF) available from COLOG, Inc. is a high resolution device that can measure vertical fluid movement from 0.03 gpm to 1.5 gpm within the borehole. The COLOG, Inc. Heat Pulse Flowmeter is based on a proven United States Geological Survey design. The HPF incorporates a thermal fluid tracer. The borehole fluid is heated or thermally tagged by as much as $1^0$ F with an electrical heater grid. The flow rate is determined by measuring the time from grid discharge to the peak of the thermal pulse of water reaching an upper or lower thermistor sensor. The flowmeter is calibrated in a flow chamber where flow rates can be controlled and measured. Calibration coefficients are entered into the processing software prior to a logging job and are used to calculate vertical flow rates.

The HPF was applied to selected monitoring wells (Table I) and the Oro Shaft at the French Gulch site (Figure 1). All the monitoring wells have two-inch diameter PVC well casing except for MW-19 which has six-inch PVC diameter casing. MW-19 also has a continuous slotted screen from (30) feet to total depth at (110) feet (Table I). The other monitoring wells in this study have at least two separate five or ten foot screens (Table I). Prior to conducting the HPF surveys the water level was measured and recorded for each monitoring well. See Table II for these results. HPF measurements were conducted under ambient conditions. The HPF is run at discrete depths. At each depth multiple measurements are taken to assure accurate and repeatable data. HPF measurements were taken above the multiple screens, between screens and if possible below the lowest screened interval for the monitoring wells. The measurements above the uppermost screen interval and below the lowest screen interval were used to confirm proper tool responses and operation in a no flow environment. Table II summarizes the Heat Pulse flow data. Appendix I contains the raw data curves and tool responses for the test measurements on the selected monitoring wells and the Oro Shaft. Figure 2 through 7 are flow histograms that summarize HPF results for the selected monitoring wells[1].

[1] Figures and subsequent results discussion refer to inflow as fluid entering the borehole from the formation and outflow as fluid exiting the borehole into the formation.

### *Oro Shaft HPF Results*

The Heat Pulse flowmeter did not detect vertical flow in the Oro Shaft (Table II). HPL measurements for the Oro Shaft were taken at depths that corresponded to the 1st through 3rd Oro Levels and at (288) feet which is between the 3rd and 4th Oro levels. The tool response was very stable prior to thermally tagging the mine water at each measuring station. The tool response remained very stable with no indications of the thermal fluid tracer after the thermal triggering (see Appendix I Oro Shaft Raw Data Curves).

### *MW-1 HPF Results*

The Heat Pulse flowmeter did not detect any vertical flow between the upper and lower alluvial screens in MW-1(Table II, Figure 2). At (45.61) feet, which is between the base of the lower screen (43 feet) and total depth (50 feet), the flowmeter measured downward flow rates of 0.73 gpm. Well logs for MW-1 indicated that the bottom of the PVC casing corresponded to the base of the lower screened interval at (43) feet. The well logs also showed an open hole completion containing caved gravel and sand from (43) feet to (50) feet. This open hole interval corresponds to the top of the shale bedrock. The downward flow in this interval appears to be flow that is entering the borehole from the lower alluvial screen and discharging below the PVC casing into the fractured shale bedrock. Flow data had excellent repeatability indicating a consistent downward flow rate.

### *MW-3 HPF Results*

Heat Pulse flowmeter measurements were not possible above the upper screened interval in this well because the water level was near the top of the upper screen. The HPF data for MW-3 was difficult to quantify. The tool response prior to thermal tagging of the borehole fluid for measurements between the two alluvial screened intervals were very unstable. This could be caused by fluctuating temperature regimes within the borehole fluids. The unstable tool response appeared to be masking the thermal tracer which resulted in the thermally tagged fluid to be very difficult to detect and consequently reduced the sensitivity of the Heat Pulse flowmeter measurements. This instability also resulted in very poor repeatability of flow calculations (see Appendix I MW-3 Raw Data Curves). The HPL data implied that there may be upward vertical flow rates ranging from 0.20 to 0.45 gpm for measurements taken between the upper and lower alluvial screens (Table II, Figure 3). This suggests that fluid is entering the borehole from the lower alluvial screen and exiting the borehole through the upper alluvial screen interval. It is possible to interpret

the Heat Pulse data for MW-3 to be very low to no vertical fluid flow. The tool response was very stable for measurements taken below the lower screened interval and showed no flow (Table II). This confirmed proper operation of the tool such that previously discussed tool response is associated with wellbore fluids.

### *MW-4 HPF Results*

The HPF data showed strong upward vertical fluid flow between the upper and lower screened alluvial intervals (Figure 4). The Heat Pulse tool responses and flow calculations had excellent repeatability for monitoring well MW-4. Vertical flow calculations ranged from 1.19 to 1.35 gpm (Table II). No vertical flow was detected by the HPF between the lower alluvial screen interval and the shale bedrock screened interval (Figure 4). The upward flow appears to be due to water entering the borehole at the base of the alluvium and exiting into the upper portions of the alluvial aquifer.

### *MW-6 HPF Results*

HPF data for MW-6 showed strong upward vertical fluid flow between the lower screened alluvial interval and the screened interval at the top of the shale bedrock (Figure 5). The Heat Pulse tool responses and flow calculations for monitoring well MW-6 also had excellent repeatability. MW-6 monitoring well did not have a screened interval in the upper portions of the alluvial aquifer. Vertical flow calculations ranged from 0.95 to 1.44 gpm (Table II). The upward flow appears to be due to water entering the borehole from the lower shale bedrock screened interval and exiting through the lower alluvial screened interval. According to Lovering (1934) the Bullhide Fault dips to the east at an angle of 58 degrees. Projecting this dip from the surface trace of the Bullhide fault places the fault plane very close to the MW-6 wellbore (Figure 1). It is possible that the fluid entry associated with the shale bedrock screen is related to the Bullhide Fault.

### *MW-8 HPF Results*

The HPL data suggests upward vertical fluid flow between the lower alluvial screened interval and the upper alluvial screened interval (Figure 6). Upward vertical flow calculations ranged from 0.20 to 0.45 gpm (Table II). However, the Heat Pulse tool responses and detection of the thermally tagged fluid on measurements taken between the lower and upper alluvial screened interval was inconsistent and did not have very good repeatability. The tool response was very stable for measurements taken above the

uppermost screened interval in MW-8 and showed no flow (Table II). Measurements between screened intervals varied from very poor response and detection of the thermally tagged fluid to a good response (see Appendix I MW-8 Raw Data Curves). The flow data suggests that fluid is entering the borehole through the lower alluvial screened interval and exiting through the upper alluvial screen.

### *MW-19 HPF Results*

This well was unique because of the continuous screened interval through the alluvial aquifer and (60) feet into the fractured shale bedrock. MW-19 was installed in the Spring of 1996 by the Colorado Division of Minerals and Geology (DMG) for the purpose of determining groundwater flow relationships between the alluvial aquifer, shale bedrock and the Bullhide Fault (Figure 1). The Bullhide Fault was not identified on the DMG well sample logs for MW-19. Results from the Heat Pulse Flowmeter implied that there is major water entry at approximately (55) feet (Figure 7). This interpretation is based on significant vertical up flow above (55) feet and down flow below (55) feet (Table II, Figure 7). It has been assumed that the major inflow at (55) feet is related to the Bullhide Fault. Based on this assumption, the Bullhide Fault appears to intersects the MW-19 borehole at the top of the shale bedrock (Figure 7). The shale and porphyry bedrock below the Bullhide Fault in MW-19 had HPF calculated upward flow rates that range from 0.35 to 0.67 gpm (Table II, Figure 7). Above the Bullhide Fault HPF calculated upward flow rates of 0.58 to 1.44 gpm (Table II). The increasing flow from (50) feet to (45) feet implies that there is additional water entry associated this interval (Table II). Outflow of borehole fluid apparently is occurring between (30) and (45) feet, (60) and (70) feet, and (70) to (80) feet. According to DMG sample well logs, the upper outflow is associated with the alluvial aquifer, the (60) to (70) feet interval with a porphyry sill, and the lower interval with the fractured shale bedrock (Figure 7). The Heat Pulse tool responses and flow calculations had excellent repeatability for monitoring well MW-19.

### *MW-19 HydroPhysical™ (HpL™) Flow Results*

The HydroPhysical™ flow evaluation of MW-19 was conducted by COLOG, Inc. under a DMG contract during high flow conditions in May of 1996. The HpL logging technique involves borehole logging after the well fluid column has been replaced with environmentally safe deionized (DI) water. DI water has a very low fluid electrical conductivity (FEC). The DI water provides a

- HpL™ and HydroPhysical™ Logging are trademarks of COLOG, Inc.

distinct FEC contrast with the naturally high fluid conductivity groundwater. HpL involves obtaining FEC measurements over time that are analyzed to identify intervals where groundwater is entering or exiting the borehole. Evaluation and quantification of inflow and outflow parameters and electrical conductivity of the groundwater associated with each water-bearing interval are accomplished by using various modeling and interpretation techniques.

The HpL flow evaluation of MW-19 also showed major water entry at around (55) feet with an upward flow rate of 0.63 gpm during high flow ambient conditions (Figure 8). This flow evaluation showed water was exiting the borehole at (35) feet. The HydroPhysical logging did not indicate any downward flow below the Bullhide fault. The measured high flow (May 1996) upward vertical fluid flow rate was less than the Heat Pulse low flow rates (Figure 7). A possible explanation for this difference could be the additional (10) feet of fluid head in the well during high flow conditions. The water level for MW-19 at the time of the HpL flow evaluation was at surface ground level. In addition, the flow measurements are based on different flow measuring techniques and it is believed that the observed differences in flow measurements are not significant.

The HpL technique was also conducted during a (25) gpm production test on MW-19 after the ambient high flow conditions evaluation. The purpose of this test was to identify and quantify the high hydraulic conductivity intervals. The Bullhide fault at approximately (50) to (55) feet and an interval in the shale bedrock from (97) to (110) feet were identified as hydraulic conductive intervals (Figure 9).

# Oro Mine Shaft Characterization and Mill Tailings Groundwater Quality Evaluation

## *Background*

The objective for characterizing the Oro Shaft was to inspect the physical condition of the shaft and evaluate the vertical distribution of water quality in the mine pool water. Understanding the role of mine pool water and its relationship to metal loading to French Gulch is important information that can be applied to the evaluation of site cleanup and remediation options. This study also included the sampling and analysis of groundwater associated with the recently installed mill tailings well south of French Gulch Road.

## *Video Log*

The Video Log (camera) was initially run on the Oro Shaft to observe the physical conditions of the mine shaft and determine the feasibility of logging the shaft with other geophysical tools. In addition to the inspection of the shaft, the Video Log was used to quantitatively examine fluid flow. This was achieved by attaching a piece of colored yarn to the end of the video tool. Between mine drift levels the Video tool was placed in a stationary mode for the purpose of observing any movement of the colored yarn. The Oro shaft's water level was measured at (87.5) feet below ground surface (bgs). The Video Log showed timbers across the shaft at the top of the mine water. These obstructions did not appear to be serious and with caution the Video tool and subsequent logging tools were lowered into the mine water with no problems. Figure 10 is a schematic diagram of the Oro Shaft based on information from Lovering (1934). The Video Log showed scattered fine suspended debris in the mine water. No flow or mine drifts were observed in the video as the tool was lowered through the upper three levels of the Oro Shaft (Figure 10). Conduit (?) cable debris was observed to intersect the mine shaft at (298) feet below surface. It was decided that it would be too risky to lower the video camera and other geophysical tools below this depth due to the potential of entangling the geophysical tools and associated wireline cable with the conduit cable debris. The Video Log showed the mine shaft to be very large, possibly greater than five feet in diameter.

### *Water Quality Log*

The Water Quality Log was run from the top of the mine water (88 feet) to a depth of 290 feet below ground surface (Attachment I). This logging interval included the 1st through 3rd Oro Mine levels (Figure 10). The Water Quality Log involves continuous measurements of temperature, fluid electrical conductivity, pH and oxidation-reduction potential.

Temperature steadily increased from six degrees Celsius at the top of the mine water to nine degrees Celsius at approximately (186) feet where the temperature stabilized. The stabilizing of temperature at (186) feet corresponds to the 2nd Oro Mine Level (Figure 10). The temperature of the mine water remained at nine degrees until a depth of (241) feet. Below (241) feet there was a very slight (0.2 degrees Celsius) decrease in temperature. The (241) foot depth corresponds to the 3rd Oro Mine Level (Figure 10).

The fluid electrical conductivity quickly increased from 1000 microS/cm at the top of the mine water (88 feet) to 3250 microS/cm at approximately (141) feet. Below (141) feet the fluid electrical conductivity gradually increased from 3250 microS/cm to 3700 microS/cm at (241) feet. At (241) feet there was a fairly abrupt increase in fluid electrical conductivity from 3700 to 3775 microS/cm. This depth corresponds to the 3rd Oro Mine Level (Figure 10).

The pH in the Oro Shaft mine water varied between 5.84 to 6.56 standard units (su) from the top of the mine water to a depth of (140) feet. Below (140) feet the pH remained fairly constant at around 6.8 su. The Oxidation-Reduction Potential (Eh) decreased in an irregular manner from +220 mV at the top of the mine water to +108 mV at (140) feet. At (140) feet the Eh abruptly decreased to +80 mV. From (142) feet to the bottom of the logging interval at 290 feet the Eh gradually decreased from +80 mV to around +60 mV. The Eh-pH values for the mine waters measured by the Water Quality Log suggests that they are associated with a reducing acidic environment on a Eh-pH diagram (Fetter, 1994).

### *Downhole Fluid Sampling*

A Discrete Point Downhole Fluid Sampler was used to collect two liter fluid samples from four locations in the mine shaft; 116 feet, 186 feet, 245 feet and 288 feet. These depths were associated with the 1st through 3rd Oro levels and at the bottom of the logged interval at (288) feet (Figure 10). These samples were analyzed for dissolved and total recoverable metals and major cations and anions. Field measurements of pH, temperature, dissolved oxygen (DO) and fluid electrical conductivity (FEC) were taken at the surface after the fluid samples were removed from the fluid sampler (Table III). In-situ dissolved oxygen and temperature measurements are more reliable data. The surface measurements for DO and temperature should only be considered as qualitative data. Table IV is a summary of the water chemistry for the mine and mill tailings fluid samples. Table V is a summary of the stable isotope results for the fluid samples. Appendix II contains the associated laboratory data packages.

Using stable isotopes as a natural tracer is a proven method to recognize waters with differing sources and to evaluate hydrologic processes such as evaporation, interactions between surface and ground waters, and subsurface fluid mixing. Stable isotopes are expressed by $^{18}O/^{16}O$ and $^{2}H/^{1}H$ (D/H) ratios. Natural waters can have distinctive stable isotopic compositions or ratios that are function of the water molecules' structure. RAS, Inc. has conducted stable isotope studies for the State of Colorado Division of Minerals and Geology at French Gulch in 1996. These studies have concluded that French Creek surface waters and associated alluvial groundwaters, and the Wellington-Oro mine water at the #3 Mine Shaft are dominated by groundwater discharge. Although all the waters at French Gulch have a groundwater isotopic character, two distinct groups are observable; (1) mine water and (2) local surface and ground water (Figure 11). Figure 11 is a plot of oxygen and hydrogen isotopes with the global meteoric water line (MWL). The isotope data includes the RAS, Inc. sampling event during low flow conditions in March 1996 and the recent samples collected from the Oro Shaft and Mill Tailings well. All samples fall on or near the global MWL indicating that the data are reasonably accurate and precise. The mill tailings and the First Oro Level (116 feet) isotopic results plot within the mine water group. The Oro Shaft samples from 186 feet (2nd Level), 245 feet (3rd Level) and 288 feet plot at lower oxygen and hydrogen isotope values than the group (1) mine water (Figure 11). The snowpack oxygen isotope composition in March of 1996 was -27.2 ‰. The lower oxygen and hydrogen isotope compositions from the upper Oro Shaft samples suggest that these waters have a greater snowmelt influence over time than the waters within the mine water group (1) and the 116 feet Oro Level.

The water quality analyses for the different mine levels suggests that the mine pool is not homogenous (Table IV). The water quality of the mill tailings during low flow conditions is less contaminated than the mine water, especially for cadmium, iron and lead (Table IV). The stable isotope composition for the mine tailings groundwater suggest that the water originated from the mine pool (Figure 11).

## Discussion

Groundwater flow characterization was evaluated by flow measurements on six selected monitoring wells at the study site. These wells were MW-1, MW-3, MW-4, MW-6, MW-8 and MW-19. The results of this characterization suggest that a significant portion of the mine water discharge is occurring within the graben fault block between the Bullhide and 11-10 faults (Figure 1). Fluid flow results from the MW-19 fault well and MW-6 suggest that the Bullhide Fault is a significant conduit for mine water. The upward vertical flow documented in the MW-19 shale bedrock suggests that fractures within the bedrock are also conduits for mine water. The downward flow from the alluvial aquifer to the fractured shale bedrock in MW-1 implies that the mine water is directly discharging into the alluvium, possibly from mine stopes at the base of the alluvium in the vicinity of the #3 Mine Shaft (Figure 10).

The Oro Shaft Study could only be conducted to a depth of about 298 feet due to obstructions in the shaft (previously described in this report). This depth is between the 3rd and 4th shaft levels (Figure 10). Consequently, the Oro Shaft characterization work only represents the upper half of the shaft. While the entire shaft was not evaluated, integration of this work with previous water quality and isotope studies conducted in the study area can be extrapolated and may provide additional insight into the role of the unexplored portion of the mine pool water system.

The stable isotope data suggests that mine water from the 2nd and 3rd Oro levels are slightly different from the mine water discharging in the area of the #3 Mine Shaft (Figure 11). Water chemistry also implies the upper levels of the Oro Shaft are different from the observed downgradient mine water discharge. This is best illustrated with iron concentrations comparisons (Figure 12). The total recoverable iron concentration in the Oro Shaft gradually increases from 125,000 ug/l at the 1st Oro Level (116 feet) to 153,000 ug/l between the 3rd and 4th Oro levels at (288) feet. This increase of iron concentration with depth corresponds to the fluid electrical conductivity gradual increase with depth measured by the Water Quality Log (Attachment I). Observed downgradient mine water from the Mine

Shaft Relief Well #3 (MSRW-3) has total recoverable iron concentrations around 185,000 ug/l.

In July of 1996 lithium chloride was injected into the top of the Oro Shaft mine water column as part of the USGS Salt Tracer Study. Lithium was never detected in downgradient stream, monitoring wells, seeps or mine water samples. Chloride concentrations are elevated in the 1st Oro Level sample at (116) feet (Table IV). This suggests that the upper mine waters in the Oro Shaft are fairly stagnant and are not discharging into other portions of the mine or downgradient mine water discharge areas. This seems to be supported by the Water Quality Log which displays a fairly distinct fluid electrical conductivity, pH and Eh boundary at approximately (140) feet. The stagnant mine water may also explain some of the higher metal concentrations compared to the 2nd and 3rd Oro levels (Table IV). The stable isotope concentrations also suggests that the 1st Oro Level mine water is different from the 2nd and 3rd levels (Figure 11). The flow evaluations on the shaft suggests minimum fluid flow in the upper portions of the Oro Shaft.

It is inferred from these data that the lower portions of the mine pool (below the 3rd Oro Level) is the source of mine water that is discharging in the area of the #3 Mine Shaft and graben fault block. This is based on comparison of mine water chemistry collected during this study with previous water quality results in the area of the #3 Mine Shaft. The pathway for the mine water would be stopes between mine levels and the faults that intersect the lower mine levels, especially the Bullhide and 11-10 faults (Figure 10). The mine water flow apparently is driven by strong upward vertical groundwater flow.

## Recommendations

Based on the urgency to understand the role of the mine pool water in local metal loading to French Creek, RAS, Inc. recommends that the obstructions in the Oro Shaft be removed and the deeper portions of the shaft be explored. Specifically, complete the described testing and conduct a similar study during high flow conditions this Spring. A high flow study with a complete logging of the Oro Shaft will further establish the mine water flow path to the discharge area in the vicinity of the Bullhide and 11-10 fault block. Also, estimates of discharge rates can be used for designing mine water treatment. Characterizing any water quality changes between the Oro Shaft and the #3 Mine Shaft can also be incorporated into the mine water treatment design and may be crucial in evaluating any underground mine water engineering options that could reduce treatment costs.

## Table I

### Multiple Screen Wells for Heat Pulse Flowmeter Borehole Logging

| Monitoring Well | Screen Intervals* | Comments |
|---|---|---|
| MW-1<br>TD- 50' | 22'-27' (upper Qal)<br>33'-43' (lower Qal) | Contaminated Qal well at mine site. Flow data for mine discharge. |
| MW-3<br>TD- 55' | 15'-25' (upper Qal)<br>45'-50' (lower Qal) | Contaminated Qal well downgradient mine site and mill tailings. Flow data for bedrock and Bullhide Fault discharge. |
| MW-4<br>TD- 64' | 20'-30' (upper Qal)<br>46'-51' (lower Qal)<br>58'-63' (Sh bedrock) | Contaminated Qal and shale well downgradient mine site. Flow data for mine and bedrock discharge. |
| MW-6<br>TD- 54' | 34'-44' (lower Qal/top sh bedrock)<br>49'-54' (sh bedrock) | Contaminated Qal and shale well below mill tailings. Flow data for bedrock discharge and Bullhide Fault. |
| MW-8<br>TD- 46' | 15'-20' (upper Qal)<br>35'-45' (lower Qal) | Contaminated Qal well immediately downgradient roaster fines. Flow data for roaster fines and bedrock discharge |
| MW-19<br>TD- 110' | 30'-110' (Qal/Shale bedrock) | Contaminated Qal and shale well. New 1996 well w/continuous slotted screen in Qal, Bullhide fault and Shale bedrock. Flow data for fault and bedrock discharge. |

*-depth measured from ground surface
Qal - Alluvial aquifer
TD- Total Depth

## Table II

## Heat Pulse Flowmeter Results

| Monitoring Well | Test Depths*-results | Comments |
|---|---|---|
| Oro Shaft | 116.00'- no vertical flow<br>116.00'- no vertical flow<br>116.00'- no vertical flow<br>186.00'- no vertical flow<br>186.00'- no vertical flow<br>186.00'- no vertical flow<br>245.00'- no vertical flow<br>245.00'- no vertical flow<br>245.00'- no vertical flow<br>288.00'- no vertical flow<br>288.00'- no vertical flow<br>288.00'- no vertical flow | -water level 87.5' bgs<br><br>1st Oro Level 116'<br><br>2nd Oro Level 186'<br><br>3rd Oro Level 245'<br><br>Total Depth Oro Shaft Logging 290' |
| MW-1 | 18.00'- no vertical flow<br>18.00'- no vertical flow<br>30.00'- no vertical flow<br>30.00'- no vertical flow<br>32.00'- no vertical flow<br>32.00'- no vertical flow<br>45.61'-0.730 gpm down flow<br>45.61'-0.730 gpm down flow | -water level 11.65' bgs<br><br>-downward flow below lower screen |
| MW-3 | 30.00'- 0.330 gpm up flow<br>30.00'- 0.252 gpm up flow<br>30.00'- 0.195 gpm up flow<br>30.00'- 0.445 gpm up flow<br>30.00'- 0.195 gpm up flow<br>35.00'- 0.339 gpm up flow<br>35.00'- 0.296 gpm up flow<br>35.00'- 0.244 gpm up flow<br>35.00'- 0.224 gpm up flow<br>35.00'- 0.195 gpm up flow<br>52.00'- no vertical flow | -water level 14.99' bgs (top of upper screen)<br><br>-poor repeatability and tool response for flow data<br><br>-results questionable |
| MW-4 | 16.00'- no vertical flow<br>16.00'- no vertical flow<br>16.00'- no vertical flow<br>35.00'- 1.186 gpm up flow<br>37.00'- 1.204 gpm up flow<br>39.00'- 1.347 gpm up flow<br>39.00'- 1.325 gpm up flow<br>43.00'- 1.304 gpm up flow<br>43.00'- 1.304 gpm up flow<br>53.00'- no vertical flow<br>55.00'- no vertical flow<br>56.00'- no vertical flow | -water level 9.91' bgs<br><br>-good tool response and data repeatability<br><br>-upward flow between lower and upper Qal screens<br><br>-no flow between shale bedrock and lower Qal screens |

Table II (cont.)

| | | |
|---|---|---|
| MW-6 | 24.99'- no vertical flow<br>24.99'- no vertical flow<br>40.01'- no vertical flow<br>40.01'- no vertical flow<br>46.00'- 1.442 gpm up flow<br>46.00'- 1.394 gpm up flow<br>46.00'- 1.134 gpm up flow<br>46.00'- 1.134 gpm up flow<br>48.00'- 1.223 gpm up flow<br>48.00'- 1.041 gpm up flow<br>48.00'- 0.949 gpm up flow | -water level 16.82' bgs<br><br>-good tool response and data repeatability<br><br>-upward flow between lower Qal/top shale bedrock and shale bedrock screens |
| MW-8 | 13.50'- no vertical flow<br>13.50'- no vertical flow<br>13.50'- no vertical flow<br>28.00'- 0.298 gpm up flow<br>30.01'- 0.314 gpm up flow<br>32.00'- 0.195 gpm up flow<br>32.00'- 0.453 gpm up flow | -water level 12.13' bgs<br><br>-poor tool response and flow data repeatability<br><br>-results questionable |
| MW-19 | 25.00'- no flow<br>25.00'- no flow<br>40.00'- 1.186 gpm up flow<br>40.00'- 1.168 gpm up flow<br>45.00'- 1.442 gpm up flow<br>45.00'- 1.442 gpm up flow<br>50.00'- 0.587 gpm up flow<br>50.00'- 0.578 gpm up flow<br>55.00'- no vertical flow<br>55.00'- no vertical flow<br>60.00'- 0.244 gpm down flow<br>60.00'- 0.567 gpm down flow<br>60.00'- 0.393 gpm down flow<br>60.00'- 0.370 gpm down flow<br>70.00'- 0.399 gpm up flow<br>70.00'- 0.528 gpm up flow<br>70.00'- 0.499 gpm up flow<br>85.00'- 0.602 gpm up flow<br>85.00'- 0.674 gpm up flow<br>85.00'- 0.633 gpm up flow<br>100.0'- 0.349 gpm up flow<br>100.0'- 0.358 gpm up flow | -water level 9.89' bgs<br><br>-good tool response and data repeatability<br><br>-upward flow above Bullhide Fault(?) @ 55'<br><br>-downward flow below Bullhide Fault(?)<br><br>-upward flow between 70' to 100' |

*-depth measured from ground surface
Qal - Alluvial aquifer
gpm - gallons per minute

## Table III

## Fluid Sample Field Parameters

| Sample No. | Sample Description | Depth to Water | pH* | Temp.* | DO* | FEC* |
|---|---|---|---|---|---|---|
| | | (ft) | | (°C) | (%) | (uS/cm) |
| FG0050 | Oro Shaft 288 ft level | 87.5 | 6.28 | 4.1 | 72.5 | 2,860 |
| FG0051 | Oro Shaft 245 ft level | 87.5 | 6.28 | 4.7 | 77.2 | 2,750 |
| FG0052 | Oro Shaft 186 ft level | 87.5 | 6.26 | 6.2 | 74.1 | 2,700 |
| FG0053 | Oro Shaft 116 ft level | 87.5 | 5.71 | 4.9 | 64.4 | 2,420 |
| FG0054 | Mill Tailings Well | 12.02 | 6.59 | 4.4 | 1.8** | 2,330 |

* readings measured at surface

** reading measured in-situ (surface reading 16%)

## Table IV

## Summary of Water Quality Data

| *Sample #* | *FG0050* | *FG0051* | *FG0052* | *FG0053* | *FG0054* |
|---|---|---|---|---|---|
| *Water Quality Data* | Oro Shaft 288 ft level | Oro Shaft 245 ft level | Oro Shaft 186 ft level | Oro Shaft 116 ft level | Mill Tailings Well WTL02 |
| Alk (mg/l) | 30 | 40 | 40 | 20 | 100 |
| TSS (mg/l) | 155 | 132 | 124 | 14 | 14 |
| Cl (mg/l) | 3.3 | ND | 3.3 | 6.95 | 3.3 |
| $SO_4$ (mg/l) | 1700 | 1720 | 1700 | 1560 | 1480 |
| Ca-d (mg/l) | 122 | 357 | 354 | 273 | 305 |
| K-d (mg/l) | 3.07 | 2.15 | 3.36 | 1.81 | 2 |
| Mg-d (mg/l) | 125 | 119 | 119 | 96.6 | 94.6 |
| Na-d (mg/l) | 14.2 | 19 | 15.1 | 11.4 | 9.13 |
| Al-t/d (ug/l) | 6020/ND | 1080/ND | 447/ND | 1810/884 | ND/ND |
| Mn-t/d (mg/l) | 43.2/44.4 | 40.5/41.4 | 36.9/39.1 | 36.7/36.5 | 42.7/44.3 |
| Ni-t/d (ug/l) | 155/125 | 147/127 | 115/121 | 123/127 | 115/122 |
| Zn-t/d (mg/l) | 191/203 | 177/190 | 170/174 | 186/187 | 141/148 |
| Cd-t/d (ug/l) | 200/184 | 183/178 | 176/185 | 384/387 | 5.09/7.55 |
| Cu-t/d (ug/l) | 15.4/ND | ND/ND | ND/ND | 65.1/47.7 | ND/ND |
| Fe-t/d (mg/l) | 153/119 | 142/117 | 137/110 | 125/118 | 79.9/79.6 |
| As-t/d (ug/l) | 9.9/ND | 11/ND | ND/ND | ND/ND | 28/30 |
| Pb-t/d (ug/l) | 210/ND | 240/ND | 180/ND | 470/250 | 30/4.2 |

"ND" = Sample Concentration not detected above method report limit

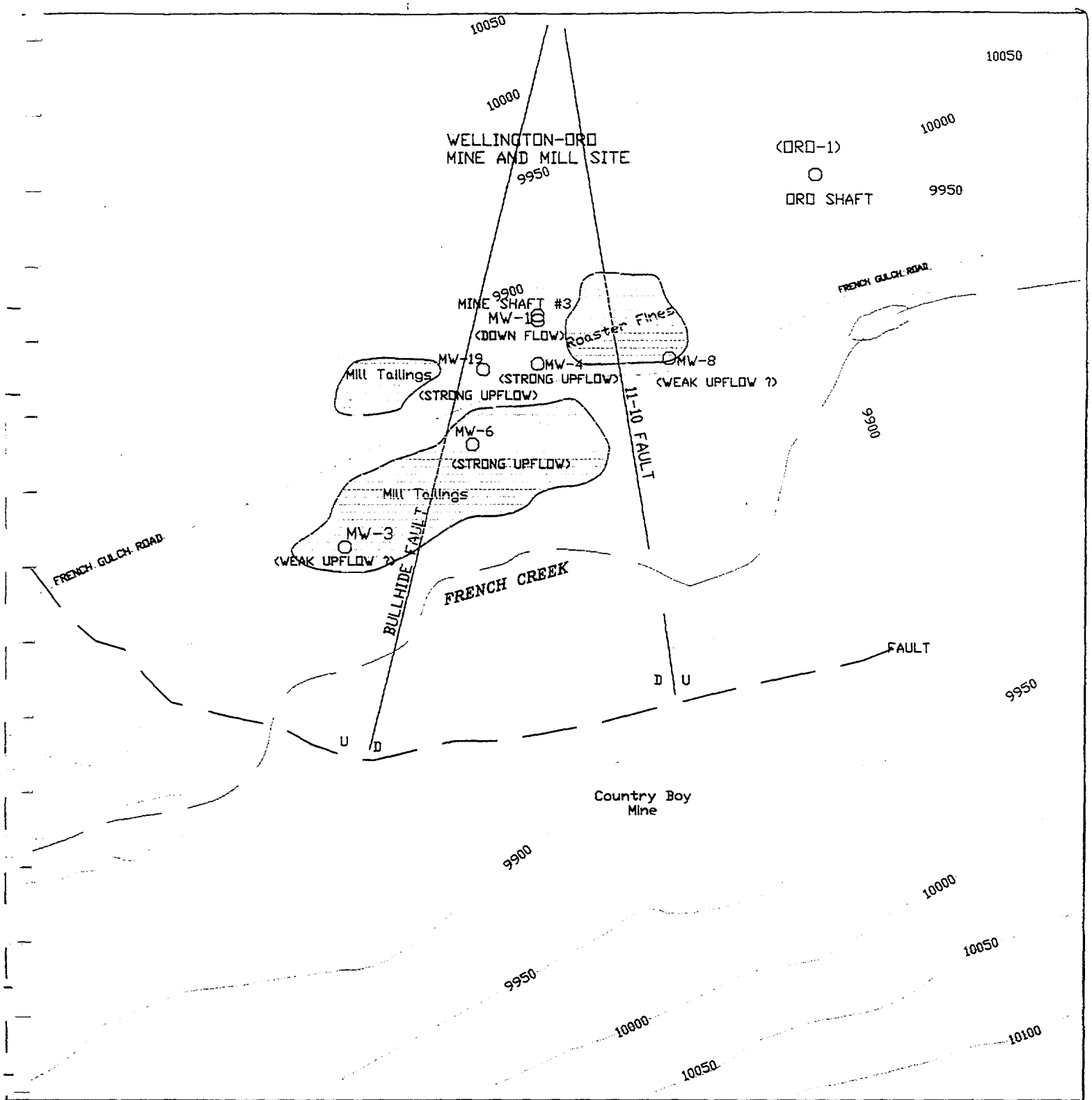
"t" = Total Recoverable

"d" = Dissolved

## Table V

## Summary of Stable Isotope Data

| *Sample #* | *FG0050* | *FG0051* | *FG0052* | *FG0053* | *FG0054* |
|---|---|---|---|---|---|
| *Stable* Isotopes | Oro Shaft 288 ft level | Oro Shaft 245 ft level | Oro Shaft 186 ft level | Oro Shaft 116 ft level | Mill Tailings Well WTL02 |
| Oxygen: Delta O18 (‰) | -19.2 | -19.4 | -19.2 | -19.0 | -18.9 |
| Hydrogen: Delta D (‰) | -146 | -146 | -146 | -143 | -141 |




# FIGURE 1

## LOCATION MAP

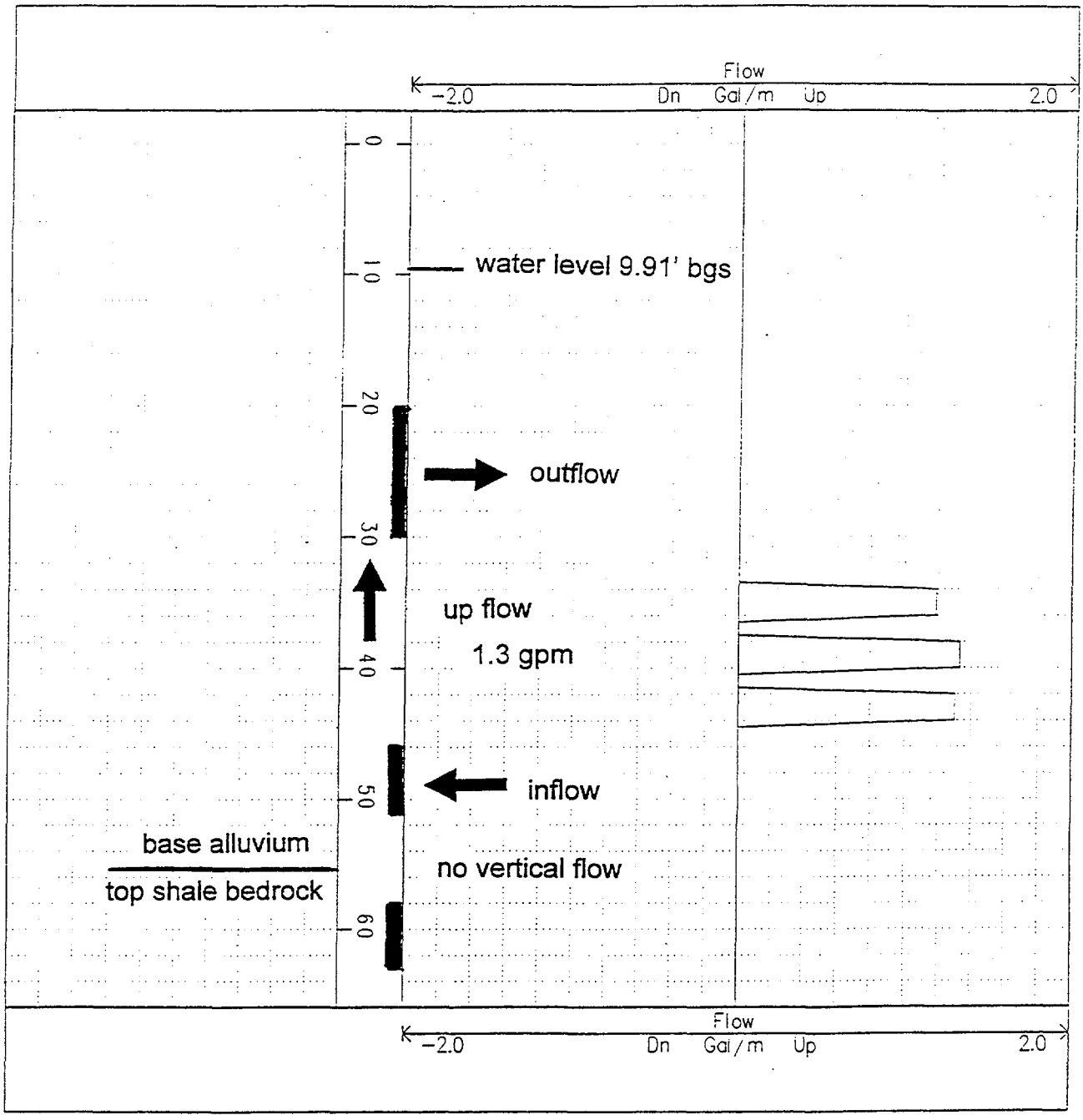
## FOR HEAT PULSE FLOWMETER WELLS

## LOW FLOW CONDITIONS, JANUARY 1997

DRAFTED BY AMERICAN GEOLOGICAL SERVICES, INC.

SCALE 1"=250' CONTOUR INTERVAL 50'

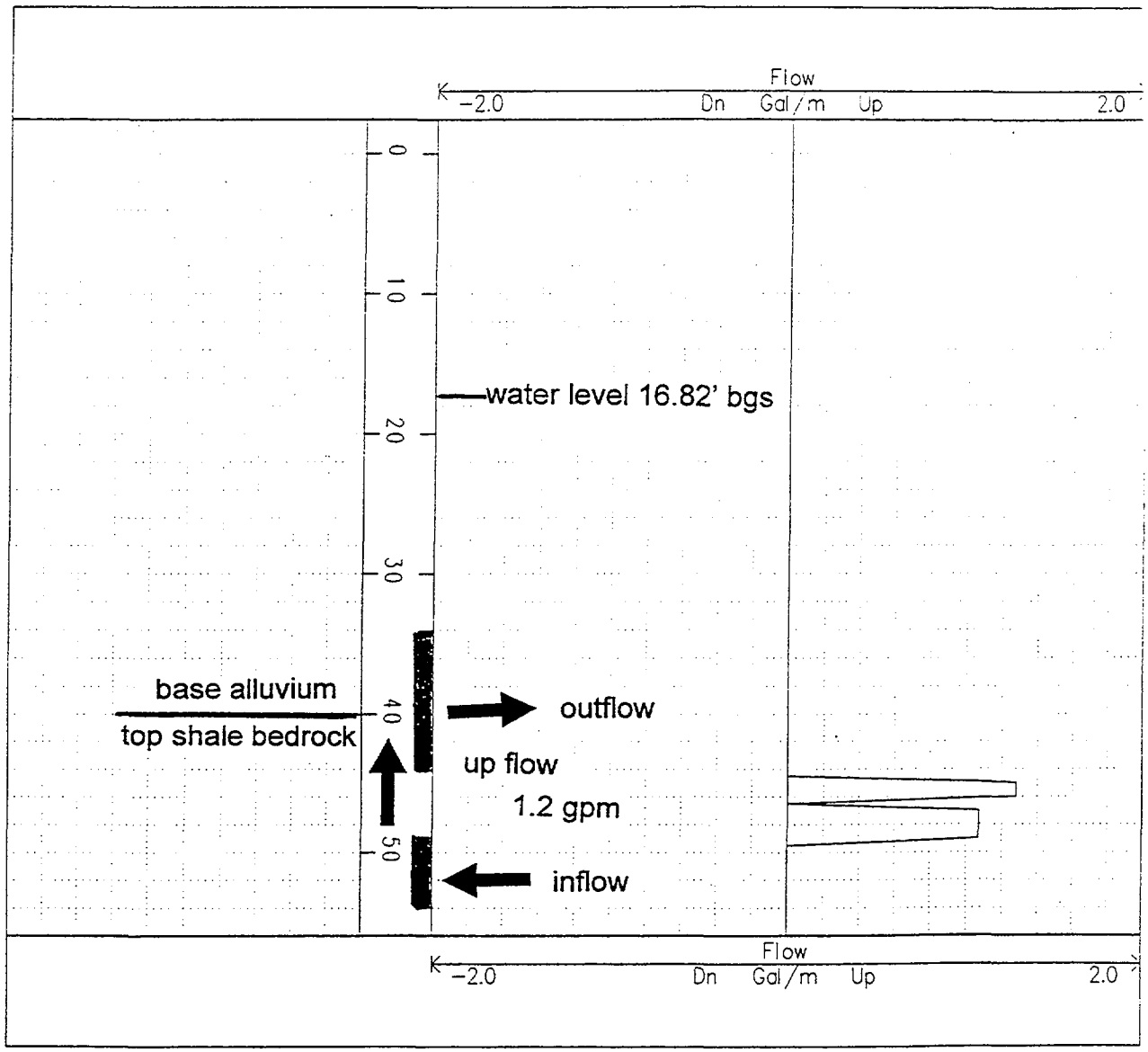
**Figure 4: Flow Histogram January 1997: MW-4**




screen interval

lithology and completion data:
from Colorado Division Minerals and Geology Well Logs

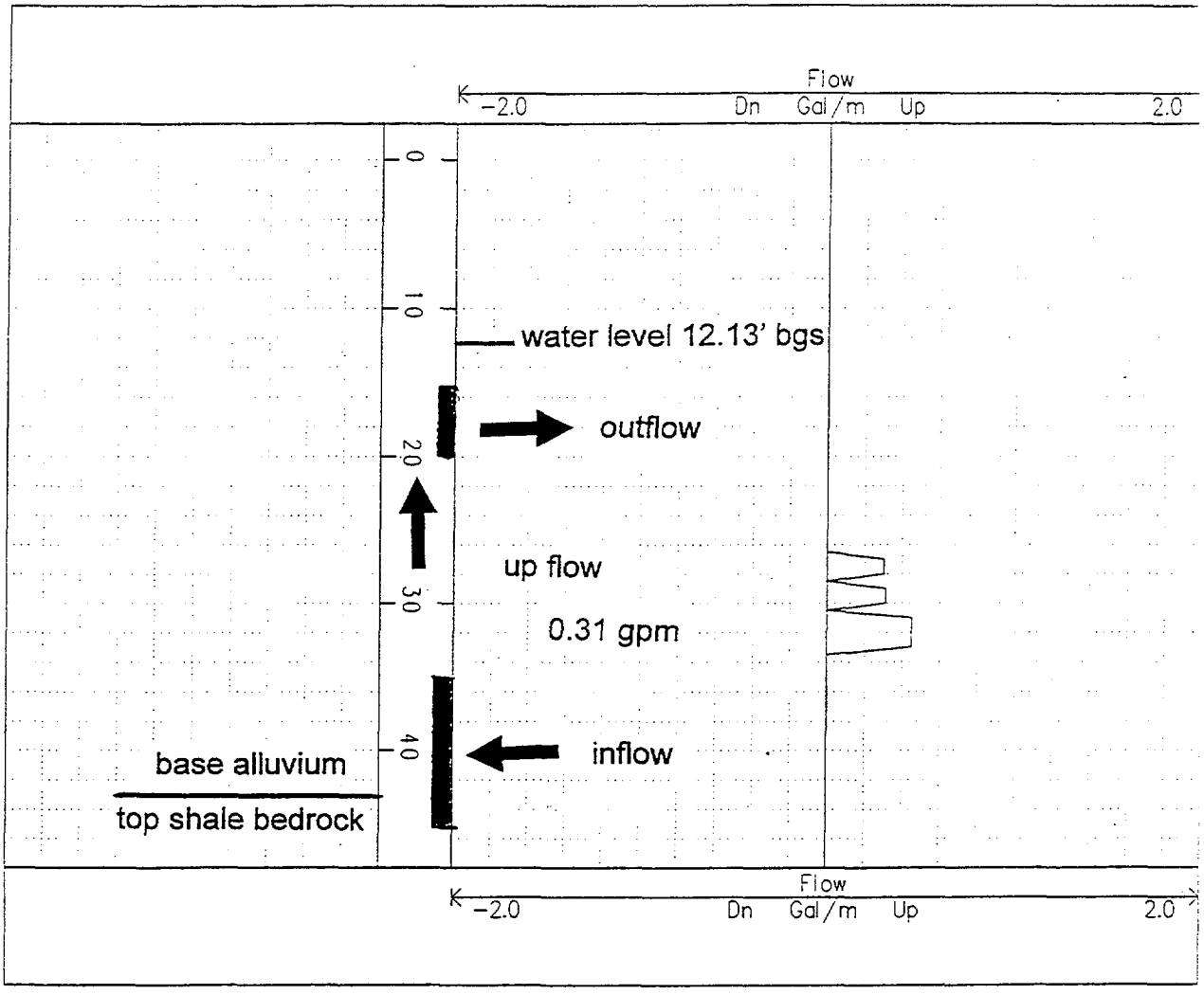
**Figure 5: Flow Histogram January 1997: MW-6**




screen interval

lithology and completion data:
,from Colorado Division Minerals and Geology Well Logs

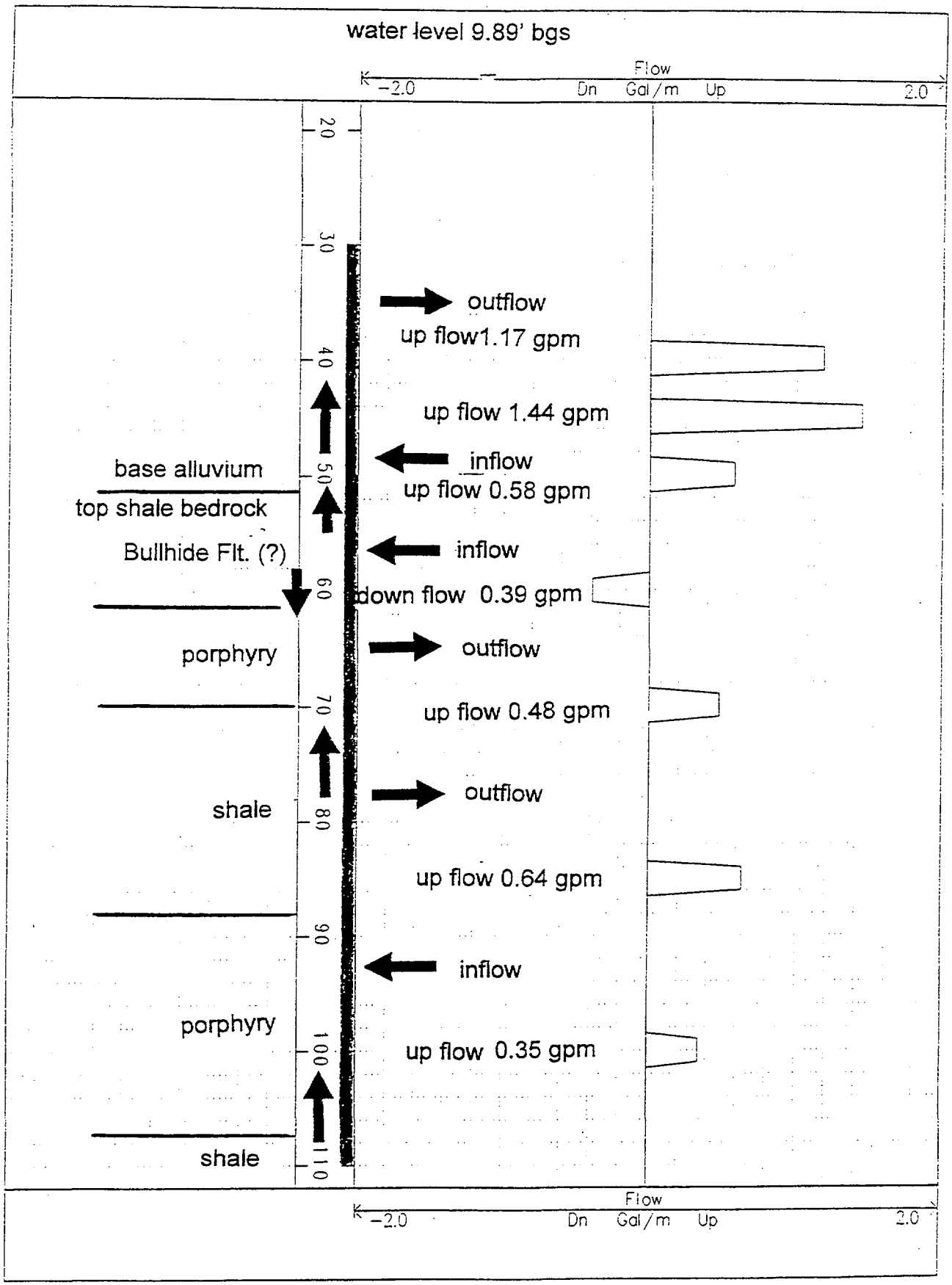
**Figure 6: Flow Histogram January 1997: MW-8**




screen interval

lithology and completion data:
from Colorado Division Minerals and Geology Well Logs

**Figure 7: Flow Histogram January 1997: MW-19**




screen interval

lithology and completion data:
from Colorado Division Minerals and Geology Well Logs

FIGURE 8: HYDROPHYSICAL LOGS FOR AMBIENT FLOW CHARACTERIZATION; STATE OF COLORADO, BRECKENRIDGE, FRENCH GULCH, CO; WELL MW-19

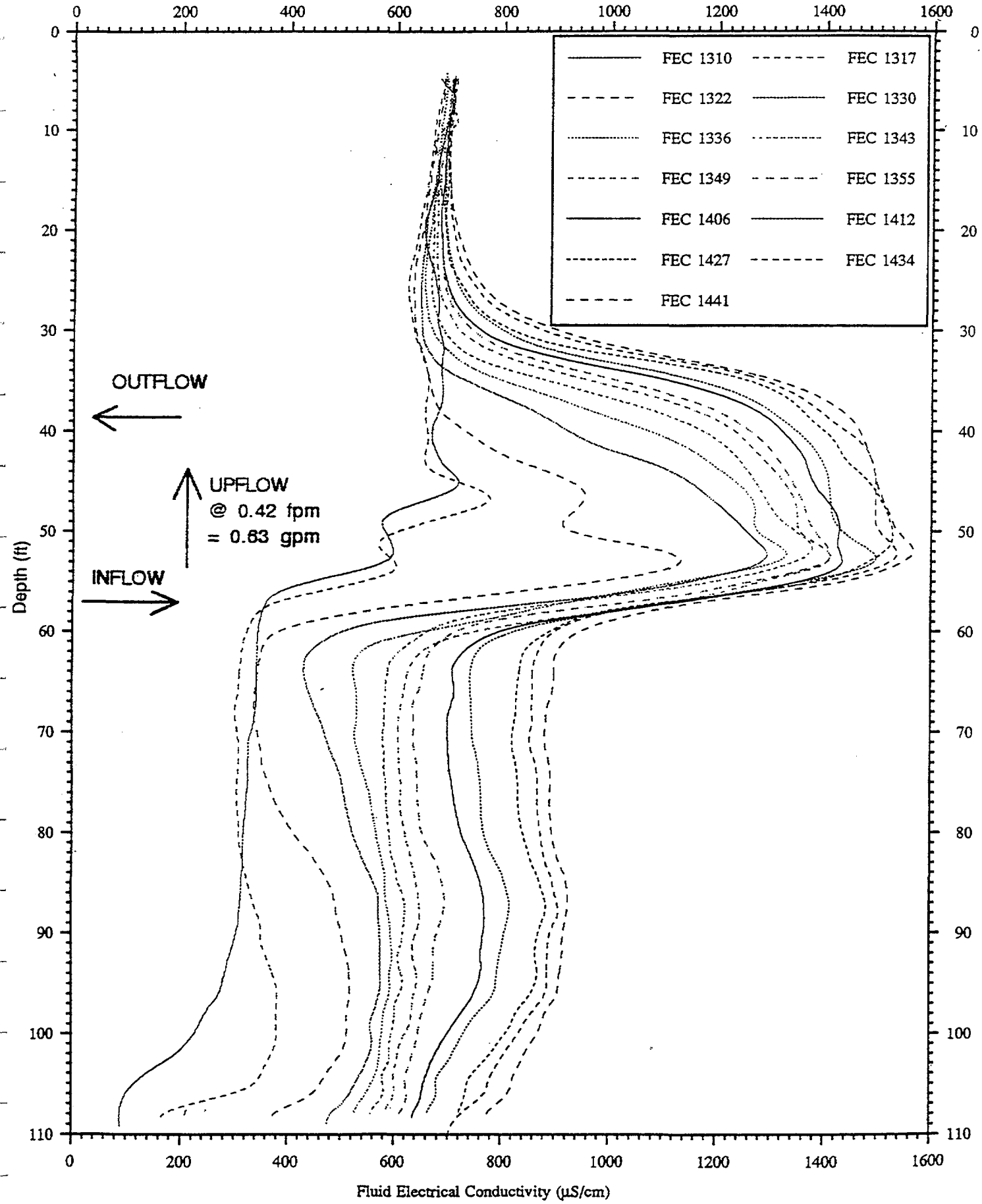
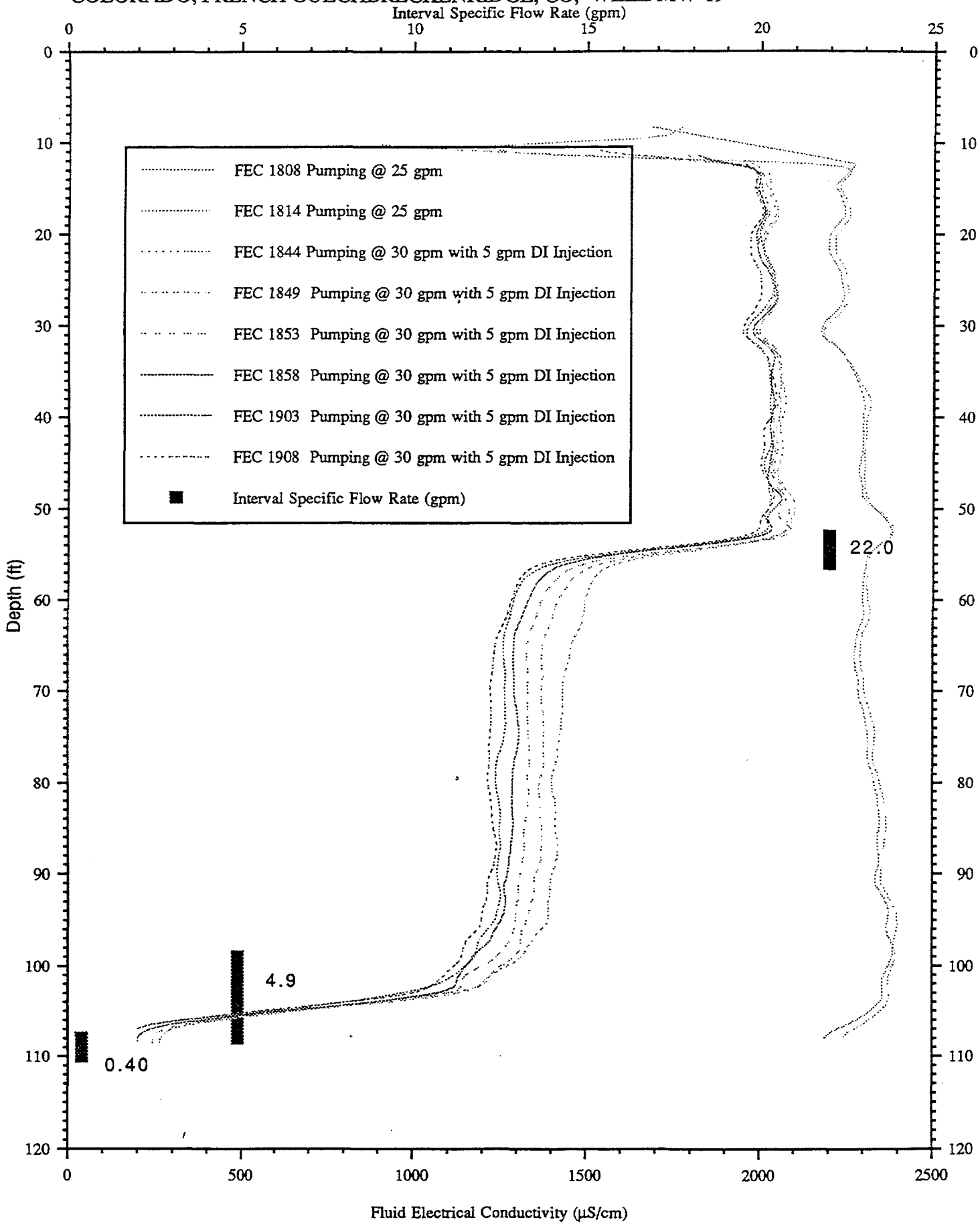


FIGURE 9: HYDROPHYSICAL LOGS DURING 25 GPM PRODUCTION TEST, STATE OF COLORADO, FRENCH GULCHBRECKENRIDGE, CO; WELL MW-19



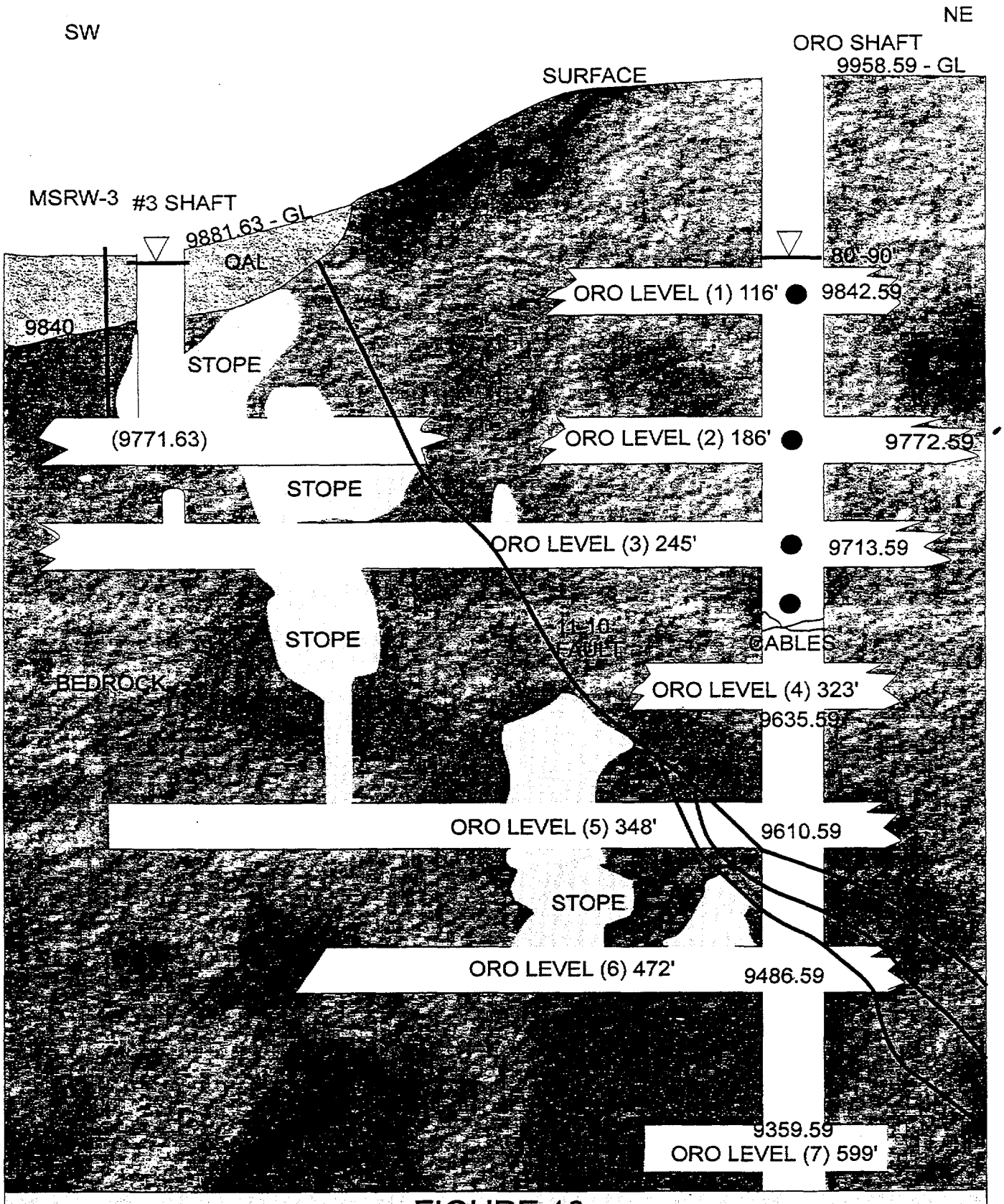



FIGURE 10

SCHEMATIC DIAGRAM OF THE ORO SHAFT

NOT TO SCALE ● Sample Locations DEPTH MEASURED FROM ORO SURFACE

DRAFTED BY AMERICAN GEOLOGICAL SERVICES, INC
AFTER LOVERING (1934)

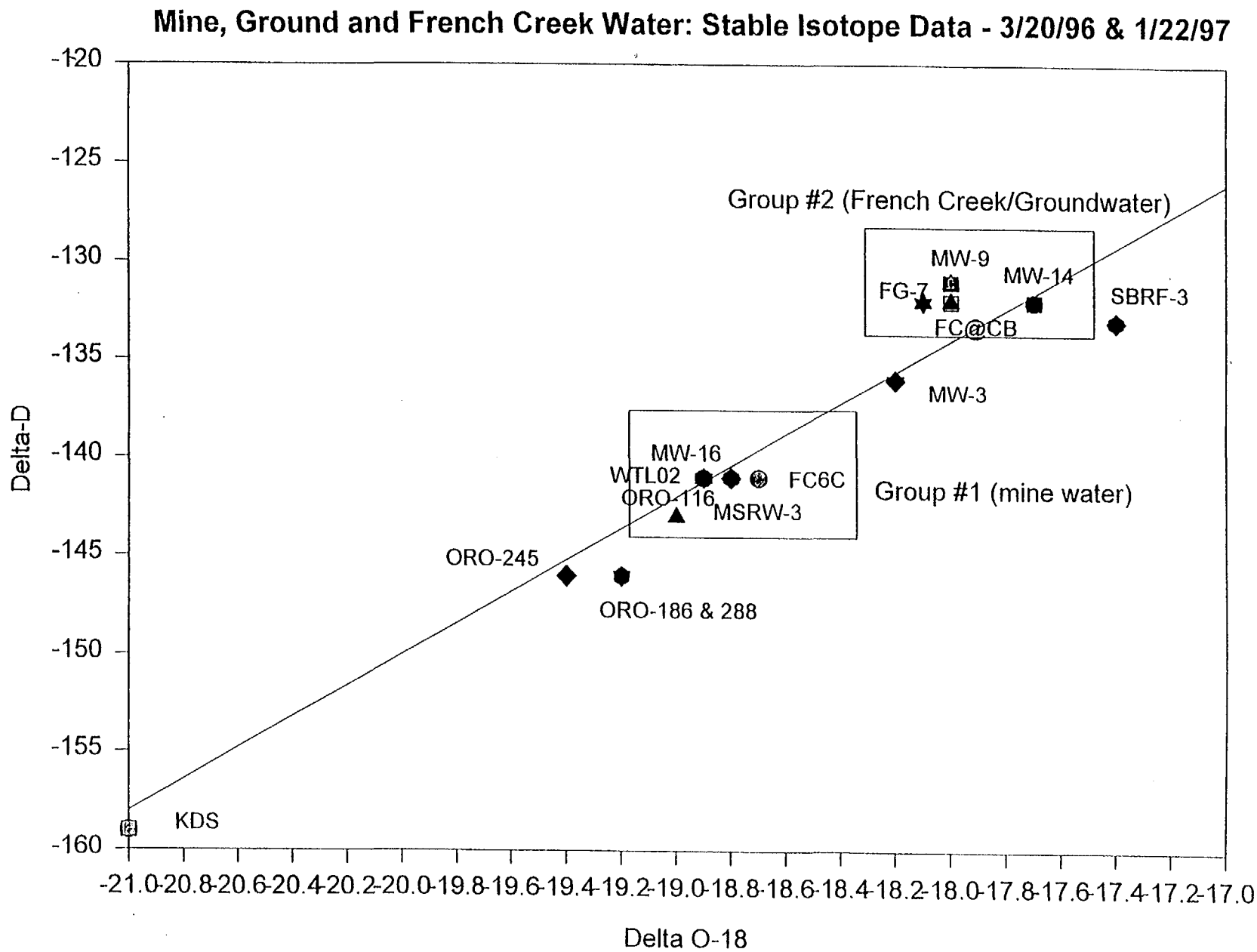



Figure 11 French Gulch Stable Isotope Composition Comparisons

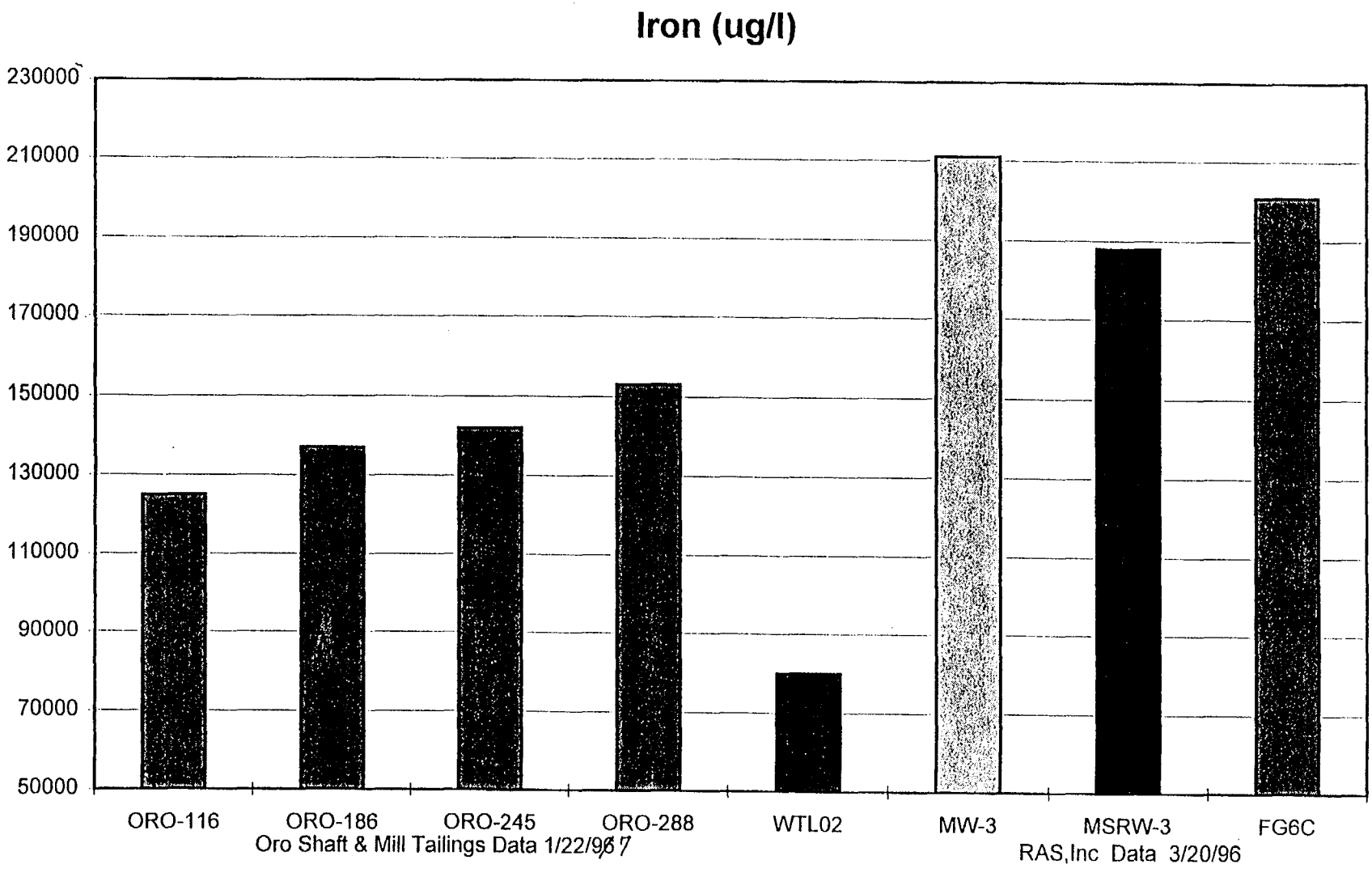



Figure 12 Comparison of Mine Water Iron Concentrations

**Isotope Solutions**
*Isotopic Environmental Consultants*
*1126 Delaware St.*
*Berkeley CA 94702*
*Tel. (510) 527-7237*
*Fax (510) 528-9421*

IS-AGS COC14976 61998
Project Name: French Gulch
Project No: French Gulch/Mine Shifts
Contact: A. Morrisey
Company: American Geological Services, Inc.
Tel. (303) 988-1845

## Stable isotope results for samples submitted by AGS

| | Sample Number | $\delta^{18}O$ (‰) | $\delta^{18}O$ Dup. | $\delta D$ (‰) | $\delta D$ Dup. |
|---|---|---|---|---|---|
| 1 | 0001 #3 MINE | -18.6 | -18.8 | -140 | -141 |
| 2 | 0003 ORO 570 | -18.7 | | -145 | -144 |
| 3 | 004 ORO 444 | -18.6 | | -139 | -139 |
| 4 | 005 ORO 348 | -18.6 | | -143 | -141 |
| 5 | 006 ORO 245 | -18.4 | | -141 | -142 |
| 6 | 007 ORO 186 | -18.6 | | -138 | -138 |
| 7 | 009 EXO 2 | -18.1 | | -137 | -138 |
| 8 | 0010 SNOW FG-O WATER | -19.3 | | -144 | -143 |
| | STANDARD | | | | |
| | NI | | -11.6 | | |
| | NI-DUP | | -11.7 | | |
| | ZM | | | -17 | |
| | ZM-DUP | | | -17 | |
| | NL | | | -331 | |
| | NL-DUP | | | -332 | |

Supervisor

Client: ISOTOPE SOLUTIONS
Recvd : 98/06/26
Job# : 1092
Final : 98/07/14

Purchase Order: 2350
Contact: B. Smith, L. Menchaca, 510/527-7237
126 Delaware St., (fax) 528-9421
Berkeley, CA 94702

| Cust | LABEL INFO | JOB.SX | REFDATE | QUANT | ELYS | TU | | eTU |
|---|---|---|---|---|---|---|---|---|
| | ISOTOPE SOLN - 0001A #3 Mine | 1092.01 | 980608 | 40 | DIR | 18 | * | 3 |
| | ISOTOPE SOLN - 0004A ORO-444 | 1092.02 | 980608 | 40 | DIR | 22 | * | 3 |
| | ISOTOPE SOLN - 0007A ORO-186 | 1092.03 | 980609 | 40 | DIR | 20 | * | 3 |

* Average of duplicate runs

ACZ Laboratories, Inc.

**CASE NARRATIVE**
July 9, 1998

| | |
|---|---|
| Client: | American Geological Services, Inc. |
| Project: | French Gulch. |
| Date Rec'd: | 06/09/98 |
| SDG#: | L18846 |
| Lab Nos.: | L18846-01 Through L18846-05 |

Five samples for this SDG were received on 6/09/98. The samples were received in good condition at 3.1 degrees C. These samples were then logged into ACZ's LIMS as projects L18846.

The samples for this SDG were analyzed for the parameters outlined in the scope of work attached with the Chain of Custody documentation. The list contained inorganic parameters.

The data package is separated into 4 sections as follows:

- Invoice and Case Narrative
- Inorganic Analytical Reports
- QC Summaries
- Chain of Custody Documentation

Items of note for this project:

1. Poor spike recoveries were accepted for several of the dissolved and total recoverable metals based on actual sample concentrations were determined to be four times greater than the spike concentrations.

2. Two Continuing Calibration Blank (CCB) for alkalinity were out of control possible due to matrix interferences.

This set of samples meets ACZ's data quality objectives.

If you have any questions please do not hesitate to call me at (800) 334-5493.

Scott Gustin, Project Manager

2773 Downhill Drive
Steamboat Springs, CO 80487

Phone (800) 334-5493
FAX No. (970) 879-2216

# ACZ Laboratories, Inc.

30400 Downhill Drive
Steamboat Springs, CO 80487
(970) 879-6590

**INVOICE**

**Service Requests**
- (●) Normal
- ( ) 1-2 Days +200%
- ( ) 3-5 Days +100%
- ( ) 6-10 Days +50%

**Deliverable**
- (●) Standard
- ( ) Std with QC Summary
- ( ) CLP Format

BILL TO: American Geological Services, Inc.
A. Morrissey
12477 W. Cedar Dr.#206
Lakewood, CO 80228

REPORT TO: American Geological Services, Inc.
A. Morrissey
12477 W. Cedar Dr.#206
Lakewood, CO 80228

| Invoice No. | Invoice Date | Reference | Terms | ACZ Project | ACZ Quote | Client Project/P.O. Number |
|---|---|---|---|---|---|---|
| 17184 | 25-Jun-98 | C9999 | Net 30 | L18846 | | French Gulch |

| Qty | Analysis | Method | Matrix | Price | Total |
|---|---|---|---|---|---|
| 5 | Alkalinity as CaCO3 | M2320B | Ground Water | $7.50 | $37.50 |
| 5 | Aluminum, dissolved | M200.7 ICP | Ground Water | $7.50 | $37.50 |
| 5 | Aluminum, total recoverable | M200.7 ICP | Ground Water | $7.50 | $37.50 |
| 5 | Antimony, total recoverable | M200.8 ICP-MS | Ground Water | $15.50 | $77.50 |
| 5 | Arsenic, dissolved | M200.8 ICP-MS | Ground Water | $15.50 | $77.50 |
| 5 | Arsenic, total recoverable | M6020 ICPMS | Ground Water | $15.50 | $77.50 |
| 5 | Cadmium, dissolved | M200.7 ICP | Ground Water | $7.50 | $37.50 |
| 5 | Cadmium, total recoverable | M200.7 ICP | Ground Water | $7.50 | $37.50 |
| 5 | Calcium, dissolved | M200.7 ICP | Ground Water | $7.50 | $37.50 |
| 5 | Carbon, total organic (TOC) | M415.1 Oxidation/IR | Ground Water | $28.00 | $140.00 |
| 5 | Cation-Anion Balance | Calculation | Ground Water | $0.00 | $0.00 |
| 5 | Chloride | M325.2 - Colorimetric (RFA) | Ground Water | $7.50 | $37.50 |
| 5 | Chromium, dissolved | M200.8 ICP-MS | Ground Water | $15.50 | $77.50 |
| 5 | Chromium, total recoverable | M200.8 ICP-MS | Ground Water | $15.50 | $77.50 |
| 5 | Conductivity @25C | M120.1 - Meter | Ground Water | $5.50 | $27.50 |
| 5 | Copper, dissolved | M200.8 ICP-MS | Ground Water | $15.50 | $77.50 |
| 5 | Copper, total recoverable | M200.8 ICP-MS | Ground Water | $15.50 | $77.50 |
| 5 | Hardness as CaCO3 | Calculation based on dissolved | Ground Water | $0.00 | $0.00 |
| 5 | Iron, dissolved | M200.7 ICP | Ground Water | $7.50 | $37.50 |
| 4 | Iron, Ferric | Calculation (Dissolved Fe - Fer | Ground Water | $0.00 | $0.00 |
| 4 | Iron, Ferrous | SM315B(c) Phenanthroline | Ground Water | $20.00 | $80.00 |
| 5 | Iron, total recoverable | M200.7 ICP | Ground Water | $7.50 | $37.50 |
| 5 | Lead, dissolved | M200.7 ICP | Ground Water | $7.50 | $37.50 |
| 5 | Lead, total recoverable | M200.7 ICP | Ground Water | $7.50 | $37.50 |
| 5 | Magnesium, dissolved | M200.7 ICP | Ground Water | $7.50 | $37.50 |
| 5 | Manganese, dissolved | M200.7 ICP | Ground Water | $7.50 | $37.50 |
| 5 | Manganese, total recoverable | M200.7 ICP | Ground Water | $7.50 | $37.50 |
| 5 | Molybdenum, total recoverable | M200.8 ICP-MS | Ground Water | $15.50 | $77.50 |
| 5 | Nickel, dissolved | M200.7 ICP | Ground Water | $7.50 | $37.50 |
| 5 | Nickel, total recoverable | M200.7 ICP | Ground Water | $7.50 | $37.50 |
| 5 | Nitrate as N | M300.0 - Ion Chromatography | Ground Water | $11.00 | $55.00 |
| 5 | Nitrite as N | M300.0 - Ion Chromatography | Ground Water | $11.00 | $55.00 |
| 5 | Nitrogen, ammonia | M350.1 - Automated Phenate | Ground Water | $7.50 | $37.50 |
| 5 | pH (lab) | M150.1 - Electrometric | Ground Water | $5.50 | $27.50 |
| 5 | Potassium, dissolved | M200.7 ICP | Ground Water | $7.50 | $37.50 |
| 5 | Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | Ground Water | $7.50 | $37.50 |
| 5 | Residue, Non-Filterable (TSS) @103-5C | M160.2 - Gravimetric | Ground Water | $7.50 | $37.50 |
| 5 | Selenium, total recoverable | SM 3500-Se C, AA-Hydride | Ground Water | $20.00 | $100.00 |
| 5 | Silver, dissolved | M200.8 ICP-MS | Ground Water | $15.50 | $77.50 |
| 5 | Silver, total recoverable | M200.8 ICP-MS | Ground Water | $15.50 | $77.50 |
| 5 | Sodium, dissolved | M200.7 ICP | Ground Water | $7.50 | $37.50 |
| 5 | Sulfate | M375.3 - Gravimetric | Ground Water | $7.50 | $37.50 |
| 5 | Sulfide as S | SM427C - Modified, Methylen | Ground Water | $8.50 | $42.50 |
| 5 | Sulfite | M377.1 - Titrimetric | Ground Water | $15.00 | $75.00 |
| 5 | TDS (calculated) | Calculation | Ground Water | $0.00 | $0.00 |
| 5 | TDS (ratio - measured/calculated) | Calculation | Ground Water | $0.00 | $0.00 |
| 5 | Total Recoverable Digestion | M3005 ICP | Ground Water | $7.00 | $35.00 |
| 5 | Total Recoverable Digestion | M3005 ICP-MS | Ground Water | $0.00 | $0.00 |
| 5 | Uranium, total recoverable | M200.8 ICP-MS | Ground Water | $15.50 | $77.50 |
| 5 | Vanadium, total recoverable | M200.8 ICP-MS | Ground Water | $15.50 | $77.50 |
| 5 | Zinc, dissolved | M200.7 ICP | Ground Water | $7.50 | $37.50 |

ACZ

# Analytical Results

*ACZ Laboratories, Inc.*
*30400 Downhill Drive*
*Steamboat Springs, CO 80487*
*(800) 334-5493*

Lab Sample ID: *L18846-01*
Client Sample ID: *0001#3 Mine*
Client Project ID: *French Gulch*
ACZ Report ID: *RG70532*

American Geological Services, Inc.
12477 W. Cedar Dr. #206
Lakewood, CO 80228
A. Morrissey

Date Sampled: *6/8/98 14:45*
Date Received: *6/9/98*
Date Reported: *6/26/98*

Sample Matrix: *Ground Water*

## Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Aluminum, dissolved | M200.7 ICP | 0.16 | B | mg/L | 0.03 | 0.2 | 6/13/98 | gg |
| Aluminum, total recoverable | M200.7 ICP | 15.30 | | mg/L | 0.06 | 0.3 | 6/24/98 | kr |
| Antimony, total recoverable | M200.8 ICP-MS | 0.004 | B | mg/L | 0.001 | 0.005 | 6/15/98 | fep |
| Arsenic, dissolved | M200.8 ICP-MS | | U | mg/L | 0.005 | 0.03 | 6/16/98 | fep |
| Arsenic, total recoverable | M6020 ICPMS | 0.063 | | mg/L | 0.005 | 0.03 | 6/15/98 | fep |
| Cadmium, dissolved | M200.7 ICP | 0.064 | | mg/L | 0.003 | 0.02 | 6/13/98 | gg |
| Cadmium, total recoverable | M200.7 ICP | 0.166 | | mg/L | 0.006 | 0.03 | 6/24/98 | kr |
| Calcium, dissolved | M200.7 ICP | 367 | | mg/L | 0.2 | 1 | 6/13/98 | gg |
| Chromium, dissolved | M200.8 ICP-MS | | U | mg/L | 0.002 | 0.01 | 6/17/98 | fep |
| Chromium, total recoverable | M200.8 ICP-MS | 0.003 | B | mg/L | 0.001 | 0.005 | 6/16/98 | fep |
| Copper, dissolved | M200.8 ICP-MS | 0.037 | | mg/L | 0.005 | 0.03 | 6/16/98 | fep |
| Copper, total recoverable | M200.8 ICP-MS | 0.474 | | mg/L | 0.005 | 0.03 | 6/15/98 | fep |
| Iron, dissolved | M200.7 ICP | 131 | | mg/L | 0.01 | 0.05 | 6/13/98 | gg |
| Iron, Ferric | Calculation (Dissolved Fe - Ferrous Fe) | | U | mg/L | 2 | 10 | 6/26/98 | calc |
| Iron, Ferrous | SM315B(c) Phenanthroline | 145 | | mg/L | 2 | 10 | 6/9/98 | sts |
| Iron, total recoverable | M200.7 ICP | 173 | | mg/L | 0.02 | 0.1 | 6/24/98 | kr |
| Lead, dissolved | M200.7 ICP | 0.26 | | mg/L | 0.04 | 0.2 | 6/13/98 | gg |
| Lead, total recoverable | M200.7 ICP | 4.60 | | mg/L | 0.08 | 0.4 | 6/24/98 | kr |
| Magnesium, dissolved | M200.7 ICP | 121 | | mg/L | 0.2 | 1 | 6/13/98 | gg |
| Manganese, dissolved | M200.7 ICP | 44.200 | | mg/L | 0.005 | 0.03 | 6/13/98 | gg |
| Manganese, total recoverable | M200.7 ICP | 42.80 | | mg/L | 0.01 | 0.05 | 6/24/98 | kr |
| Molybdenum, total recoverable | M200.8 ICP-MS | 0.002 | B | mg/L | 0.001 | 0.005 | 6/15/98 | fep |
| Nickel, dissolved | M200.7 ICP | 0.13 | | mg/L | 0.01 | 0.05 | 6/13/98 | gg |
| Nickel, total recoverable | M200.7 ICP | 0.13 | | mg/L | 0.02 | 0.1 | 6/24/98 | kr |
| Potassium, dissolved | M200.7 ICP | 3.0 | | mg/L | 0.3 | 1 | 6/13/98 | gg |
| Selenium, total recoverable | SM 3500-Se C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 6/25/98 | bg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0005 | 0.003 | 6/16/98 | fep |
| Silver, total recoverable | M200.8 ICP-MS | 0.0050 | | mg/L | 0.0005 | 0.003 | 6/15/98 | fep |
| Sodium, dissolved | M200.7 ICP | 13.8 | | mg/L | 0.3 | 1 | 6/13/98 | gg |
| Uranium, total recoverable | M200.8 ICP-MS | 0.0084 | | mg/L | 0.0005 | 0.003 | 6/15/98 | fep |
| Vanadium, total recoverable | M200.8 ICP-MS | 0.005 | | mg/L | 0.001 | 0.005 | 6/15/98 | fep |
| Zinc, dissolved | M200.7 ICP | 196 | | mg/L | 0.05 | 0.3 | 6/15/98 | gg |
| Zinc, total recoverable | M200.7 ICP | 197 | | mg/L | 0.05 | 0.3 | 6/25/98 | kr |

**Inorganic Qualifiers (based on EPA CLP 3/90)**

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RV Poulsen

Vice President of Operations: Ralph Poulsen

# ACZ

## Analytical Results

*ACZ Laboratories, Inc.*
*30400 Downhill Drive*
*Steamboat Springs, CO 80487*
*(800) 334-5493*

Lab Sample ID: ***L18846-01***
Client Sample ID: *0001#3 Mine*
Client Project ID: *French Gulch*
ACZ Report ID: *RG70532*

American Geological Services, Inc.
12477 W. Cedar Dr. #206
Lakewood, CO 80228
A. Morrissey

Date Sampled: *6/8/98 14:45*
Date Received: *6/9/98*
Date Reported: *6/26/98*

Sample Matrix: *Ground Water*

### Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M3005 ICP | | | | | | 6/24/98 | laa |
| Total Recoverable Digestion | M3005 ICP-MS | | | | | | 6/12/98 | laa |

### Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Alkalinity as CaCO3 | M2320B | | | | | | | |
| Bicarbonate as CaCO3 | | 45 | | mg/L | 2 | 10 | 6/20/98 | sts |
| Carbonate as CaCO3 | | | U | mg/L | 2 | 10 | 6/20/98 | sts |
| Hydroxide as CaCO3 | | | U | mg/L | 2 | 10 | 6/20/98 | sts |
| Total Alkalinity | | 45 | | mg/L | 2 | 10 | 6/20/98 | sts |
| Carbon, total organic (TOC) | M415.1 Oxidation/IR | 2 | B | mg/L | 1 | 5 | 6/15/98 | bg |
| Cation-Anion Balance | Calculation | | | | | | | |
| Cation-Anion Balance | | 3.4 | | % | | | 6/26/98 | calc |
| Sum of Anions | | 42.3 | | meq/L | 0.1 | 0.5 | 6/26/98 | calc |
| Sum of Cations | | 45.3 | | meq/L | 0.1 | 0.5 | 6/26/98 | calc |
| Chloride | M325.2 - Colorimetric (RFA) | 1 | B | mg/L | 1 | 5 | 6/22/98 | mh |
| Conductivity @25C | M120.1 - Meter | 2780 | | umhos/cm | 1 | 10 | 6/18/98 | sts |
| Hardness as CaCO3 | Calculation based on dissolved Ca & Mg | 1410 | | mg/L | 1 | 7 | 6/26/98 | calc |
| Nitrate as N | M300.0 - Ion Chromatography | 0.13 | | mg/L | 0.01 | 0.05 | 6/15/98 | fp |
| Nitrite as N | M300.0 - Ion Chromatography | | U | mg/L | 0.01 | 0.05 | 6/15/98 | fp |
| Nitrogen, ammonia | M350.1 - Automated Phenate | 0.60 | | mg/L | 0.05 | 0.3 | 6/19/98 | ss |
| pH (lab) | M150.1 - Electrometric | 5.1 | | units | 0.1 | 0.1 | 6/18/98 | sts |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 3200 | | mg/L | 10 | 20 | 6/11/98 | bk/cj |
| Residue, Non-Filterable (TSS) @103-5C | M160.2 - Gravimetric | 600 | | mg/L | 5 | 20 | 6/10/98 | ss/bk |
| Sulfate | M375.3 - Gravimetric | 1970 | | mg/L | 10 | 20 | 6/19/98 | cj |
| Sulfide as S | SM427C - Modified, Methylene Blue | 0.07 | B | mg/L | 0.02 | 0.1 | 6/15/98 | cj |
| Sulfite | M377.1 - Titrimetric | 2 | B | mg/L | 2 | 10 | 6/10/98 | bk |
| TDS (calculated) | Calculation | 2870 | | mg/L | 10 | 50 | 6/26/98 | calc |
| TDS (ratio - measured/calculated) | Calculation | 1.11 | | | | | 6/26/98 | calc |

**Note: Field measured Ferrous Iron = 330 mg/L.**

**Inorganic Qualifiers (based on EPA CLP 3/90)**

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RVP

Vice President of Operations: Ralph Poulsen

ACZ

# Analytical Results

*ACZ Laboratories, Inc.*
*30400 Downhill Drive*
*Steamboat Springs, CO 80487*
*(800) 334-5493*

Lab Sample ID: *L18846-02*
Client Sample ID: *0002*
Client Project ID: *French Gulch*
ACZ Report ID: *RG70533*

American Geological Services, Inc.
12477 W. Cedar Dr. #206
Lakewood, CO 80228
A. Morrissey

Date Sampled: *6/8/98 14:45*
Date Received: *6/9/98*
Date Reported: *6/26/98*

Sample Matrix: *Ground Water*

## Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Aluminum, dissolved | M200.7 ICP | 0.17 | B | mg/L | 0.03 | 0.2 | 6/13/98 | gg |
| Aluminum, total recoverable | M200.7 ICP | 15.00 | | mg/L | 0.06 | 0.3 | 6/24/98 | kr |
| Antimony, total recoverable | M200.8 ICP-MS | 0.004 | B | mg/L | 0.001 | 0.005 | 6/15/98 | fep |
| Arsenic, dissolved | M200.8 ICP-MS | 0.006 | B | mg/L | 0.005 | 0.03 | 6/16/98 | fep |
| Arsenic, total recoverable | M6020 ICPMS | 0.067 | | mg/L | 0.005 | 0.03 | 6/15/98 | fep |
| Cadmium, dissolved | M200.7 ICP | 0.062 | | mg/L | 0.003 | 0.02 | 6/13/98 | gg |
| Cadmium, total recoverable | M200.7 ICP | 0.153 | | mg/L | 0.006 | 0.03 | 6/24/98 | kr |
| Calcium, dissolved | M200.7 ICP | 369 | | mg/L | 0.2 | 1 | 6/13/98 | gg |
| Chromium, dissolved | M200.8 ICP-MS | | U | mg/L | 0.002 | 0.01 | 6/17/98 | fep |
| Chromium, total recoverable | M200.8 ICP-MS | 0.003 | B | mg/L | 0.001 | 0.005 | 6/16/98 | fep |
| Copper, dissolved | M200.8 ICP-MS | 0.038 | | mg/L | 0.005 | 0.03 | 6/16/98 | fep |
| Copper, total recoverable | M200.8 ICP-MS | 0.499 | | mg/L | 0.005 | 0.03 | 6/15/98 | fep |
| Iron, dissolved | M200.7 ICP | 132 | | mg/L | 0.01 | 0.05 | 6/13/98 | gg |
| Iron, total recoverable | M200.7 ICP | 170 | | mg/L | 0.02 | 0.1 | 6/24/98 | kr |
| Lead, dissolved | M200.7 ICP | 0.24 | | mg/L | 0.04 | 0.2 | 6/13/98 | gg |
| Lead, total recoverable | M200.7 ICP | 4.70 | | mg/L | 0.08 | 0.4 | 6/24/98 | kr |
| Magnesium, dissolved | M200.7 ICP | 120 | | mg/L | 0.2 | 1 | 6/13/98 | gg |
| Manganese, dissolved | M200.7 ICP | 44.200 | | mg/L | 0.005 | 0.03 | 6/13/98 | gg |
| Manganese, total recoverable | M200.7 ICP | 43.00 | | mg/L | 0.01 | 0.05 | 6/24/98 | kr |
| Molybdenum, total recoverable | M200.8 ICP-MS | 0.002 | B | mg/L | 0.001 | 0.005 | 6/15/98 | fep |
| Nickel, dissolved | M200.7 ICP | 0.12 | | mg/L | 0.01 | 0.05 | 6/13/98 | gg |
| Nickel, total recoverable | M200.7 ICP | 0.13 | | mg/L | 0.02 | 0.1 | 6/24/98 | kr |
| Potassium, dissolved | M200.7 ICP | 3.0 | | mg/L | 0.3 | 1 | 6/13/98 | gg |
| Selenium, total recoverable | SM 3500-Se C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 6/25/98 | bg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0005 | 0.003 | 6/16/98 | fep |
| Silver, total recoverable | M200.8 ICP-MS | 0.0049 | | mg/L | 0.0005 | 0.003 | 6/15/98 | fep |
| Sodium, dissolved | M200.7 ICP | 13.6 | | mg/L | 0.3 | 1 | 6/13/98 | gg |
| Uranium, total recoverable | M200.8 ICP-MS | 0.0086 | | mg/L | 0.0005 | 0.003 | 6/15/98 | fep |
| Vanadium, total recoverable | M200.8 ICP-MS | 0.006 | | mg/L | 0.001 | 0.005 | 6/15/98 | fep |
| Zinc, dissolved | M200.7 ICP | 195 | | mg/L | 0.05 | 0.3 | 6/15/98 | gg |
| Zinc, total recoverable | M200.7 ICP | 194 | | mg/L | 0.05 | 0.3 | 6/25/98 | kr |

## Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M3005 ICP | | | | | | 6/24/98 | laa |
| Total Recoverable Digestion | M3005 ICP-MS | | | | | | 6/12/98 | laa |

**Inorganic Qualifiers (based on EPA CLP 3/90)**

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RVPoulsen

Vice President of Operations: Ralph Poulsen

**ACZ** **Analytical Results**

*ACZ Laboratories, Inc.*
*30400 Downhill Drive*
*Steamboat Springs, CO 80487*
*(800) 334-5493*

Lab Sample ID: *L18846-02*
Client Sample ID: *0002*
Client Project ID: *French Gulch*
ACZ Report ID: *RG70533*

American Geological Services, Inc.
12477 W. Cedar Dr. #206
Lakewood, CO 80228
A. Morrissey

Date Sampled: *6/8/98 14:45*
Date Received: *6/9/98*
Date Reported: *6/26/98*

Sample Matrix: *Ground Water*

## Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Alkalinity as CaCO3 | M2320B | | | | | | | |
| Bicarbonate as CaCO3 | | 78 | | mg/L | 2 | 10 | 6/20/98 | sts |
| Carbonate as CaCO3 | | | U | mg/L | 2 | 10 | 6/20/98 | sts |
| Hydroxide as CaCO3 | | | U | mg/L | 2 | 10 | 6/20/98 | sts |
| Total Alkalinity | | 78 | | mg/L | 2 | 10 | 6/20/98 | sts |
| Carbon, total organic (TOC) | M415.1 Oxidation/IR | 2 | B | mg/L | 1 | 5 | 6/15/98 | bg |
| Cation-Anion Balance | Calculation | | | | | | | |
| Cation-Anion Balance | | 3.4 | | % | | | 6/26/98 | calc |
| Sum of Anions | | 42.3 | | meq/L | 0.1 | 0.5 | 6/26/98 | calc |
| Sum of Cations | | 45.3 | | meq/L | 0.1 | 0.5 | 6/26/98 | calc |
| Chloride | M325.2 - Colorimetric (RFA) | 1 | B | mg/L | 1 | 5 | 6/22/98 | mh |
| Conductivity @25C | M120.1 - Meter | 2760 | | umhos/cm | 1 | 10 | 6/18/98 | sts |
| Hardness as CaCO3 | Calculation based on dissolved Ca & Mg | 1420 | | mg/L | 1 | 7 | 6/26/98 | calc |
| Nitrate as N | M300.0 - Ion Chromatography | 0.06 | | mg/L | 0.01 | 0.05 | 6/15/98 | fp |
| Nitrite as N | M300.0 - Ion Chromatography | | U | mg/L | 0.01 | 0.05 | 6/15/98 | fp |
| Nitrogen, ammonia | M350.1 - Automated Phenate | 0.80 | | mg/L | 0.05 | 0.3 | 6/19/98 | ss |
| pH (lab) | M150.1 - Electrometric | 5.0 | | units | 0.1 | 0.1 | 6/18/98 | sts |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 3190 | | mg/L | 10 | 20 | 6/11/98 | bk/cj |
| Residue, Non-Filterable (TSS) @103-5C | M160.2 - Gravimetric | 400 | | mg/L | 5 | 20 | 6/10/98 | ss/bk |
| Sulfate | M375.3 - Gravimetric | 1940 | | mg/L | 10 | 20 | 6/19/98 | cj |
| Sulfide as S | SM427C - Modified, Methylene Blue | 0.09 | B | mg/L | 0.02 | 0.1 | 6/15/98 | cj |
| Sulfite | M377.1 - Titrimetric | | U | mg/L | 2 | 10 | 6/10/98 | bk |
| TDS (calculated) | Calculation | 2870 | | mg/L | 10 | 50 | 6/26/98 | calc |
| TDS (ratio - measured/calculated) | Calculation | 1.11 | | | | | 6/26/98 | calc |

**Inorganic Qualifiers (based on EPA CLP 3/90)**

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RVP

Vice President of Operations: Ralph Poulsen

ACZ

# Analytical Results

*ACZ Laboratories, Inc.*
*30400 Downhill Drive*
*Steamboat Springs, CO 80487*
*(800) 334-5493*

Lab Sample ID: *L18846-03*
Client Sample ID: *0003 ORO SHAFT*
Client Project ID: *French Gulch*
ACZ Report ID: *RG70534*

American Geological Services, Inc.
12477 W. Cedar Dr. #206
Lakewood, CO 80228
A. Morrissey

Date Sampled: *6/8/98 14:45*
Date Received: *6/9/98*
Date Reported: *6/26/98*

Sample Matrix: *Ground Water*

## Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Aluminum, dissolved | M200.7 ICP | 0.10 | B | mg/L | 0.03 | 0.2 | 6/12/98 | gg |
| Aluminum, total recoverable | M200.7 ICP | 0.10 | B | mg/L | 0.06 | 0.3 | 6/24/98 | kr |
| Antimony, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.001 | 0.005 | 6/15/98 | fep |
| Arsenic, dissolved | M200.8 ICP-MS | 0.012 | B | mg/L | 0.005 | 0.03 | 6/16/98 | fep |
| Arsenic, total recoverable | M6020 ICPMS | 0.014 | B | mg/L | 0.005 | 0.03 | 6/15/98 | fep |
| Cadmium, dissolved | M200.7 ICP | 0.009 | B | mg/L | 0.003 | 0.02 | 6/12/98 | gg |
| Cadmium, total recoverable | M200.7 ICP | 0.016 | B | mg/L | 0.006 | 0.03 | 6/24/98 | kr |
| Calcium, dissolved | M200.7 ICP | 435 | | mg/L | 0.2 | 1 | 6/12/98 | gg |
| Chromium, dissolved | M200.8 ICP-MS | | U | mg/L | 0.002 | 0.01 | 6/17/98 | fep |
| Chromium, total recoverable | M200.8 ICP-MS | 0.007 | | mg/L | 0.001 | 0.005 | 6/16/98 | fep |
| Copper, dissolved | M200.8 ICP-MS | 0.035 | | mg/L | 0.005 | 0.03 | 6/16/98 | fep |
| Copper, total recoverable | M200.8 ICP-MS | 0.040 | | mg/L | 0.005 | 0.03 | 6/15/98 | fep |
| Iron, dissolved | M200.7 ICP | 142 | | mg/L | 0.01 | 0.05 | 6/12/98 | gg |
| Iron, Ferric | Calculation (Dissolved Fe - Ferrous Fe) | | U | mg/L | 2 | 10 | 6/26/98 | calc |
| Iron, Ferrous | SM315B(c) Phenanthroline | 142 | | mg/L | 2 | 10 | 6/9/98 | sts |
| Iron, total recoverable | M200.7 ICP | 143 | | mg/L | 0.02 | 0.1 | 6/24/98 | kr |
| Lead, dissolved | M200.7 ICP | | U | mg/L | 0.04 | 0.2 | 6/12/98 | gg |
| Lead, total recoverable | M200.7 ICP | | U | mg/L | 0.08 | 0.4 | 6/24/98 | kr |
| Magnesium, dissolved | M200.7 ICP | 134 | | mg/L | 1 | 5 | 6/18/98 | gg |
| Manganese, dissolved | M200.7 ICP | 43.30 | | mg/L | 0.03 | 0.1 | 6/18/98 | gg |
| Manganese, total recoverable | M200.7 ICP | 40.80 | | mg/L | 0.01 | 0.05 | 6/24/98 | kr |
| Molybdenum, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.001 | 0.005 | 6/15/98 | fep |
| Nickel, dissolved | M200.7 ICP | 0.15 | | mg/L | 0.01 | 0.05 | 6/12/98 | gg |
| Nickel, total recoverable | M200.7 ICP | 0.15 | | mg/L | 0.02 | 0.1 | 6/24/98 | kr |
| Potassium, dissolved | M200.7 ICP | 3.4 | | mg/L | 0.3 | 1 | 6/12/98 | gg |
| Selenium, total recoverable | SM 3500-Se C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 6/25/98 | bg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0005 | 0.003 | 6/16/98 | fep |
| Silver, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.0005 | 0.003 | 6/15/98 | fep |
| Sodium, dissolved | M200.7 ICP | 14.9 | | mg/L | 0.3 | 1 | 6/12/98 | gg |
| Uranium, total recoverable | M200.8 ICP-MS | 0.0016 | B | mg/L | 0.0005 | 0.003 | 6/15/98 | fep |
| Vanadium, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.001 | 0.005 | 6/15/98 | fep |
| Zinc, dissolved | M200.7 ICP | 148 | | mg/L | 0.05 | 0.3 | 6/18/98 | gg |
| Zinc, total recoverable | M200.7 ICP | 137 | | mg/L | 0.05 | 0.3 | 6/25/98 | kr |

**Inorganic Qualifiers (based on EPA CLP 3/90)**

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

R V Poulsen

Vice President of Operations: Ralph Poulsen

# ACZ

## Analytical Results

*ACZ Laboratories, Inc.*
*30400 Downhill Drive*
*Steamboat Springs, CO 80487*
*(800) 334-5493*

Lab Sample ID: *L18846-03*
Client Sample ID: *0003 ORO SHAFT*
Client Project ID: *French Gulch*
ACZ Report ID: *RG70534*

American Geological Services, Inc.
12477 W. Cedar Dr. #206
Lakewood, CO 80228
A. Morrissey

Date Sampled: *6/8/98 14:45*
Date Received: *6/9/98*
Date Reported: *6/26/98*

Sample Matrix: *Ground Water*

### Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M3005 ICP | | | | | | 6/24/98 | laa |
| Total Recoverable Digestion | M3005 ICP-MS | | | | | | 6/12/98 | laa |

### Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Alkalinity as CaCO3 | M2320B | | | | | | | |
| Bicarbonate as CaCO3 | | 78 | | mg/L | 2 | 10 | 6/18/98 | sts |
| Carbonate as CaCO3 | | | U | mg/L | 2 | 10 | 6/18/98 | sts |
| Hydroxide as CaCO3 | | | U | mg/L | 2 | 10 | 6/18/98 | sts |
| Total Alkalinity | | 78 | | mg/L | 2 | 10 | 6/18/98 | sts |
| Carbon, total organic (TOC) | M415.1 Oxidation/IR | 2 | B | mg/L | 1 | 5 | 6/15/98 | bg |
| Cation-Anion Balance | Calculation | | | | | | | |
| Cation-Anion Balance | | 3.5 | | % | | | 6/26/98 | calc |
| Sum of Anions | | 45.5 | | meq/L | 0.1 | 0.5 | 6/26/98 | calc |
| Sum of Cations | | 48.8 | | meq/L | 0.1 | 0.5 | 6/26/98 | calc |
| Chloride | M325.2 - Colorimetric (RFA) | 1 | B | mg/L | 1 | 5 | 6/22/98 | mh |
| Conductivity @25C | M120.1 - Meter | 2930 | | umhos/cm | 1 | 10 | 6/18/98 | sts |
| Hardness as CaCO3 | Calculation based on dissolved Ca & Mg | 1640 | | mg/L | 1 | 7 | 6/26/98 | calc |
| Nitrate as N | M300.0 - Ion Chromatography | 0.07 | | mg/L | 0.01 | 0.05 | 6/15/98 | fp |
| Nitrite as N | M300.0 - Ion Chromatography | | U | mg/L | 0.01 | 0.05 | 6/15/98 | fp |
| Nitrogen, ammonia | M350.1 - Automated Phenate | 0.54 | | mg/L | 0.05 | 0.3 | 6/19/98 | ss |
| pH (lab) | M150.1 - Electrometric | 5.8 | | units | 0.1 | 0.1 | 6/18/98 | sts |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 3440 | | mg/L | 10 | 20 | 6/11/98 | bk/cj |
| Residue, Non-Filterable (TSS) @103-5C | M160.2 - Gravimetric | 32 | | mg/L | 5 | 20 | 6/10/98 | ss/bk |
| Sulfate | M375.3 - Gravimetric | 2090 | | mg/L | 10 | 20 | 6/19/98 | cj |
| Sulfide as S | SM427C - Modified, Methylene Blue | | U | mg/L | 0.02 | 0.1 | 6/15/98 | cj |
| Sulfite | M377.1 - Titrimetric | | U | mg/L | 2 | 10 | 6/10/98 | bk |
| TDS (calculated) | Calculation | 3060 | | mg/L | 10 | 50 | 6/26/98 | calc |
| TDS (ratio - measured/calculated) | Calculation | 1.12 | | | | | 6/26/98 | calc |

**Note: Field measured Ferrous Iron = 180 mg/L.**

**Inorganic Qualifiers (based on EPA CLP 3/90)**

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RP

Vice President of Operations: Ralph Poulsen

# ACZ

## Analytical Results

*ACZ Laboratories, Inc.*
*30400 Downhill Drive*
*Steamboat Springs, CO 80487*
*(800) 334-5493*

Lab Sample ID: *L18846-04*
Client Sample ID: *0004 ORO SHAFT*
Client Project ID: *French Gulch*
ACZ Report ID: *RG70535*

American Geological Services, Inc.
12477 W. Cedar Dr. #206
Lakewood, CO 80228
A. Morrissey

Date Sampled: *6/8/98 14:45*
Date Received: *6/9/98*
Date Reported: *6/26/98*

Sample Matrix: *Ground Water*

### Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Aluminum, dissolved | M200.7 ICP | 0.71 | | mg/L | 0.03 | 0.2 | 6/12/98 | gg |
| Aluminum, total recoverable | M200.7 ICP | 0.83 | | mg/L | 0.06 | 0.3 | 6/24/98 | kr |
| Antimony, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.001 | 0.005 | 6/15/98 | fep |
| Arsenic, dissolved | M200.8 ICP-MS | 0.009 | B | mg/L | 0.005 | 0.03 | 6/16/98 | fep |
| Arsenic, total recoverable | M6020 ICPMS | 0.011 | B | mg/L | 0.005 | 0.03 | 6/15/98 | fep |
| Cadmium, dissolved | M200.7 ICP | 0.234 | | mg/L | 0.003 | 0.02 | 6/12/98 | gg |
| Cadmium, total recoverable | M200.7 ICP | 0.205 | | mg/L | 0.006 | 0.03 | 6/24/98 | kr |
| Calcium, dissolved | M200.7 ICP | 299 | | mg/L | 0.2 | 1 | 6/12/98 | gg |
| Chromium, dissolved | M200.8 ICP-MS | | U | mg/L | 0.002 | 0.01 | 6/17/98 | fep |
| Chromium, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.001 | 0.005 | 6/16/98 | fep |
| Copper, dissolved | M200.8 ICP-MS | 0.084 | | mg/L | 0.005 | 0.03 | 6/16/98 | fep |
| Copper, total recoverable | M200.8 ICP-MS | 0.088 | | mg/L | 0.005 | 0.03 | 6/15/98 | fep |
| Iron, dissolved | M200.7 ICP | 123 | | mg/L | 0.01 | 0.05 | 6/12/98 | gg |
| Iron, Ferric | Calculation (Dissolved Fe - Ferrous Fe) | 7 | B | mg/L | 2 | 10 | 6/26/98 | calc |
| Iron, Ferrous | SM315B(c) Phenanthroline | 116 | | mg/L | 2 | 10 | 6/9/98 | sts |
| Iron, total recoverable | M200.7 ICP | 121 | | mg/L | 0.02 | 0.1 | 6/24/98 | kr |
| Lead, dissolved | M200.7 ICP | 0.20 | | mg/L | 0.04 | 0.2 | 6/12/98 | gg |
| Lead, total recoverable | M200.7 ICP | 0.24 | B | mg/L | 0.08 | 0.4 | 6/24/98 | kr |
| Magnesium, dissolved | M200.7 ICP | 99 | | mg/L | 1 | 5 | 6/18/98 | gg |
| Manganese, dissolved | M200.7 ICP | 37.50 | | mg/L | 0.03 | 0.1 | 6/18/98 | gg |
| Manganese, total recoverable | M200.7 ICP | 36.40 | | mg/L | 0.01 | 0.05 | 6/24/98 | kr |
| Molybdenum, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.001 | 0.005 | 6/15/98 | fep |
| Nickel, dissolved | M200.7 ICP | 0.11 | | mg/L | 0.01 | 0.05 | 6/12/98 | gg |
| Nickel, total recoverable | M200.7 ICP | 0.12 | | mg/L | 0.02 | 0.1 | 6/24/98 | kr |
| Potassium, dissolved | M200.7 ICP | 2.8 | | mg/L | 0.3 | 1 | 6/12/98 | gg |
| Selenium, total recoverable | SM 3500-Se C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 6/25/98 | bg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0005 | 0.003 | 6/16/98 | fep |
| Silver, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.0005 | 0.003 | 6/15/98 | fep |
| Sodium, dissolved | M200.7 ICP | 11.1 | | mg/L | 0.3 | 1 | 6/12/98 | gg |
| Uranium, total recoverable | M200.8 ICP-MS | 0.0013 | B | mg/L | 0.0005 | 0.003 | 6/15/98 | fep |
| Vanadium, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.001 | 0.005 | 6/15/98 | fep |
| Zinc, dissolved | M200.7 ICP | 172 | | mg/L | 0.05 | 0.3 | 6/18/98 | gg |
| Zinc, total recoverable | M200.7 ICP | 160 | | mg/L | 0.05 | 0.3 | 6/25/98 | kr |

**Inorganic Qualifiers (based on EPA CLP 3/90)**

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RV Poulsen

Vice President of Operations: Ralph Poulsen

**ACZ**

# Analytical Results

*ACZ Laboratories, Inc.*
*30400 Downhill Drive*
*Steamboat Springs, CO 80487*
*(800) 334-5493*

Lab Sample ID: *L18846-04*
Client Sample ID: *0004 ORO SHAFT*
Client Project ID: *French Gulch*
ACZ Report ID: *RG70535*

American Geological Services, Inc.
12477 W. Cedar Dr. #206
Lakewood, CO 80228
A. Morrissey

Date Sampled: *6/8/98 14:45*
Date Received: *6/9/98*
Date Reported: *6/26/98*

Sample Matrix: *Ground Water*

## Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M3005 ICP | | | | | | 6/24/98 | laa |
| Total Recoverable Digestion | M3005 ICP-MS | | | | | | 6/12/98 | laa |

## Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Alkalinity as CaCO3 | M2320B | | | | | | | |
| Bicarbonate as CaCO3 | | 16 | | mg/L | 2 | 10 | 6/20/98 | sts |
| Carbonate as CaCO3 | | | U | mg/L | 2 | 10 | 6/20/98 | sts |
| Hydroxide as CaCO3 | | | U | mg/L | 2 | 10 | 6/20/98 | sts |
| Total Alkalinity | | 16 | | mg/L | 2 | 10 | 6/20/98 | sts |
| Carbon, total organic (TOC) | M415.1 Oxidation/IR | 2 | B | mg/L | 1 | 5 | 6/15/98 | bg |
| Cation-Anion Balance | Calculation | | | | | | | |
| Cation-Anion Balance | | 4.5 | | % | | | 6/26/98 | calc |
| Sum of Anions | | 35.0 | | meq/L | 0.1 | 0.5 | 6/26/98 | calc |
| Sum of Cations | | 38.3 | | meq/L | 0.1 | 0.5 | 6/26/98 | calc |
| Chloride | M325.2 - Colorimetric (RFA) | 2 | B | mg/L | 1 | 5 | 6/22/98 | mh |
| Conductivity @25C | M120.1 - Meter | 2420 | | umhos/cm | 1 | 10 | 6/18/98 | sts |
| Hardness as CaCO3 | Calculation based on dissolved Ca & Mg | 1150 | | mg/L | 1 | 7 | 6/26/98 | calc |
| Nitrate as N | M300.0 - Ion Chromatography | 0.16 | | mg/L | 0.01 | 0.05 | 6/15/98 | fp |
| Nitrite as N | M300.0 - Ion Chromatography | | U | mg/L | 0.01 | 0.05 | 6/15/98 | fp |
| Nitrogen, ammonia | M350.1 - Automated Phenate | 0.44 | | mg/L | 0.05 | 0.3 | 6/19/98 | ss |
| pH (lab) | M150.1 - Electrometric | 5.3 | | units | 0.1 | 0.1 | 6/18/98 | sts |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 2710 | | mg/L | 10 | 20 | 6/11/98 | bk/cj |
| Residue, Non-Filterable (TSS) @103-5C | M160.2 - Gravimetric | 50 | | mg/L | 5 | 20 | 6/10/98 | ss/bk |
| Sulfate | M375.3 - Gravimetric | 1650 | | mg/L | 10 | 20 | 6/19/98 | cj |
| Sulfide as S | SM427C - Modified, Methylene Blue | | U | mg/L | 0.02 | 0.1 | 6/15/98 | cj |
| Sulfite | M377.1 - Titrimetric | | U | mg/L | 2 | 10 | 6/10/98 | bk |
| TDS (calculated) | Calculation | 2410 | | mg/L | 10 | 50 | 6/26/98 | calc |
| TDS (ratio - measured/calculated) | Calculation | 1.13 | | | | | 6/26/98 | calc |

**Note: Field measured Ferrous Iron = 130 mg/L.**

**Inorganic Qualifiers (based on EPA CLP 3/90)**

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RVP

Vice President of Operations: Ralph Poulsen

# ACZ

## Analytical Results

*ACZ Laboratories, Inc.*
*30400 Downhill Drive*
*Steamboat Springs, CO 80487*
*(800) 334-5493*

Lab Sample ID: *L18846-05*
Client Sample ID: *0005 ORO SHAFT*
Client Project ID: *French Gulch*
ACZ Report ID: *RG70536*

American Geological Services, Inc.
12477 W. Cedar Dr. #206
Lakewood, CO 80228
A. Morrissey

Date Sampled: *6/8/98 14:45*
Date Received: *6/9/98*
Date Reported: *6/26/98*

Sample Matrix: *Ground Water*

### Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Aluminum, dissolved | M200.7 ICP | 0.83 | | mg/L | 0.03 | 0.2 | 6/12/98 | gg |
| Aluminum, total recoverable | M200.7 ICP | 0.97 | | mg/L | 0.06 | 0.3 | 6/24/98 | kr |
| Antimony, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.001 | 0.005 | 6/16/98 | fep |
| Arsenic, dissolved | M200.8 ICP-MS | 0.008 | B | mg/L | 0.005 | 0.03 | 6/16/98 | fep |
| Arsenic, total recoverable | M6020 ICPMS | 0.010 | B | mg/L | 0.005 | 0.03 | 6/16/98 | fep |
| Cadmium, dissolved | M200.7 ICP | 0.268 | | mg/L | 0.003 | 0.02 | 6/12/98 | gg |
| Cadmium, total recoverable | M200.7 ICP | 0.249 | | mg/L | 0.006 | 0.03 | 6/24/98 | kr |
| Calcium, dissolved | M200.7 ICP | 291 | | mg/L | 0.2 | 1 | 6/12/98 | gg |
| Chromium, dissolved | M200.8 ICP-MS | | U | mg/L | 0.002 | 0.01 | 6/17/98 | fep |
| Chromium, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.001 | 0.005 | 6/16/98 | fep |
| Copper, dissolved | M200.8 ICP-MS | 0.091 | | mg/L | 0.005 | 0.03 | 6/16/98 | fep |
| Copper, total recoverable | M200.8 ICP-MS | 0.112 | | mg/L | 0.005 | 0.03 | 6/16/98 | fep |
| Iron, dissolved | M200.7 ICP | 122 | | mg/L | 0.01 | 0.05 | 6/12/98 | gg |
| Iron, Ferric | Calculation (Dissolved Fe - Ferrous Fe) | 21 | | mg/L | 2 | 10 | 6/26/98 | calc |
| Iron, Ferrous | SM315B(c) Phenanthroline | 101 | | mg/L | 2 | 10 | 6/9/98 | sts |
| Iron, total recoverable | M200.7 ICP | 114 | | mg/L | 0.02 | 0.1 | 6/24/98 | kr |
| Lead, dissolved | M200.7 ICP | 0.26 | | mg/L | 0.04 | 0.2 | 6/12/98 | gg |
| Lead, total recoverable | M200.7 ICP | 0.30 | B | mg/L | 0.08 | 0.4 | 6/24/98 | kr |
| Magnesium, dissolved | M200.7 ICP | 94 | | mg/L | 1 | 5 | 6/18/98 | gg |
| Manganese, dissolved | M200.7 ICP | 36.50 | | mg/L | 0.03 | 0.1 | 6/18/98 | gg |
| Manganese, total recoverable | M200.7 ICP | 34.50 | | mg/L | 0.01 | 0.05 | 6/24/98 | kr |
| Molybdenum, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.001 | 0.005 | 6/16/98 | fep |
| Nickel, dissolved | M200.7 ICP | 0.11 | | mg/L | 0.01 | 0.05 | 6/12/98 | gg |
| Nickel, total recoverable | M200.7 ICP | 0.11 | | mg/L | 0.02 | 0.1 | 6/24/98 | kr |
| Potassium, dissolved | M200.7 ICP | 3.0 | | mg/L | 0.3 | 1 | 6/12/98 | gg |
| Selenium, total recoverable | SM 3500-Se C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 6/25/98 | bg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0005 | 0.003 | 6/16/98 | fep |
| Silver, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.0005 | 0.003 | 6/16/98 | fep |
| Sodium, dissolved | M200.7 ICP | 11.8 | | mg/L | 0.3 | 1 | 6/12/98 | gg |
| Uranium, total recoverable | M200.8 ICP-MS | 0.0014 | B | mg/L | 0.0005 | 0.003 | 6/16/98 | fep |
| Vanadium, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.001 | 0.005 | 6/16/98 | fep |
| Zinc, dissolved | M200.7 ICP | 172 | | mg/L | 0.05 | 0.3 | 6/18/98 | gg |
| Zinc, total recoverable | M200.7 ICP | 159 | | mg/L | 0.05 | 0.3 | 6/25/98 | kr |

**Inorganic Qualifiers (based on EPA CLP 3/90)**

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RVPoulsen

Vice President of Operations: Ralph Poulsen

ACZ

# Analytical Results

*ACZ Laboratories, Inc.*
*30400 Downhill Drive*
*Steamboat Springs, CO 80487*
*(800) 334-5493*

Lab Sample ID: ***L18846-05***
Client Sample ID: *0005 ORO SHAFT*
Client Project ID: *French Gulch*
ACZ Report ID: *RG70536*

American Geological Services, Inc.
12477 W. Cedar Dr. #206
Lakewood, CO 80228
A. Morrissey

Date Sampled: *6/8/98 14:45*
Date Received: *6/9/98*
Date Reported: *6/26/98*

Sample Matrix: *Ground Water*

## Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M3005 ICP | | | | | | 6/24/98 | laa |
| Total Recoverable Digestion | M3005 ICP-MS | | | | | | 6/12/98 | laa |

## Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Alkalinity as CaCO3 | M2320B | | | | | | | |
| Bicarbonate as CaCO3 | | 74 | | mg/L | 2 | 10 | 6/20/98 | sts |
| Carbonate as CaCO3 | | | U | mg/L | 2 | 10 | 6/20/98 | sts |
| Hydroxide as CaCO3 | | | U | mg/L | 2 | 10 | 6/20/98 | sts |
| Total Alkalinity | | 74 | | mg/L | 2 | 10 | 6/20/98 | sts |
| Carbon, total organic (TOC) | M415.1 Oxidation/IR | 2 | B | mg/L | 1 | 5 | 6/15/98 | bg |
| Cation-Anion Balance | Calculation | | | | | | | |
| Cation-Anion Balance | | 0.8 | | % | | | 6/26/98 | calc |
| Sum of Anions | | 36.8 | | meq/L | 0.1 | 0.5 | 6/26/98 | calc |
| Sum of Cations | | 37.4 | | meq/L | 0.1 | 0.5 | 6/26/98 | calc |
| Chloride | M325.2 - Colorimetric (RFA) | 2 | B | mg/L | 1 | 5 | 6/22/98 | mh |
| Conductivity @25C | M120.1 - Meter | 2310 | | umhos/cm | 1 | 10 | 6/18/98 | sts |
| Hardness as CaCO3 | Calculation based on dissolved Ca & Mg | 1110 | | mg/L | 1 | 7 | 6/26/98 | calc |
| Nitrate as N | M300.0 - Ion Chromatography | 0.09 | | mg/L | 0.01 | 0.05 | 6/15/98 | fp |
| Nitrite as N | M300.0 - Ion Chromatography | | U | mg/L | 0.01 | 0.05 | 6/15/98 | fp |
| Nitrogen, ammonia | M350.1 - Automated Phenate | 0.47 | | mg/L | 0.05 | 0.3 | 6/19/98 | ss |
| pH (lab) | M150.1 - Electrometric | 5.0 | | units | 0.1 | 0.1 | 6/18/98 | sts |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 2760 | | mg/L | 10 | 20 | 6/11/98 | bk/cj |
| Residue, Non-Filterable (TSS) @103-5C | M160.2 - Gravimetric | 46 | | mg/L | 5 | 20 | 6/10/98 | ss/bk |
| Sulfate | M375.3 - Gravimetric | 1680 | | mg/L | 10 | 20 | 6/19/98 | cj |
| Sulfide as S | SM427C - Modified, Methylene Blue | | U | mg/L | 0.02 | 0.1 | 6/15/98 | cj |
| Sulfite | M377.1 - Titrimetric | | U | mg/L | 2 | 10 | 6/10/98 | bk |
| TDS (calculated) | Calculation | 2460 | | mg/L | 10 | 50 | 6/26/98 | calc |
| TDS (ratio - measured/calculated) | Calculation | 1.12 | | | | | 6/26/98 | calc |

**Note: Field measured Ferrous Iron = 140 mg/L.**

| Inorganic Qualifiers (based on EPA CLP 3/90) |
|---|
| U = Analyte was analyzed for but not detected at the indicated MDL |
| B = Analyte concentration detected at a value between MDL and PQL |
| PQL = Practical Quantitation Limit |

RVP

Vice President of Operations: Ralph Poulsen

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report ID:** QC1759-E

**ACZ Project ID:** L18846

**REPORT TO:**

**A. Morrissey**
**American Geological Services, Inc.**
**12477 W. Cedar Dr. #206**
**Lakewood, CO 80228**
**Monday, July 06, 1998**

Bradley W. Craig, Quality Assurance Officer — Date: 7-6-98

Scott Gustin, Project Manager — Date: 7-8-98

REPQC001.07.97.03

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

| | |
|---|---|
| ACZ Project # | L18846 |
| QC Report ID | QC1759-E |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

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# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

## Sample Identification

| | |
|---|---|
| ACZ Project # | L18846 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

| ACZ Lab ID | Client Sample ID | Sample Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| L18846-01 | 0001#3 Mine | Ground Water | 6/8/98 2:45:00 PM | 6/9/98 |
| L18846-02 | 0002 | Ground Water | 6/8/98 2:45:00 PM | 6/9/98 |
| L18846-03 | 0003 ORO SHAFT | Ground Water | 6/8/98 2:45:00 PM | 6/9/98 |
| L18846-04 | 0004 ORO SHAFT | Ground Water | 6/8/98 2:45:00 PM | 6/9/98 |
| L18846-05 | 0005 ORO SHAFT | Ground Water | 6/8/98 2:45:00 PM | 6/9/98 |

Comments:



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# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

## Project Summary

ACZ Project # L18846
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/9/98
Date Reported 7/6/98

**ACZ Lab ID: L18846-**

| Product Description | Method | 01 | 02 | 03 | 04 | 05 |
|---|---|---|---|---|---|---|
| Alkalinity as CaCO3 | M2320B | X | X | X | X | X |
| Aluminum, dissolved | M200.7 ICP | X | X | X | X | X |
| Aluminum, total recoverable | M200.7 ICP | X | X | X | X | X |
| Antimony, total recoverable | M200.8 ICP-MS | X | X | X | X | X |
| Arsenic, dissolved | M200.8 ICP-MS | X | X | X | X | X |
| Arsenic, total recoverable | M6020 ICPMS | X | X | X | X | X |
| Cadmium, dissolved | M200.7 ICP | X | X | X | X | X |
| Cadmium, total recoverable | M200.7 ICP | X | X | X | X | X |
| Calcium, dissolved | M200.7 ICP | X | X | X | X | X |
| Carbon, total organic (TOC) | M415.1 Oxidation/IR | X | X | X | X | X |
| Chloride | M325.2 - Colorimetric (RFA) | X | X | X | X | X |
| Chromium, dissolved | M200.8 ICP-MS | X | X | X | X | X |
| Chromium, total recoverable | M200.8 ICP-MS | X | X | X | X | X |
| Conductivity @25C | M120.1 - Meter | X | X | X | X | X |
| Copper, dissolved | M200.8 ICP-MS | X | X | X | X | X |
| Copper, total recoverable | M200.8 ICP-MS | X | X | X | X | X |
| Iron, dissolved | M200.7 ICP | X | X | X | X | X |
| Iron, Ferrous | SM315B(c) Phenanthroline | X | | X | X | X |
| Iron, total recoverable | M200.7 ICP | X | X | X | X | X |
| Lead, dissolved | M200.7 ICP | X | X | X | X | X |
| Lead, total recoverable | M200.7 ICP | X | X | X | X | X |
| Magnesium, dissolved | M200.7 ICP | X | X | X | X | X |
| Manganese, dissolved | M200.7 ICP | X | X | X | X | X |
| Manganese, total recoverable | M200.7 ICP | X | X | X | X | X |
| Molybdenum, total recoverable | M200.8 ICP-MS | X | X | X | X | X |
| Nickel, dissolved | M200.7 ICP | X | X | X | X | X |
| Nickel, total recoverable | M200.7 ICP | X | X | X | X | X |
| Nitrate as N | M300.0 - Ion Chromatography | X | X | X | X | X |
| Nitrite as N | M300.0 - Ion Chromatography | X | X | X | X | X |
| Nitrogen, ammonia | M350.1 - Automated Phenate | X | X | X | X | X |
| pH (lab) | M150.1 - Electrometric | X | X | X | X | X |
| Potassium, dissolved | M200.7 ICP | X | X | X | X | X |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | X | X | X | X | X |
| Residue, Non-Filterable (TSS) @103-5C | M160.2 - Gravimetric | X | X | X | X | X |
| Selenium, total recoverable | SM 3500-Se C, AA-Hydride | X | X | X | X | X |
| Silver, dissolved | M200.8 ICP-MS | X | X | X | X | X |
| Silver, total recoverable | M200.8 ICP-MS | X | X | X | X | X |

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# Inorganic QC Summary

*30400 Downhill Drive*
*Steamboat Springs, CO 80487*
*(800) 334-5493*
*Fax: (970) 879-2216*

## *Project Summary*

| | |
|---|---|
| ACZ Project # | L18846 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

**ACZ Lab ID: L18846-**

| Product Description | Method | 01 | 02 | 03 | 04 | 05 |
|---|---|---|---|---|---|---|
| Sodium, dissolved | M200.7 ICP | X | X | X | X | X |
| Sulfate | M375.3 - Gravimetric | X | X | X | X | X |
| Sulfide as S | SM427C - Modified, Methylene Blue | X | X | X | X | X |
| Sulfite | M377.1 - Titrimetric | X | X | X | X | X |
| Uranium, total recoverable | M200.8 ICP-MS | X | X | X | X | X |
| Vanadium, total recoverable | M200.8 ICP-MS | X | X | X | X | X |
| Zinc, dissolved | M200.7 ICP | X | X | X | X | X |
| Zinc, total recoverable | M200.7 ICP | X | X | X | X | X |

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# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

## Calibration Verification - Control Samples
## Cover Page

| | |
|---|---|
| ACZ Project # | L18846 |
| QC Report ID | QC1759-E |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

| | Page |
|---|---|
| **Metal Analysis** | 7 |
| Metals - Hydride | |
| Total Recoverable Metals | |
| Metals - ICP | |
| Dissolved Metals | |
| Total Recoverable Metals | |
| Metals - ICPMS | |
| Dissolved Metals | |
| Total Recoverable Metals | |
| **Wet Chemistry** | 16 |
| Alphabetical by Parameter | |

Additional analytical runs may have been required as a result of matrix effects and/or instrumental problems.
Re-analysis data immediately follows initial QC data as outlined in above sequence.



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# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - Hydride
**QC Report** ***Calibration Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | L18846 |
| QC Report ID | QC1759-E |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

## Selenium, total recoverable

Method SM 3500-Se C, AA-Hydride

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) | | | Control Limits, % | | Q |
|---|---|---|---|---|---|---|---|---|---|
| | | | | True | Found | Q Rec (%) | Lower | Upper | |
| WG63103ICV | ICV | II980316-6 | 6/25/98 2:07:00 PM | 0.02 | 0.0203 | 101.5 | 90 | 110 | |
| WG63103CCV1 | CCV | II980316-6 | 6/25/98 2:24:00 PM | 0.02 | 0.0196 | 98 | 90 | 110 | |
| WG63103CCV2 | CCV | II980316-6 | 6/25/98 2:42:00 PM | 0.02 | 0.0198 | 99 | 90 | 110 | |

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# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICP
**QC Report** ***Calibration Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | L18846 |
| QC Report ID | QC1759-E |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec.(%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | WG62487ICV | ICV | II980611-3 | 6/12/98 12:08:00 AM | 1 | 1.01 | | 101.1 | 95 | 105 | |
| Aluminum | WG62487CCV1 | CCV | II980611-3 | 6/12/98 1:03:00 AM | 1 | 0.950 | | 95 | 90 | 110 | |
| Aluminum | WG62487CCV2 | CCV | II980611-3 | 6/12/98 1:58:00 AM | 1 | 1.00 | | 100.3 | 90 | 110 | |
| Aluminum | WG62484ICV | ICV | II980611-3 | 6/13/98 3:49:00 AM | 1 | 0.985 | | 98.5 | 95 | 105 | |
| Aluminum | WG62484CCV3 | CCV | II980611-3 | 6/13/98 5:38:00 AM | 1 | 0.968 | | 96.8 | 90 | 110 | |
| Aluminum | WG62484CCV5 | CCV | II980611-3 | 6/13/98 6:10:00 AM | 1 | 0.986 | | 98.6 | 90 | 110 | |
| Cadmium | WG62487ICV | ICV | II980611-3 | 6/12/98 12:08:00 AM | 1 | 0.985 | | 98.5 | 95 | 105 | |
| Cadmium | WG62487CCV1 | CCV | II980611-3 | 6/12/98 1:03:00 AM | 1 | 0.979 | | 97.9 | 90 | 110 | |
| Cadmium | WG62487CCV2 | CCV | II980611-3 | 6/12/98 1:58:00 AM | 1 | 1.07 | | 106.7 | 90 | 110 | |
| Cadmium | WG62484ICV | ICV | II980611-3 | 6/13/98 3:49:00 AM | 1 | 0.975 | | 97.5 | 95 | 105 | |
| Cadmium | WG62484CCV3 | CCV | II980611-3 | 6/13/98 5:38:00 AM | 1 | 0.999 | | 99.9 | 90 | 110 | |
| Cadmium | WG62484CCV5 | CCV | II980611-3 | 6/13/98 6:10:00 AM | 1 | 1.01 | | 101.3 | 90 | 110 | |
| Calcium | WG62487ICV | ICV | II980611-3 | 6/12/98 12:08:00 AM | 51 | 48.7 | | 95.5 | 95 | 105 | |
| Calcium | WG62487CCV1 | CCV | II980611-3 | 6/12/98 1:03:00 AM | 51 | 48.2 | | 94.5 | 90 | 110 | |
| Calcium | WG62487CCV2 | CCV | II980611-3 | 6/12/98 1:58:00 AM | 51 | 52.4 | | 102.7 | 90 | 110 | |
| Calcium | WG62484ICV | ICV | II980611-3 | 6/13/98 3:49:00 AM | 51 | 49.1 | | 96.2 | 95 | 105 | |
| Calcium | WG62484CCV3 | CCV | II980611-3 | 6/13/98 5:38:00 AM | 51 | 50.1 | | 98.2 | 90 | 110 | |
| Calcium | WG62484CCV5 | CCV | II980611-3 | 6/13/98 6:10:00 AM | 51 | 50.6 | | 99.2 | 90 | 110 | |
| Iron | WG62487ICV | ICV | II980611-3 | 6/12/98 12:08:00 AM | 1 | 0.971 | | 97.1 | 95 | 105 | |
| Iron | WG62487CCV1 | CCV | II980611-3 | 6/12/98 1:03:00 AM | 1 | 0.965 | | 96.5 | 90 | 110 | |
| Iron | WG62487CCV2 | CCV | II980611-3 | 6/12/98 1:58:00 AM | 1 | 1.04 | | 104 | 90 | 110 | |
| Iron | WG62484ICV | ICV | II980611-3 | 6/13/98 3:49:00 AM | 1 | 0.971 | | 97.1 | 95 | 105 | |
| Iron | WG62484CCV3 | CCV | II980611-3 | 6/13/98 5:38:00 AM | 1 | 0.974 | | 97.4 | 90 | 110 | |
| Iron | WG62484CCV5 | CCV | II980611-3 | 6/13/98 6:10:00 AM | 1 | 0.988 | | 98.8 | 90 | 110 | |

ACZ ✓ Client

ACZ FORM II - IN



REPQC001.07.97.03

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# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - ICP*
**QC Report** ***Calibration Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lead | WG62487ICV | ICV | II980611-3 | 6/12/98 12:08:00 AM | 1 | 0.983 | | 98.3 | 95 | 105 | |
| Lead | WG62487CCV1 | CCV | II980611-3 | 6/12/98 1:03:00 AM | 1 | 0.986 | | 98.6 | 90 | 110 | |
| Lead | WG62487CCV2 | CCV | II980611-3 | 6/12/98 1:58:00 AM | 1 | 1.07 | | 107.2 | 90 | 110 | |
| Lead | WG62484ICV | ICV | II980611-3 | 6/13/98 3:49:00 AM | 1 | 1.01 | | 101.3 | 95 | 105 | |
| Lead | WG62484CCV3 | CCV | II980611-3 | 6/13/98 5:38:00 AM | 1 | 1.01 | | 100.9 | 90 | 110 | |
| Lead | WG62484CCV5 | CCV | II980611-3 | 6/13/98 6:10:00 AM | 1 | 1.03 | | 102.9 | 90 | 110 | |
| Magnesium | WG62484ICV | ICV | II980611-3 | 6/13/98 3:49:00 AM | 51 | 48.6 | | 95.3 | 95 | 105 | |
| Magnesium | WG62484CCV3 | CCV | II980611-3 | 6/13/98 5:38:00 AM | 51 | 48.2 | | 94.6 | 90 | 110 | |
| Magnesium | WG62484CCV5 | CCV | II980611-3 | 6/13/98 6:10:00 AM | 51 | 48.1 | | 94.4 | 90 | 110 | |
| Magnesium | WG62859ICV | ICV | II980617-1 | 6/18/98 5:04:00 PM | 51 | 48.5 | | 95.1 | 95 | 105 | |
| Magnesium | WG62859CCV1 | CCV | II980617-1 | 6/18/98 5:59:00 PM | 51 | 49.6 | | 97.3 | 90 | 110 | |
| Magnesium | WG62859CCV2 | CCV | II980617-1 | 6/18/98 6:53:00 PM | 51 | 48.3 | | 94.8 | 90 | 110 | |
| Manganese | WG62484ICV | ICV | II980611-3 | 6/13/98 3:49:00 AM | 1 | 0.977 | | 97.7 | 95 | 105 | |
| Manganese | WG62484CCV3 | CCV | II980611-3 | 6/13/98 5:38:00 AM | 1 | 0.988 | | 98.8 | 90 | 110 | |
| Manganese | WG62484CCV5 | CCV | II980611-3 | 6/13/98 6:10:00 AM | 1 | 0.995 | | 99.5 | 90 | 110 | |
| Manganese | WG62859ICV | ICV | II980617-1 | 6/18/98 5:04:00 PM | 1 | 0.994 | | 99.4 | 95 | 105 | |
| Manganese | WG62859CCV1 | CCV | II980617-1 | 6/18/98 5:59:00 PM | 1 | 1.01 | | 101.1 | 90 | 110 | |
| Manganese | WG62859CCV2 | CCV | II980617-1 | 6/18/98 6:53:00 PM | 1 | 0.987 | | 98.7 | 90 | 110 | |
| Nickel | WG62487ICV | ICV | II980611-3 | 6/12/98 12:08:00 AM | 1 | 0.967 | | 96.7 | 95 | 105 | |
| Nickel | WG62487CCV1 | CCV | II980611-3 | 6/12/98 1:03:00 AM | 1 | 0.956 | | 95.6 | 90 | 110 | |
| Nickel | WG62487CCV2 | CCV | II980611-3 | 6/12/98 1:58:00 AM | 1 | 1.04 | | 103.8 | 90 | 110 | |
| Nickel | WG62484ICV | ICV | II980611-3 | 6/13/98 3:49:00 AM | 1 | 0.957 | | 95.7 | 95 | 105 | |
| Nickel | WG62484CCV3 | CCV | II980611-3 | 6/13/98 5:38:00 AM | 1 | 0.971 | | 97.1 | 90 | 110 | |
| Nickel | WG62484CCV5 | CCV | II980611-3 | 6/13/98 6:10:00 AM | 1 | 0.975 | | 97.5 | 90 | 110 | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICP
**QC Report** ***Calibration Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | L18846 |
| QC Report ID | QC1759-E |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | PCN/SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Potassium | WG62487ICV | ICV | II980611-3 | 6/12/98 12:08:00 AM | 60 | 60.3 | | 100.5 | 95 | 105 | |
| Potassium | WG62487CCV1 | CCV | II980611-3 | 6/12/98 1:03:00 AM | 60 | 56.7 | | 94.6 | 90 | 110 | |
| Potassium | WG62487CCV2 | CCV | II980611-3 | 6/12/98 1:58:00 AM | 60 | 58.7 | | 97.8 | 90 | 110 | |
| Potassium | WG62484ICV | ICV | II980611-3 | 6/13/98 3:49:00 AM | 60 | 59.6 | | 99.4 | 95 | 105 | |
| Potassium | WG62484CCV3 | CCV | II980611-3 | 6/13/98 5:38:00 AM | 60 | 58.2 | | 96.9 | 90 | 110 | |
| Potassium | WG62484CCV5 | CCV | II980611-3 | 6/13/98 6:10:00 AM | 60 | 57.6 | | 96 | 90 | 110 | |
| Sodium | WG62487ICV | ICV | II980611-3 | 6/12/98 12:08:00 AM | 51 | 52.0 | | 102 | 95 | 105 | |
| Sodium | WG62487CCV1 | CCV | II980611-3 | 6/12/98 1:03:00 AM | 51 | 48.8 | | 95.8 | 90 | 110 | |
| Sodium | WG62487CCV2 | CCV | II980611-3 | 6/12/98 1:58:00 AM | 51 | 49.9 | | 97.9 | 90 | 110 | |
| Sodium | WG62484ICV | ICV | II980611-3 | 6/13/98 3:49:00 AM | 51 | 51.4 | | 100.9 | 95 | 105 | |
| Sodium | WG62484CCV3 | CCV | II980611-3 | 6/13/98 5:38:00 AM | 51 | 49.7 | | 97.4 | 90 | 110 | |
| Sodium | WG62484CCV5 | CCV | II980611-3 | 6/13/98 6:10:00 AM | 51 | 49.1 | | 96.3 | 90 | 110 | |
| Zinc | WG62611ICV | ICV | II980611-3 | 6/15/98 5:57:00 PM | 1 | 0.985 | | 98.5 | 95 | 105 | |
| Zinc | WG62611CCV1 | CCV | II980611-3 | 6/15/98 6:52:00 PM | 1 | 0.990 | | 99 | 90 | 110 | |
| Zinc | WG62611CCV2 | CCV | II980611-3 | 6/15/98 7:46:00 PM | 1 | 1.03 | | 102.9 | 90 | 110 | |
| Zinc | WG62859ICV | ICV | II980617-1 | 6/18/98 5:04:00 PM | 1 | 0.987 | | 98.7 | 95 | 105 | |
| Zinc | WG62859CCV1 | CCV | II980617-1 | 6/18/98 5:59:00 PM | 1 | 0.995 | | 99.5 | 90 | 110 | |
| Zinc | WG62859CCV2 | CCV | II980617-1 | 6/18/98 6:53:00 PM | 1 | 0.978 | | 97.8 | 90 | 110 | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - ICP*
**QC Report** ***Calibration Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | WG63232ICV | ICV | II980617-1 | 6/24/98 9:07:00 PM | 1 | 0.976 | | 97.6 | 95 | 105 | |
| Aluminum | WG63232CCV1 | CCV | II980617-1 | 6/24/98 9:59:00 PM | 1 | 0.968 | | 96.8 | 90 | 110 | |
| Cadmium | WG63232ICV | ICV | II980617-1 | 6/24/98 9:07:00 PM | 1 | 0.996 | | 99.6 | 95 | 105 | |
| Cadmium | WG63232CCV1 | CCV | II980617-1 | 6/24/98 9:59:00 PM | 1 | 1.02 | | 101.5 | 90 | 110 | |
| Iron | WG63232ICV | ICV | II980617-1 | 6/24/98 9:07:00 PM | 1 | 0.967 | | 96.7 | 95 | 105 | |
| Iron | WG63232CCV1 | CCV | II980617-1 | 6/24/98 9:59:00 PM | 1 | 0.989 | | 98.9 | 90 | 110 | |
| Lead | WG63232ICV | ICV | II980617-1 | 6/24/98 9:07:00 PM | 1 | 0.994 | | 99.4 | 95 | 105 | |
| Lead | WG63232CCV1 | CCV | II980617-1 | 6/24/98 9:59:00 PM | 1 | 1.00 | | 100.5 | 90 | 110 | |
| Manganese | WG63232ICV | ICV | II980617-1 | 6/24/98 9:07:00 PM | 1 | 0.992 | | 99.2 | 95 | 105 | |
| Manganese | WG63232CCV1 | CCV | II980617-1 | 6/24/98 9:59:00 PM | 1 | 1.01 | | 100.8 | 90 | 110 | |
| Nickel | WG63232ICV | ICV | II980617-1 | 6/24/98 9:07:00 PM | 1 | 0.972 | | 97.2 | 95 | 105 | |
| Nickel | WG63232CCV1 | CCV | II980617-1 | 6/24/98 9:59:00 PM | 1 | 0.991 | | 99.1 | 90 | 110 | |
| Zinc | WG63330ICV | ICV | II980617-1 | 6/25/98 5:54:00 PM | 1 | 0.968 | | 96.8 | 95 | 105 | |
| Zinc | WG63330CCV1 | CCV | II980617-1 | 6/25/98 6:46:00 PM | 1 | 0.975 | | 97.5 | 90 | 110 | |

ACZ ✓ Client

# ACZ

## Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICPMS*
**QC Report** | ***Calibration Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.8 ICP-MS

| Element | Acz ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | WG62476QCS | QCS | MS980526-9 | 6/16/98 5:33:00 AM | 0.05 | 0.0494 | | 98.7 | 90 | 110 | |
| Arsenic | WG62476ICS2 | ICS | MS980526-6 | 6/16/98 6:57:00 AM | 0.1 | 0.101 | | 101.4 | 90 | 110 | |
| Arsenic | WG62476ICS3 | ICS | MS980526-6 | 6/16/98 8:43:00 AM | 0.1 | 0.0978 | | 97.8 | 90 | 110 | |
| Chromium | WG62688ICS1 | ICS | MS980526-6 | 6/16/98 11:23:00 PM | 0.1 | 0.100 | | 100.2 | 90 | 110 | |
| Chromium | WG62688QCS | QCS | MS980526-9 | 6/16/98 11:40:00 PM | 0.05 | 0.0505 | | 101 | 90 | 110 | |
| Chromium | WG62688ICS2 | ICS | MS980526-6 | 6/17/98 1:08:00 AM | 0.1 | 0.0997 | | 99.7 | 90 | 110 | |
| Copper | WG62476QCS | QCS | MS980526-9 | 6/16/98 5:33:00 AM | 0.05 | 0.0497 | | 99.4 | 90 | 110 | |
| Copper | WG62476ICS2 | ICS | MS980526-6 | 6/16/98 6:57:00 AM | 0.1 | 0.101 | | 101.3 | 90 | 110 | |
| Copper | WG62476ICS3 | ICS | MS980526-6 | 6/16/98 8:43:00 AM | 0.1 | 0.0948 | | 94.8 | 90 | 110 | |
| Silver | WG62476QCS | QCS | MS980526-9 | 6/16/98 5:33:00 AM | 0.05 | 0.0498 | | 99.6 | 90 | 110 | |
| Silver | WG62476ICS2 | ICS | MS980526-3 | 6/16/98 6:57:00 AM | 0.1 | 0.100 | | 100.4 | 90 | 110 | |
| Silver | WG62476ICS3 | ICS | MS980526-3 | 6/16/98 8:43:00 AM | 0.1 | 0.101 | | 101.3 | 90 | 110 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - ICPMS*
**QC Report** ***Calibration Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | WG62612QCS | QCS | MS980526-9 | 6/15/98 4:34:00 PM | 0.05 | 0.0513 | | 102.5 | 90 | 110 | S |
| Antimony | WG62478QCS | QCS | MS980526-9 | 6/15/98 9:07:00 PM | 0.05 | 0.0510 | | 102.1 | 90 | 110 | |
| Antimony | WG62478ICS2 | ICS | MS980526-6 | 6/15/98 10:32:00 PM | 0.1 | 0.100 | | 100.4 | 90 | 110 | |
| Antimony | WG62478ICS3 | ICS | MS980526-6 | 6/16/98 12:18:00 AM | 0.1 | 0.102 | | 101.7 | 90 | 110 | |
| Antimony | WG62478ICS4 | ICS | MS980526-6 | 6/16/98 1:19:00 AM | 0.1 | 0.102 | | 102 | 90 | 110 | |
| Chromium | WG62478QCS | QCS | MS980526-9 | 6/15/98 9:07:00 PM | 0.05 | 0.0502 | | 100.4 | 90 | 110 | |
| Chromium | WG62478ICS3 | ICS | MS980526-6 | 6/16/98 12:18:00 AM | 0.1 | 0.0978 | | 97.8 | 90 | 110 | |
| Chromium | WG62478ICS4 | ICS | MS980526-6 | 6/16/98 1:19:00 AM | 0.1 | 0.0973 | | 97.3 | 90 | 110 | |
| Chromium | WG62476QCS | QCS | MS980526-9 | 6/16/98 5:33:00 AM | 0.05 | 0.0510 | | 101.9 | 90 | 110 | S |
| Chromium | WG62660ICS1 | ICS | MS980526-6 | 6/16/98 9:04:00 PM | 0.1 | 0.0996 | | 99.6 | 90 | 110 | |
| Chromium | WG62660QCS | QCS | MS980526-9 | 6/16/98 9:21:00 PM | 0.05 | 0.0498 | | 99.5 | 90 | 110 | |
| Chromium | WG62660ICS2 | ICS | MS980526-6 | 6/16/98 10:49:00 PM | 0.1 | 0.0977 | | 97.7 | 90 | 110 | |
| Copper | WG62612QCS | QCS | MS980526-9 | 6/15/98 4:34:00 PM | 0.05 | 0.0486 | | 97.2 | 90 | 110 | S |
| Copper | WG62478ICS2 | ICS | MS980526-6 | 6/15/98 10:32:00 PM | 0.1 | 0.102 | | 101.9 | 90 | 110 | |
| Copper | WG62478ICS3 | ICS | MS980526-6 | 6/16/98 12:18:00 AM | 0.1 | 0.105 | | 104.5 | 90 | 110 | |
| Copper | WG62478ICS4 | ICS | MS980526-6 | 6/16/98 1:19:00 AM | 0.1 | 0.105 | | 104.6 | 90 | 110 | |
| Molybdenum | WG62478QCS | QCS | MS980526-9 | 6/15/98 9:07:00 PM | 0.05 | 0.0501 | | 100.2 | 90 | 110 | |
| Molybdenum | WG62478ICS2 | ICS | MS980526-6 | 6/15/98 10:32:00 PM | 0.1 | 0.0964 | | 96.4 | 90 | 110 | |
| Molybdenum | WG62478ICS3 | ICS | MS980526-6 | 6/16/98 12:18:00 AM | 0.1 | 0.0983 | | 98.3 | 90 | 110 | |
| Molybdenum | WG62478ICS4 | ICS | MS980526-6 | 6/16/98 1:19:00 AM | 0.1 | 0.0956 | | 95.6 | 90 | 110 | |
| Silver | WG62478ICS2 | ICS | MS980526-3 | 6/15/98 10:32:00 PM | 0.1 | 0.0988 | | 98.8 | 90 | 110 | |
| Silver | WG62478ICS3 | ICS | MS980526-3 | 6/16/98 12:18:00 AM | 0.1 | 0.0981 | | 98.1 | 90 | 110 | |
| Silver | WG62478ICS4 | ICS | MS980526-3 | 6/16/98 1:19:00 AM | 0.1 | 0.0972 | | 97.2 | 90 | 110 | |

ACZ / Client ✓

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - ICPMS*
**QC Report** ***Calibration Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Uranium | WG62478QCS | QCS | MS980526-9 | 6/15/98 9:07:00 PM | 0.05 | 0.0496 | | 99.2 | 90 | 110 | |
| Uranium | WG62478ICS2 | ICS | MS980526-6 | 6/15/98 10:32:00 PM | 0.1 | 0.101 | | 100.8 | 90 | 110 | |
| Uranium | WG62478ICS3 | ICS | MS980526-6 | 6/16/98 12:18:00 AM | 0.1 | 0.101 | | 101.3 | 90 | 110 | |
| Uranium | WG62478ICS4 | ICS | MS980526-6 | 6/16/98 1:19:00 AM | 0.1 | 0.104 | | 104.1 | 90 | 110 | |
| Vanadium | WG62478QCS | QCS | MS980526-9 | 6/15/98 9:07:00 PM | 0.05 | 0.0502 | | 100.5 | 90 | 110 | |
| Vanadium | WG62478ICS2 | ICS | MS980526-6 | 6/15/98 10:32:00 PM | 0.1 | 0.0976 | | 97.6 | 90 | 110 | |
| Vanadium | WG62478ICS3 | ICS | MS980526-6 | 6/16/98 12:18:00 AM | 0.1 | 0.0986 | | 98.6 | 90 | 110 | |
| Vanadium | WG62478ICS4 | ICS | MS980526-6 | 6/16/98 1:19:00 AM | 0.1 | 0.0980 | | 98 | 90 | 110 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - ICPMS*
**QC Report** ***Calibration Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M6020 ICPMS

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits;% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | WG62478QCS | QCS | MS980526-9 | 6/15/98 9:07:00 PM | 0.05 | 0.0487 | | 97.4 | 90 | 110 | |
| Arsenic | WG62478ICS2 | ICS | MS980526-6 | 6/15/98 10:32:00 PM | 0.1 | 0.0983 | | 98.3 | 90 | 110 | |
| Arsenic | WG62478ICS3 | ICS | MS980526-6 | 6/16/98 12:18:00 AM | 0.1 | 0.104 | | 104.1 | 90 | 110 | |
| Arsenic | WG62478ICS4 | ICS | MS980526-6 | 6/16/98 1:19:00 AM | 0.1 | 0.104 | | 103.5 | 90 | 110 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Wet Chemistry
**QC Report** ***Calibration Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Alkalinity as CaCO3

Method M2320B

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62810CCV1 | CCV | WC980508-1 | 6/18/98 6:46:00 PM | 82 | 89.8 | | 109.5 | 90 | 110 | |
| WG62810CCV4 | CCV | WC980508-1 | 6/18/98 8:42:00 PM | 82 | 88.9 | | 108.4 | 90 | 110 | |
| WG62964CCV1 | CCV | WC980508-1 | 6/20/98 2:39:00 AM | 82 | 88.9 | | 108.4 | 90 | 110 | |

## Carbon, total organic (TOC)

Method M415.1 Oxidation/IR

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62533ICV | ICV | WC980528-2 | 6/15/98 | 71 | 72.0 | | 101.4 | 90 | 110 | |
| WG62533CCV1 | CCV | WC970609-1 | 6/15/98 | 40 | 39.0 | | 97.5 | 90 | 110 | |
| WG62533CCV2 | CCV | WC970609-1 | 6/15/98 | 40 | 42.0 | | 105 | 90 | 110 | |

## Chloride

Method M325.2 - Colorimetric (RFA)

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG63015ICV | ICV | WC980613-5 | 6/22/98 11:34:01 AM | 51.6 | 48.0 | | 93 | 90 | 110 | |
| WG63015CCV1 | CCV | WC980613-5 | 6/22/98 11:50:00 AM | 50 | 49.2 | | 98.3 | 90 | 110 | |

## Conductivity @25C

Method M120.1 - Meter

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (umhos/cm) True | Found | Q | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62810CCV3 | CCV | WC980617-2 | 6/18/98 6:55:00 PM | 1413 | 1460 | | 103.1 | 90 | 110 | |
| WG62810CCV6 | CCV | WC980617-2 | 6/18/98 8:51:00 PM | 1413 | 1420 | | 100.6 | 90 | 110 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Wet Chemistry
**QC Report** ***Calibration Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Nitrate as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) | | | Control Limits, % | | Q |
|---|---|---|---|---|---|---|---|---|---|
| | | | | True | Found | Q Rec (%) | Lower | Upper | |
| WG62436ICV | ICV | IC980609-2 | 6/15/98 | 3.62 | 3.66 | 101.1 | 90 | 110 | |
| WG62436CCV2 | CCV | IC980609-1 | 6/15/98 | 2.26 | 2.42 | 107.1 | 90 | 110 | |
| WG62436CCV3 | CCV | IC980609-1 | 6/15/98 | 2.26 | 2.44 | 108 | 90 | 110 | |

## Nitrite as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) | | | Control Limits, % | | Q |
|---|---|---|---|---|---|---|---|---|---|
| | | | | True | Found | Q Rec (%) | Lower | Upper | |
| WG62436CCV2 | CCV | IC980609-1 | 6/15/98 | 3.04 | 3.20 | 105.3 | 90 | 110 | |
| WG62436CCV3 | CCV | IC980609-1 | 6/15/98 | 3.04 | 3.24 | 106.6 | 90 | 110 | |

## Nitrogen, ammonia

Method M350.1 - Automated Phenate

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) | | | Control Limits, % | | Q |
|---|---|---|---|---|---|---|---|---|---|
| | | | | True | Found | Q Rec (%) | Lower | Upper | |
| WG62972ICV | ICV | WC980520-2 | 6/19/98 10:57:51 PM | 1.55 | 1.57 | 101.5 | 90 | 110 | |
| WG62972CCV1 | CCV | WC980401-2 | 6/19/98 11:13:49 PM | 1.5 | 1.50 | 100.2 | 90 | 110 | |
| WG62972CCV2 | CCV | WC980401-2 | 6/19/98 11:29:48 PM | 1.5 | 1.49 | 99.3 | 90 | 110 | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Wet Chemistry
**QC Report** ***Calibration Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## pH (lab)

Method M150.1 - Electrometric

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (units) True | Found | Q | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62810ICV | ICV | WC980617-2 | 6/18/98 3:45:00 PM | 7 | 7.03 | | 100.4 | 90 | 110 | |
| WG62810CCV2 | CCV | WC980617-2 | 6/18/98 6:50:00 PM | 7 | 7.02 | | 100.3 | 90 | 110 | |
| WG62810CCV5 | CCV | WC980617-2 | 6/18/98 8:46:00 PM | 7 | 7.02 | | 100.3 | 90 | 110 | |

## Sulfide as S

Method SM427C - Modified, Methylene Blue

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62597CCV1 | CCV | WC980615-1 | 6/15/98 | 0.214 | 0.202 | | 94.4 | 90 | 110 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

***Calibration Verification - Blanks***

***Cover Page***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

| | Page |
|---|---|
| **Metal Analysis** | 20 |
| Metals - Hydride | |
| Total Recoverable Metals | |
| Metals - ICP | |
| Dissolved Metals | |
| Total Recoverable Metals | |
| Metals - ICPMS | |
| Dissolved Metals | |
| Total Recoverable Metals | |
| **Wet Chemistry** | 29 |
| Alphabetical by Parameter | |

Additional analytical runs may have been required as a result of matrix effects and/or instrumental problems.
Re-analysis data immediately follows initial QC data as outlined in above sequence.

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - Hydride
**QC Report** ***Calibration Verification-Blanks***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Selenium, total recoverable

Method SM 3500-Se C, AA-Hydride

| ACZ ID | QC Type | Analysis Date | Concentration | | | Control Limits | | Units | Q |
|---|---|---|---|---|---|---|---|---|---|
| | | | MDL | Found | Q | Lower | Upper | | |
| WG63103ICB | ICB | 6/25/98 2:08:00 PM | 0.001 | 0.0001 | | -0.002 | 0.002 | mg/L | |
| WG63103CCB1 | CCB | 6/25/98 2:26:00 PM | 0.001 | 0.0000 | | -0.002 | 0.002 | mg/L | |
| WG63103CCB2 | CCB | 6/25/98 2:43:00 PM | 0.001 | 0.0000 | | -0.002 | 0.002 | mg/L | |

ACZ ✓ Client

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICP*
**QC Report** | ***Calibration Verification-Blanks***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | Analysis Date | Concentration MDL | Found | Q | Control Limits Lower | Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | WG62487ICB | ICB | 6/12/98 12:12:00 AM | 0.03 | -0.01476 | | -0.03 | 0.03 | mg/L | |
| Aluminum | WG62487CCB1 | CCB | 6/12/98 1:07:00 AM | 0.03 | -0.00254 | | -0.03 | 0.03 | mg/L | |
| Aluminum | WG62487CCB2 | CCB | 6/12/98 2:02:00 AM | 0.03 | 0.00058 | | -0.03 | 0.03 | mg/L | |
| Aluminum | WG62484ICB | ICB | 6/13/98 3:53:00 AM | 0.03 | -0.00641 | | -0.03 | 0.03 | mg/L | |
| Aluminum | WG62484CCB13 | CCB | 6/13/98 5:43:00 AM | 0.03 | -0.00839 | | -0.03 | 0.03 | mg/L | |
| Aluminum | WG62484CCB21 | CCB | 6/13/98 6:15:00 AM | 0.03 | -0.01034 | | -0.03 | 0.03 | mg/L | |
| Cadmium | WG62487ICB | ICB | 6/12/98 12:12:00 AM | 0.003 | -0.00047 | | -0.003 | 0.003 | mg/L | |
| Cadmium | WG62487CCB1 | CCB | 6/12/98 1:07:00 AM | 0.003 | 0.00000 | | -0.003 | 0.003 | mg/L | |
| Cadmium | WG62487CCB2 | CCB | 6/12/98 2:02:00 AM | 0.003 | -0.00047 | | -0.003 | 0.003 | mg/L | |
| Cadmium | WG62484ICB | ICB | 6/13/98 3:53:00 AM | 0.003 | 0.00129 | | -0.003 | 0.003 | mg/L | |
| Cadmium | WG62484CCB13 | CCB | 6/13/98 5:43:00 AM | 0.003 | 0.00086 | | -0.003 | 0.003 | mg/L | |
| Cadmium | WG62484CCB21 | CCB | 6/13/98 6:15:00 AM | 0.003 | 0.00000 | | -0.003 | 0.003 | mg/L | |
| Calcium | WG62487ICB | ICB | 6/12/98 12:12:00 AM | 0.2 | 0.01203 | | -0.2 | 0.2 | mg/L | |
| Calcium | WG62487CCB1 | CCB | 6/12/98 1:07:00 AM | 0.2 | 0.01871 | | -0.2 | 0.2 | mg/L | |
| Calcium | WG62487CCB2 | CCB | 6/12/98 2:02:00 AM | 0.2 | 0.01604 | | -0.2 | 0.2 | mg/L | |
| Calcium | WG62484ICB | ICB | 6/13/98 3:53:00 AM | 0.2 | 0.00875 | | -0.2 | 0.2 | mg/L | |
| Calcium | WG62484CCB13 | CCB | 6/13/98 5:43:00 AM | 0.2 | 0.00625 | | -0.2 | 0.2 | mg/L | |
| Calcium | WG62484CCB21 | CCB | 6/13/98 6:15:00 AM | 0.2 | 0.01126 | | -0.2 | 0.2 | mg/L | |
| Iron | WG62487ICB | ICB | 6/12/98 12:12:00 AM | 0.01 | 0.00003 | | -0.01 | 0.01 | mg/L | |
| Iron | WG62487CCB1 | CCB | 6/12/98 1:07:00 AM | 0.01 | -0.00394 | | -0.01 | 0.01 | mg/L | |
| Iron | WG62487CCB2 | CCB | 6/12/98 2:02:00 AM | 0.01 | -0.00336 | | -0.01 | 0.01 | mg/L | |
| Iron | WG62484ICB | ICB | 6/13/98 3:53:00 AM | 0.01 | 0.00107 | | -0.01 | 0.01 | mg/L | |
| Iron | WG62484CCB13 | CCB | 6/13/98 5:43:00 AM | 0.01 | -0.00495 | | -0.01 | 0.01 | mg/L | |
| Iron | WG62484CCB21 | CCB | 6/13/98 6:15:00 AM | 0.01 | -0.00276 | | -0.01 | 0.01 | mg/L | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICP
**QC Report** Calibration Verification-Blanks

| | |
|---|---|
| ACZ Project # | L18846 |
| QC Report ID | QC1759-E |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | Analysis Date | Concentration MDL | Found | Q | Control Limits Lower | Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| Lead | WG62487ICB | ICB | 6/12/98 12:12:00 AM | 0.04 | -0.03038 | | -0.04 | 0.04 | mg/L | |
| Lead | WG62487CCB1 | CCB | 6/12/98 1:07:00 AM | 0.04 | 0.01257 | | -0.04 | 0.04 | mg/L | |
| Lead | WG62487CCB2 | CCB | 6/12/98 2:02:00 AM | 0.04 | -0.02514 | | -0.04 | 0.04 | mg/L | |
| Lead | WG62484ICB | ICB | 6/13/98 3:53:00 AM | 0.04 | -0.02872 | | -0.04 | 0.04 | mg/L | |
| Lead | WG62484CCB13 | CCB | 6/13/98 5:43:00 AM | 0.04 | 0.00396 | | -0.04 | 0.04 | mg/L | |
| Lead | WG62484CCB21 | CCB | 6/13/98 6:15:00 AM | 0.04 | -0.02574 | | -0.04 | 0.04 | mg/L | |
| Magnesium | WG62484ICB | ICB | 6/13/98 3:53:00 AM | 0.2 | -0.01128 | | -0.2 | 0.2 | mg/L | |
| Magnesium | WG62484CCB13 | CCB | 6/13/98 5:43:00 AM | 0.2 | 0.00925 | | -0.2 | 0.2 | mg/L | |
| Magnesium | WG62484CCB21 | CCB | 6/13/98 6:15:00 AM | 0.2 | 0.00178 | | -0.2 | 0.2 | mg/L | |
| Magnesium | WG62859ICB | ICB | 6/18/98 5:09:00 PM | 0.2 | 0.03778 | | -0.2 | 0.2 | mg/L | |
| Magnesium | WG62859CCB1 | CCB | 6/18/98 6:03:00 PM | 0.2 | 0.06081 | | -0.2 | 0.2 | mg/L | |
| Magnesium | WG62859CCB2 | CCB | 6/18/98 6:58:00 PM | 0.2 | 0.03781 | | -0.2 | 0.2 | mg/L | |
| Manganese | WG62484ICB | ICB | 6/13/98 3:53:00 AM | 0.005 | -0.00140 | | -0.005 | 0.005 | mg/L | |
| Manganese | WG62484CCB13 | CCB | 6/13/98 5:43:00 AM | 0.005 | -0.00323 | | -0.005 | 0.005 | mg/L | |
| Manganese | WG62484CCB21 | CCB | 6/13/98 6:15:00 AM | 0.005 | -0.00237 | | -0.005 | 0.005 | mg/L | |
| Manganese | WG62859ICB | ICB | 6/18/98 5:09:00 PM | 0.005 | 0.00069 | | -0.005 | 0.005 | mg/L | |
| Manganese | WG62859CCB1 | CCB | 6/18/98 6:03:00 PM | 0.005 | 0.00196 | | -0.005 | 0.005 | mg/L | |
| Manganese | WG62859CCB2 | CCB | 6/18/98 6:58:00 PM | 0.005 | 0.00069 | | -0.005 | 0.005 | mg/L | |
| Nickel | WG62487ICB | ICB | 6/12/98 12:12:00 AM | 0.01 | 0.00000 | | -0.01 | 0.01 | mg/L | |
| Nickel | WG62487CCB1 | CCB | 6/12/98 1:07:00 AM | 0.01 | -0.00208 | | -0.01 | 0.01 | mg/L | |
| Nickel | WG62487CCB2 | CCB | 6/12/98 2:02:00 AM | 0.01 | -0.00206 | | -0.01 | 0.01 | mg/L | |
| Nickel | WG62484ICB | ICB | 6/13/98 3:53:00 AM | 0.01 | 0.00115 | | -0.01 | 0.01 | mg/L | |
| Nickel | WG62484CCB13 | CCB | 6/13/98 5:43:00 AM | 0.01 | 0.00270 | | -0.01 | 0.01 | mg/L | |
| Nickel | WG62484CCB21 | CCB | 6/13/98 6:15:00 AM | 0.01 | -0.00274 | | -0.01 | 0.01 | mg/L | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICP
**QC Report** **Calibration Verification-Blanks**

| | |
|---|---|
| ACZ Project # | L18846 |
| QC Report ID | QC1759-E |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | Analysis Date | Concentration MDL | Found | Q | Control Limits Lower | Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| Potassium | WG62487ICB | ICB | 6/12/98 12:12:00 AM | 0.3 | -0.01249 | | -0.3 | 0.3 | mg/L | |
| Potassium | WG62487CCB1 | CCB | 6/12/98 1:07:00 AM | 0.3 | -0.03748 | | -0.3 | 0.3 | mg/L | |
| Potassium | WG62487CCB2 | CCB | 6/12/98 2:02:00 AM | 0.3 | -0.02915 | | -0.3 | 0.3 | mg/L | |
| Potassium | WG62484ICB | ICB | 6/13/98 3:53:00 AM | 0.3 | -0.02186 | | -0.3 | 0.3 | mg/L | |
| Potassium | WG62484CCB13 | CCB | 6/13/98 5:43:00 AM | 0.3 | 0.01311 | | -0.3 | 0.3 | mg/L | |
| Potassium | WG62484CCB21 | CCB | 6/13/98 6:15:00 AM | 0.3 | 0.01749 | | -0.3 | 0.3 | mg/L | |
| Sodium | WG62487ICB | ICB | 6/12/98 12:12:00 AM | 0.3 | -0.01034 | | -0.3 | 0.3 | mg/L | |
| Sodium | WG62487CCB1 | CCB | 6/12/98 1:07:00 AM | 0.3 | -0.01089 | | -0.3 | 0.3 | mg/L | |
| Sodium | WG62487CCB2 | CCB | 6/12/98 2:02:00 AM | 0.3 | 0.01361 | | -0.3 | 0.3 | mg/L | |
| Sodium | WG62484ICB | ICB | 6/13/98 3:53:00 AM | 0.3 | 0.00290 | | -0.3 | 0.3 | mg/L | |
| Sodium | WG62484CCB13 | CCB | 6/13/98 5:43:00 AM | 0.3 | 0.02549 | | -0.3 | 0.3 | mg/L | |
| Sodium | WG62484CCB21 | CCB | 6/13/98 6:15:00 AM | 0.3 | 0.01796 | | -0.3 | 0.3 | mg/L | |
| Zinc | WG62611ICB | ICB | 6/15/98 6:02:00 PM | 0.01 | -0.00169 | | -0.01 | 0.01 | mg/L | |
| Zinc | WG62611CCB1 | CCB | 6/15/98 6:56:00 PM | 0.01 | -0.00171 | | -0.01 | 0.01 | mg/L | |
| Zinc | WG62611CCB2 | CCB | 6/15/98 7:51:00 PM | 0.01 | -0.00086 | | -0.01 | 0.01 | mg/L | |
| Zinc | WG62859ICB | ICB | 6/18/98 5:09:00 PM | 0.01 | -0.00039 | | -0.01 | 0.01 | mg/L | |
| Zinc | WG62859CCB1 | CCB | 6/18/98 6:03:00 PM | 0.01 | -0.00117 | | -0.01 | 0.01 | mg/L | |
| Zinc | WG62859CCB2 | CCB | 6/18/98 6:58:00 PM | 0.01 | 0.00037 | | -0.01 | 0.01 | mg/L | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICP*
**QC Report** | ***Calibration Verification-Blanks***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | Analysis Date | Concentration MDL | Found | Q | Control Limits Lower | Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | WG63232ICB | ICB | 6/24/98 9:11:00 PM | 0.03 | -0.01502 | | -0.03 | 0.03 | mg/L | |
| Aluminum | WG63232CCB1 | CCB | 6/24/98 10:04:00 PM | 0.03 | -0.01584 | | -0.03 | 0.03 | mg/L | |
| Cadmium | WG63232ICB | ICB | 6/24/98 9:11:00 PM | 0.003 | -0.00143 | | -0.003 | 0.003 | mg/L | |
| Cadmium | WG63232CCB1 | CCB | 6/24/98 10:04:00 PM | 0.003 | -0.00271 | | -0.003 | 0.003 | mg/L | |
| Iron | WG63232ICB | ICB | 6/24/98 9:11:00 PM | 0.01 | 0.00038 | | -0.01 | 0.01 | mg/L | |
| Iron | WG63232CCB1 | CCB | 6/24/98 10:04:00 PM | 0.01 | 0.00308 | | -0.01 | 0.01 | mg/L | |
| Lead | WG63232ICB | ICB | 6/24/98 9:11:00 PM | 0.04 | -0.00846 | | -0.04 | 0.04 | mg/L | |
| Lead | WG63232CCB1 | CCB | 6/24/98 10:04:00 PM | 0.04 | -0.00916 | | -0.04 | 0.04 | mg/L | |
| Manganese | WG63232ICB | ICB | 6/24/98 9:11:00 PM | 0.005 | -0.00048 | | -0.005 | 0.005 | mg/L | |
| Manganese | WG63232CCB1 | CCB | 6/24/98 10:04:00 PM | 0.005 | 0.00048 | | -0.005 | 0.005 | mg/L | |
| Nickel | WG63232ICB | ICB | 6/24/98 9:11:00 PM | 0.01 | -0.00155 | | -0.01 | 0.01 | mg/L | |
| Nickel | WG63232CCB1 | CCB | 6/24/98 10:04:00 PM | 0.01 | 0.00221 | | -0.01 | 0.01 | mg/L | |
| Zinc | WG63330ICB | ICB | 6/25/98 5:58:00 PM | 0.01 | -0.00008 | | -0.01 | 0.01 | mg/L | |
| Zinc | WG63330CCB1 | CCB | 6/25/98 6:51:00 PM | 0.01 | 0.00085 | | -0.01 | 0.01 | mg/L | |

ACZ ✓ | Client

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICPMS*
**QC Report** | ***Calibration Verification-Blanks***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | Analysis Date | Concentration MDL | Found | Q | Control Limits Lower | Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | WG62476ICB1 | ICB | 6/16/98 5:24:00 AM | 0.001 | -0.00001 | | -0.0022 | 0.0022 | mg/L | |
| Arsenic | WG62476ICB2 | ICB | 6/16/98 7:06:00 AM | 0.001 | -0.00003 | | -0.0022 | 0.0022 | mg/L | |
| Arsenic | WG62476ICB3 | ICB | 6/16/98 8:52:00 AM | 0.001 | 0.00006 | | -0.0022 | 0.0022 | mg/L | |
| Arsenic | WG62476ICB4 | ICB | 6/16/98 9:42:00 AM | 0.001 | 0.00019 | | -0.0022 | 0.0022 | mg/L | |
| Chromium | WG62688ICB1 | ICB | 6/16/98 11:32:00 PM | 0.0002 | -0.00008 | | -0.00044 | 0.00044 | mg/L | |
| Chromium | WG62688ICB2 | ICB | 6/17/98 1:16:00 AM | 0.0002 | 0.00017 | | -0.00044 | 0.00044 | mg/L | |
| Chromium | WG62688ICB3 | ICB | 6/17/98 2:15:00 AM | 0.0002 | -0.00003 | | -0.00044 | 0.00044 | mg/L | |
| Copper | WG62476ICB1 | ICB | 6/16/98 5:24:00 AM | 0.001 | -0.00003 | | -0.0022 | 0.0022 | mg/L | |
| Copper | WG62476ICB2 | ICB | 6/16/98 7:06:00 AM | 0.001 | -0.00006 | | -0.0022 | 0.0022 | mg/L | |
| Copper | WG62476ICB3 | ICB | 6/16/98 8:52:00 AM | 0.001 | -0.00003 | | -0.0022 | 0.0022 | mg/L | |
| Copper | WG62476ICB4 | ICB | 6/16/98 9:42:00 AM | 0.001 | 0.00005 | | -0.0022 | 0.0022 | mg/L | |
| Silver | WG62476ICB1 | ICB | 6/16/98 5:24:00 AM | 0.0001 | 0.00001 | | -0.00022 | 0.00022 | mg/L | |
| Silver | WG62476ICB2 | ICB | 6/16/98 7:06:00 AM | 0.0001 | 0.00001 | | -0.00022 | 0.00022 | mg/L | |
| Silver | WG62476ICB3 | ICB | 6/16/98 8:52:00 AM | 0.0001 | 0.00001 | | -0.00022 | 0.00022 | mg/L | |
| Silver | WG62476ICB4 | ICB | 6/16/98 9:42:00 AM | 0.0001 | 0.00033 | | -0.00022 | 0.00022 | mg/L | X |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICPMS
**QC Report** ***Calibration Verification-Blanks***

| | |
|---|---|
| ACZ Project # | L18846 |
| QC Report ID | QC1759-E |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

## Total Recoverable Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | Analysis Date | Concentration MDL | Found | Q | Control Limits Lower | Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | WG62478ICB1 | ICB | 6/15/98 8:59:00 PM | 0.0002 | 0.00002 | | -0.00044 | 0.00044 | mg/L | |
| Antimony | WG62478ICB2 | ICB | 6/15/98 10:41:00 PM | 0.0002 | 0.00001 | | -0.00044 | 0.00044 | mg/L | |
| Antimony | WG62478ICB3 | ICB | 6/16/98 12:27:00 AM | 0.0002 | 0.00002 | | -0.00044 | 0.00044 | mg/L | |
| Antimony | WG62478ICB4 | ICB | 6/16/98 1:28:00 AM | 0.0002 | 0.00001 | | -0.00044 | 0.00044 | mg/L | |
| Chromium | WG62478ICB1 | ICB | 6/15/98 8:59:00 PM | 0.0002 | -0.00003 | | -0.00044 | 0.00044 | mg/L | |
| Chromium | WG62478ICB2 | ICB | 6/15/98 10:41:00 PM | 0.0002 | -0.00013 | | -0.00044 | 0.00044 | mg/L | |
| Chromium | WG62660ICB1 | ICB | 6/16/98 9:12:00 PM | 0.0002 | -0.00006 | | -0.00044 | 0.00044 | mg/L | |
| Chromium | WG62660ICB2 | ICB | 6/16/98 10:57:00 PM | 0.0002 | 0.00013 | | -0.00044 | 0.00044 | mg/L | |
| Copper | WG62478ICB1 | ICB | 6/15/98 8:59:00 PM | 0.001 | -0.00003 | | -0.0022 | 0.0022 | mg/L | |
| Copper | WG62478ICB2 | ICB | 6/15/98 10:41:00 PM | 0.001 | 0.00089 | | -0.0022 | 0.0022 | mg/L | |
| Copper | WG62478ICB3 | ICB | 6/16/98 12:27:00 AM | 0.001 | 0.00022 | | -0.0022 | 0.0022 | mg/L | |
| Copper | WG62478ICB4 | ICB | 6/16/98 1:28:00 AM | 0.001 | 0.00017 | | -0.0022 | 0.0022 | mg/L | |
| Molybdenum | WG62478ICB1 | ICB | 6/15/98 8:59:00 PM | 0.0002 | 0.00000 | | -0.00044 | 0.00044 | mg/L | |
| Molybdenum | WG62478ICB2 | ICB | 6/15/98 10:41:00 PM | 0.0002 | 0.00001 | | -0.00044 | 0.00044 | mg/L | |
| Molybdenum | WG62478ICB3 | ICB | 6/16/98 12:27:00 AM | 0.0002 | 0.00000 | | -0.00044 | 0.00044 | mg/L | |
| Molybdenum | WG62478ICB4 | ICB | 6/16/98 1:28:00 AM | 0.0002 | 0.00000 | | -0.00044 | 0.00044 | mg/L | |
| Silver | WG62478ICB1 | ICB | 6/15/98 8:59:00 PM | 0.0001 | 0.00001 | | -0.00022 | 0.00022 | mg/L | |
| Silver | WG62478ICB2 | ICB | 6/15/98 10:41:00 PM | 0.0001 | 0.00001 | | -0.00022 | 0.00022 | mg/L | |
| Silver | WG62478ICB3 | ICB | 6/16/98 12:27:00 AM | 0.0001 | 0.00001 | | -0.00022 | 0.00022 | mg/L | |
| Silver | WG62478ICB4 | ICB | 6/16/98 1:28:00 AM | 0.0001 | 0.00000 | | -0.00022 | 0.00022 | mg/L | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICPMS*
**QC Report** | ***Calibration Verification-Blanks***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | Analysis Date | Concentration MDL | Found | Q | Control Limits Lower | Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| Uranium | WG62478ICB1 | ICB | 6/15/98 8:59:00 PM | 0.0001 | 0.00000 | | -0.00022 | 0.00022 | mg/L | |
| Uranium | WG62478ICB2 | ICB | 6/15/98 10:41:00 PM | 0.0001 | 0.00001 | | -0.00022 | 0.00022 | mg/L | |
| Uranium | WG62478ICB3 | ICB | 6/16/98 12:27:00 AM | 0.0001 | 0.00001 | | -0.00022 | 0.00022 | mg/L | |
| Uranium | WG62478ICB4 | ICB | 6/16/98 1:28:00 AM | 0.0001 | 0.00001 | | -0.00022 | 0.00022 | mg/L | |
| Vanadium | WG62478ICB1 | ICB | 6/15/98 8:59:00 PM | 0.0002 | 0.00004 | | -0.00044 | 0.00044 | mg/L | |
| Vanadium | WG62478ICB2 | ICB | 6/15/98 10:41:00 PM | 0.0002 | -0.00014 | | -0.00044 | 0.00044 | mg/L | |
| Vanadium | WG62478ICB3 | ICB | 6/16/98 12:27:00 AM | 0.0002 | 0.00014 | | -0.00044 | 0.00044 | mg/L | |
| Vanadium | WG62478ICB4 | ICB | 6/16/98 1:28:00 AM | 0.0002 | 0.00011 | | -0.00044 | 0.00044 | mg/L | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICPMS
**QC Report** ***Calibration Verification-Blanks***

| | |
|---|---|
| ACZ Project # | L18846 |
| QC Report ID | QC1759-E |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

## Total Recoverable Metals

Method M6020 ICPMS

| Element | ACZ ID | QC Type | Analysis Date | Concentration | | | Control Limits | | Units | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | MDL | Found | Q | Lower | Upper | | |
| Arsenic | WG62478ICB1 | ICB | 6/15/98 8:59:00 PM | 0.001 | -0.00008 | | -0.0022 | 0.0022 | mg/L | |
| Arsenic | WG62478ICB2 | ICB | 6/15/98 10:41:00 PM | 0.001 | 0.00006 | | -0.0022 | 0.0022 | mg/L | |
| Arsenic | WG62478ICB3 | ICB | 6/16/98 12:27:00 AM | 0.001 | 0.00029 | | -0.0022 | 0.0022 | mg/L | |
| Arsenic | WG62478ICB4 | ICB | 6/16/98 1:28:00 AM | 0.001 | 0.00007 | | -0.0022 | 0.0022 | mg/L | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Wet Chemistry*
**QC Report** ***Calibration Verification-Blanks***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Alkalinity as CaCO3

Method M2320B

| ACZ ID | QC Type | Analysis Date | Concentration MDL | Found | Q | Control Limits Lower | Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|
| WG62810ICB | ICB | 6/18/98 4:46:00 PM | 2 | 2.6300 | | -4 | 4 | mg/L | |
| WG62810CCB2 | CCB | 6/18/98 7:03:00 PM | 2 | 4.2700 | | -4 | 4 | mg/L | X |
| WG62810CCB4 | CCB | 6/18/98 8:59:00 PM | 2 | 4.1800 | | -4 | 4 | mg/L | X |
| WG62964ICB | ICB | 6/19/98 11:11:00 PM | 2 | 3.4500 | | -4 | 4 | mg/L | |
| WG62964CCB3 | CCB | 6/20/98 2:56:00 AM | 2 | 3.0000 | | -4 | 4 | mg/L | |

## Carbon, total organic (TOC)

Method M415.1 Oxidation/IR

| ACZ ID | QC Type | Analysis Date | Concentration MDL | Found | Q | Control Limits Lower | Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|
| WG62533ICB | ICB | 6/15/98 | 1 | 0.000 | | -1 | 1 | mg/L | |
| WG62533CCB1 | CCB | 6/15/98 | 1 | 0.000 | | -1 | 1 | mg/L | |
| WG62533CCB2 | CCB | 6/15/98 | 1 | 0.000 | | -1 | 1 | mg/L | |

## Chloride

Method M325.2 - Colorimetric (RFA)

| ACZ ID | QC Type | Analysis Date | Concentration MDL | Found | Q | Control Limits Lower | Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|
| WG63015ICB | ICB | 6/22/98 11:35:21 AM | 1 | -1.1750 | | -2 | 2 | mg/L | |
| WG63015CCB1 | CCB | 6/22/98 11:51:20 AM | 1 | -1.1350 | | -2 | 2 | mg/L | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Wet Chemistry*
**QC Report** | ***Calibration Verification-Blanks***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Conductivity @25C

Method M120.1 - Meter

| ACZ ID | QC Type | Analysis Date | Concentration MDL | Found | Q | Control Limits Lower | Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|
| WG62810ICB | ICB | 6/18/98 4:36:00 PM | 1 | 2.7470 | | -5 | 5 | hos/cm | |
| WG62810CCB1 | CCB | 6/18/98 6:59:00 PM | 1 | 2.8990 | | -5 | 5 | hos/cm | |
| WG62810CCB3 | CCB | 6/18/98 8:55:00 PM | 1 | 3.0390 | | -5 | 5 | hos/cm | |

## Nitrate as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | Analysis Date | Concentration MDL | Found | Q | Control Limits Lower | Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|
| WG62436ICB | ICB | 6/15/98 | 0.01 | 0.0160 | | -0.01 | 0.01 | mg/L | X |
| WG62436CCB2 | CCB | 6/15/98 | 0.01 | 0.0160 | | -0.01 | 0.01 | mg/L | X |
| WG62436CCB3 | CCB | 6/15/98 | 0.01 | 0.0000 | | -0.01 | 0.01 | mg/L | |

## Nitrite as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | Analysis Date | Concentration MDL | Found | Q | Control Limits Lower | Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|
| WG62436ICB | ICB | 6/15/98 | 0.01 | 0.0110 | | -0.01 | 0.01 | mg/L | X |
| WG62436CCB2 | CCB | 6/15/98 | 0.01 | 0.0140 | | -0.01 | 0.01 | mg/L | X |
| WG62436CCB3 | CCB | 6/15/98 | 0.01 | 0.0000 | | -0.01 | 0.01 | mg/L | |

## Nitrogen, ammonia

Method M350.1 - Automated Phenate

| ACZ ID | QC Type | Analysis Date | Concentration MDL | Found | Q | Control Limits Lower | Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|
| WG62972ICB | ICB | 6/19/98 10:59:11 PM | 0.05 | 0.0100 | | -0.1 | 0.1 | mg/L | |
| WG62972CCB1 | CCB | 6/19/98 11:15:09 PM | 0.05 | 0.0110 | | -0.1 | 0.1 | mg/L | |
| WG62972CCB2 | CCB | 6/19/98 11:31:08 PM | 0.05 | -0.0030 | | -0.1 | 0.1 | mg/L | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Wet Chemistry*
**QC Report** ***Calibration Verification-Blanks***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Sulfide as S

Method SM427C - Modified, Methylene Blue

| ACZ ID | QC Type | Analysis Date | Concentration | | | Control Limits | | Units | Q |
|---|---|---|---|---|---|---|---|---|---|
| | | | MDL | Found | Q | Lower | Upper | | |
| WG62597CCB1 | CCB | 6/15/98 | 0.02 | 0.000 | | -0.04 | 0.04 | mg/L | |

ACZ ✓ Client

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

***Spike Verification***

***Cover Page***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

| | Page |
|---|---|
| **Metal Analysis** | 33 |
| Metals - Hydride | |
| Total Recoverable Metals | |
| Metals - ICP | |
| Dissolved Metals | |
| Total Recoverable Metals | |
| Metals - ICPMS | |
| Dissolved Metals | |
| Total Recoverable Metals | |
| **Wet Chemistry** | 41 |
| Alphabetical by Parameter | |

Additional analytical runs may have been required as a result of matrix effects and/or instrumental problems.
Re-analysis data immediately follows initial QC data as outlined in above sequence.

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - Hydride*
**QC Report** | ***Spike Verification***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Selenium, total recoverable

Method SM 3500-Se C, AA-Hydride

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L18795-10AS | AS | II980316-5 | 6/25/98 2:17:00 PM | 0.02 | | U | 0.0209 | | mg/L | 104.5 | 75 | 125 | Y |
| L18795-10ASD | ASD | II980316-5 | 6/25/98 2:18:00 PM | 0.02 | | U | 0.0217 | | mg/L | 108.5 | 75 | 125 | Y |
| L18861-01AS | AS | II980316-5 | 6/25/98 2:36:00 PM | 0.02 | 0.004 | B | 0.0240 | | mg/L | 100 | 75 | 125 | Y |
| L18861-01ASD | ASD | II980316-5 | 6/25/98 2:37:00 PM | 0.02 | 0.004 | B | 0.0242 | | mg/L | 101 | 75 | 125 | Y |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICP
**QC Report** *Spike Verification*

| | |
|---|---|
| ACZ Project # | L18846 |
| QC Report ID | QC1759-E |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | L18846-03AS | AS | II980423-1 | 6/12/98 1:12:00 AM | 1 | 0.1 | B | 1.07 | | mg/L | 96.9 | 85 | 115 | |
| Aluminum | L18846-03ASD | ASD | II980423-1 | 6/12/98 1:17:00 AM | 1 | 0.1 | B | 1.07 | | mg/L | 96.8 | 85 | 115 | |
| Aluminum | L18791-09AS | AS | II980423-1 | 6/13/98 4:20:00 AM | 1 | | U | 1.01 | | mg/L | 100.6 | 85 | 115 | Y |
| Aluminum | L18791-09ASD | ASD | II980423-1 | 6/13/98 4:25:00 AM | 1 | | U | 1.01 | | mg/L | 101 | 85 | 115 | Y |
| Cadmium | L18846-03AS | AS | II980509-1 | 6/12/98 1:12:00 AM | 0.5 | 0.009 | B | 0.455 | | mg/L | 89.3 | 85 | 115 | |
| Cadmium | L18846-03ASD | ASD | II980509-1 | 6/12/98 1:17:00 AM | 0.5 | 0.009 | B | 0.473 | | mg/L | 92.7 | 85 | 115 | |
| Cadmium | L18791-09AS | AS | II980509-1 | 6/13/98 4:20:00 AM | 0.5 | | U | 0.489 | | mg/L | 97.7 | 85 | 115 | Y |
| Cadmium | L18791-09ASD | ASD | II980509-1 | 6/13/98 4:25:00 AM | 0.5 | | U | 0.493 | | mg/L | 98.7 | 85 | 115 | Y |
| Calcium | L18846-03AS | AS | II980423-1 | 6/12/98 1:12:00 AM | 90 | 435 | | 488 | | mg/L | 59.2 | 85 | 115 | Z |
| Calcium | L18846-03ASD | ASD | II980423-1 | 6/12/98 1:17:00 AM | 90 | 435 | | 502 | | mg/L | 74.8 | 85 | 115 | Z |
| Calcium | L18791-09AS | AS | II980423-1 | 6/13/98 4:20:00 AM | 90 | 0.6 | B | 89.4 | | mg/L | 98.6 | 85 | 115 | Y |
| Calcium | L18791-09ASD | ASD | II980423-1 | 6/13/98 4:25:00 AM | 90 | 0.6 | B | 89.6 | | mg/L | 98.9 | 85 | 115 | Y |
| Iron | L18846-03AS | AS | II980509-1 | 6/12/98 1:12:00 AM | 1 | 142 | | 131 | | mg/L | -1060 | 85 | 115 | Z |
| Iron | L18846-03ASD | ASD | II980509-1 | 6/12/98 1:17:00 AM | 1 | 142 | | 135 | | mg/L | -691 | 85 | 115 | Z |
| Iron | L18791-09AS | AS | II980509-1 | 6/13/98 4:20:00 AM | 1 | 0.04 | B | 1.05 | | mg/L | 100.7 | 85 | 115 | Y |
| Iron | L18791-09ASD | ASD | II980509-1 | 6/13/98 4:25:00 AM | 1 | 0.04 | B | 1.05 | | mg/L | 100.9 | 85 | 115 | Y |
| Lead | L18846-03AS | AS | II980509-1 | 6/12/98 1:12:00 AM | 1 | | U | 0.940 | | mg/L | 94 | 85 | 115 | |
| Lead | L18846-03ASD | ASD | II980509-1 | 6/12/98 1:17:00 AM | 1 | | U | 0.993 | | mg/L | 99.3 | 85 | 115 | |
| Lead | L18791-09AS | AS | II980509-1 | 6/13/98 4:20:00 AM | 1 | | U | 1.02 | | mg/L | 102.4 | 85 | 115 | Y |
| Lead | L18791-09ASD | ASD | II980509-1 | 6/13/98 4:25:00 AM | 1 | | U | 0.986 | | mg/L | 98.6 | 85 | 115 | Y |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICP*
**QC Report** | ***Spike Verification***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Magnesium | L18795-08AS | AS | II980423-1 | 6/13/98 5:11:00 AM | 50 | 3.1 | | 51.7 | | mg/L | 97.2 | 85 | 115 | Y |
| Magnesium | L18795-08ASD | ASD | II980423-1 | 6/13/98 5:15:00 AM | 50 | 3.1 | | 52.2 | | mg/L | 98.2 | 85 | 115 | Y |
| Magnesium | L18040-11AS | AS | II980423-1 | 6/18/98 5:27:00 PM | 50 | 1.9 | | 51.9 | | mg/L | 99.9 | 85 | 115 | Y |
| Magnesium | L18040-11ASD | ASD | II980423-1 | 6/18/98 5:31:00 PM | 50 | 1.9 | | 51.7 | | mg/L | 99.7 | 85 | 115 | Y |
| Magnesium | L18846-03AS | AS | II980423-1 | 6/18/98 6:22:00 PM | 50 | 26.8 | | 75.3 | | mg/L | 97 | 85 | 115 | |
| Magnesium | L18846-04AS | AS | II980423-1 | 6/18/98 6:31:00 PM | 50 | 19.8 | | 69.0 | | mg/L | 98.4 | 85 | 115 | |
| Magnesium | L18846-05AS | AS | II980423-1 | 6/18/98 6:40:00 PM | 50 | 18.8 | | 67.5 | | mg/L | 97.4 | 85 | 115 | |
| Manganese | L18795-08AS | AS | II980509-1 | 6/13/98 5:11:00 AM | 0.5 | | U | 0.501 | | mg/L | 100.1 | 85 | 115 | Y |
| Manganese | L18795-08ASD | ASD | II980509-1 | 6/13/98 5:15:00 AM | 0.5 | | U | 0.486 | | mg/L | 97.2 | 85 | 115 | Y |
| Manganese | L18040-11AS | AS | II980509-1 | 6/18/98 5:27:00 PM | 0.5 | 0.007 | B | 0.521 | | mg/L | 102.7 | 85 | 115 | Y |
| Manganese | L18040-11ASD | ASD | II980509-1 | 6/18/98 5:31:00 PM | 0.5 | 0.007 | B | 0.512 | | mg/L | 101.1 | 85 | 115 | Y |
| Manganese | L18846-03AS | AS | II980509-1 | 6/18/98 6:22:00 PM | 0.5 | 8.66 | | 8.81 | | mg/L | 29.1 | 85 | 115 | Z |
| Manganese | L18846-04AS | AS | II980509-1 | 6/18/98 6:31:00 PM | 0.5 | 7.5 | | 7.80 | | mg/L | 60.7 | 85 | 115 | Z |
| Manganese | L18846-05AS | AS | II980509-1 | 6/18/98 6:40:00 PM | 0.5 | 7.3 | | 7.44 | | mg/L | 28.8 | 85 | 115 | Z |
| Nickel | L18846-03AS | AS | II980509-1 | 6/12/98 1:12:00 AM | 0.5 | 0.15 | | 0.578 | | mg/L | 85.6 | 85 | 115 | |
| Nickel | L18846-03ASD | ASD | II980509-1 | 6/12/98 1:17:00 AM | 0.5 | 0.15 | | 0.597 | | mg/L | 89.4 | 85 | 115 | |
| Nickel | L18791-09AS | AS | II980509-1 | 6/13/98 4:20:00 AM | 0.5 | | U | 0.484 | | mg/L | 96.8 | 85 | 115 | Y |
| Nickel | L18791-09ASD | ASD | II980509-1 | 6/13/98 4:25:00 AM | 0.5 | | U | 0.490 | | mg/L | 98.1 | 85 | 115 | Y |
| Potassium | L18846-03AS | AS | II980423-1 | 6/12/98 1:12:00 AM | 100 | 3.4 | | 102 | | mg/L | 98.3 | 85 | 115 | |
| Potassium | L18846-03ASD | ASD | II980423-1 | 6/12/98 1:17:00 AM | 100 | 3.4 | | 103 | | mg/L | 99.7 | 85 | 115 | |
| Potassium | L18791-09AS | AS | II980423-1 | 6/13/98 4:20:00 AM | 100 | 0.6 | B | 105 | | mg/L | 104.4 | 85 | 115 | Y |
| Potassium | L18791-09ASD | ASD | II980423-1 | 6/13/98 4:25:00 AM | 100 | 0.6 | B | 104 | | mg/L | 103.2 | 85 | 115 | Y |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICP*
**QC Report** | ***Spike Verification***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sodium | L18846-03AS | AS | II980423-1 | 6/12/98 1:12:00 AM | 116.4 | 14.9 | | 125 | | mg/L | 94.4 | 85 | 115 | |
| Sodium | L18846-03ASD | ASD | II980423-1 | 6/12/98 1:17:00 AM | 116.4 | 14.9 | | 126 | | mg/L | 95.7 | 85 | 115 | |
| Sodium | L18791-09AS | AS | II980423-1 | 6/13/98 4:20:00 AM | 116.4 | 161 | | 269 | | mg/L | 92.6 | 85 | 115 | Y |
| Sodium | L18791-09ASD | ASD | II980423-1 | 6/13/98 4:25:00 AM | 116.4 | 161 | | 266 | | mg/L | 90.4 | 85 | 115 | Y |
| Zinc | L18846-02AS | AS | II980423-1 | 6/15/98 7:19:00 PM | 0.5 | 39 | | 38.2 | | mg/L | -161 | 85 | 115 | Z |
| Zinc | L18846-02ASD | ASD | II980423-1 | 6/15/98 7:24:00 PM | 0.5 | 39 | | 38.6 | | mg/L | -83.4 | 85 | 115 | Z |
| Zinc | L18846-03AS | AS | II980423-1 | 6/18/98 6:22:00 PM | 0.5 | 29.6 | | 28.8 | | mg/L | -151 | 85 | 115 | Z |
| Zinc | L18846-04AS | AS | II980423-1 | 6/18/98 6:31:00 PM | 0.5 | 34.4 | | 33.8 | | mg/L | -125 | 85 | 115 | Z |
| Zinc | L18846-05AS | AS | II980423-1 | 6/18/98 6:40:00 PM | 0.5 | 34.4 | | 33.1 | | mg/L | -256 | 85 | 115 | Z |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICP*
**QC Report** | ***Spike Verification***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | L18861-03LFM | LFM | II980423-1 | 6/24/98 10:39:00 P | 1 | 0.7 | | 2.17 | | mg/L | 146.8 | 70 | 130 | Y |
| Aluminum | L18861-03LFMD | LFMD | II980423-1 | 6/24/98 10:43:00 P | 1 | 0.7 | | 2.37 | | mg/L | 166.7 | 70 | 130 | Y |
| Cadmium | L18861-03LFM | LFM | II980509-1 | 6/24/98 10:39:00 P | 0.5 | | U | 0.466 | | mg/L | 93.2 | 70 | 130 | Y |
| Cadmium | L18861-03LFMD | LFMD | II980509-1 | 6/24/98 10:43:00 P | 0.5 | | U | 0.464 | | mg/L | 92.8 | 70 | 130 | Y |
| Iron | L18861-03LFM | LFM | II980509-1 | 6/24/98 10:39:00 P | 1 | 0.74 | | 1.85 | | mg/L | 110.6 | 70 | 130 | Y |
| Iron | L18861-03LFMD | LFMD | II980509-1 | 6/24/98 10:43:00 P | 1 | 0.74 | | 1.98 | | mg/L | 123.5 | 70 | 130 | Y |
| Lead | L18861-03LFM | LFM | II980509-1 | 6/24/98 10:39:00 P | 1 | | U | 0.931 | | mg/L | 93.1 | 70 | 130 | Y |
| Lead | L18861-03LFMD | LFMD | II980509-1 | 6/24/98 10:43:00 P | 1 | | U | 0.953 | | mg/L | 95.3 | 70 | 130 | Y |
| Manganese | L18861-03LFM | LFM | II980509-1 | 6/24/98 10:39:00 P | 0.5 | 0.189 | | 0.653 | | mg/L | 92.7 | 70 | 130 | Y |
| Manganese | L18861-03LFMD | LFMD | II980509-1 | 6/24/98 10:43:00 P | 0.5 | 0.189 | | 0.656 | | mg/L | 93.4 | 70 | 130 | Y |
| Nickel | L18861-03LFM | LFM | II980509-1 | 6/24/98 10:39:00 P | 0.5 | | U | 0.457 | | mg/L | 91.4 | 70 | 130 | Y |
| Nickel | L18861-03LFMD | LFMD | II980509-1 | 6/24/98 10:43:00 P | 0.5 | | U | 0.456 | | mg/L | 91.3 | 70 | 130 | Y |
| Zinc | L18852-01LFM | LFM | II980423-1 | 6/25/98 6:42:00 PM | 0.5 | 162 | | 161 | | mg/L | -195 | 70 | 130 | Z |
| Zinc | L18852-01LFMD | LFMD | II980423-1 | 6/25/98 6:55:00 PM | 0.5 | 162 | | 159 | | mg/L | -588 | 70 | 130 | Z |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICPMS*
**QC Report** | ***Spike Verification***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | L18846-01LFM | LFM | MS980526-6 | 6/16/98 7:32:00 AM | 0.1 | | U | 0.0890 | | mg/L | 89 | 70 | 130 | |
| Arsenic | L18846-01LFMD | LFMD | MS980526-6 | 6/16/98 7:41:00 AM | 0.1 | | U | 0.0850 | | mg/L | 85 | 70 | 130 | |
| Chromium | L18851-01LFM | LFM | MS980526-6 | 6/17/98 1:50:00 AM | 0.1 | | U | 0.0970 | | mg/L | 97 | 70 | 130 | Y |
| Chromium | L18851-01LFMD | LFMD | MS980526-6 | 6/17/98 1:58:00 AM | 0.1 | | U | 0.0990 | | mg/L | 99 | 70 | 130 | Y |
| Copper | L18846-01LFM | LFM | MS980526-6 | 6/16/98 7:32:00 AM | 0.1 | 0.037 | | 0.0900 | | mg/L | 82.6 | 70 | 130 | |
| Copper | L18846-01LFMD | LFMD | MS980526-6 | 6/16/98 7:41:00 AM | 0.1 | 0.037 | | 0.0880 | | mg/L | 80.6 | 70 | 130 | |
| Silver | L18846-01LFM | LFM | MS980526-3 | 6/16/98 7:32:00 AM | 0.1 | | U | 0.0940 | | mg/L | 94 | 70 | 130 | |
| Silver | L18846-01LFMD | LFMD | MS980526-3 | 6/16/98 7:41:00 AM | 0.1 | | U | 0.0940 | | mg/L | 94 | 70 | 130 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICPMS
**QC Report** ***Spike Verification***

| | |
|---|---|
| ACZ Project # | L18846 |
| QC Report ID | QC1759-E |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

## Total Recoverable Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | L18846-04LFM | LFM | MS980526-6 | 6/16/98 12:00:00 A | 0.2 | | U | 0.206 | | mg/L | 103 | 70 | 130 | |
| Antimony | L18846-04LFMD | LFMD | MS980526-6 | 6/16/98 12:10:00 A | 0.2 | | U | 0.200 | | mg/L | 100 | 70 | 130 | |
| Chromium | L18846-04LFM | LFM | MS980526-6 | 6/16/98 10:23:00 P | 0.2 | | U | 0.180 | | mg/L | 90 | 70 | 130 | |
| Chromium | L18846-04LFMD | LFMD | MS980526-6 | 6/16/98 10:32:00 P | 0.2 | | U | 0.161 | | mg/L | 80.5 | 70 | 130 | |
| Copper | L18846-04LFM | LFM | MS980526-6 | 6/16/98 12:00:00 A | 0.2 | 0.088 | | 0.286 | | mg/L | 99 | 70 | 130 | |
| Copper | L18846-04LFMD | LFMD | MS980526-6 | 6/16/98 12:10:00 A | 0.2 | 0.088 | | 0.267 | | mg/L | 89.5 | 70 | 130 | |
| Molybdenum | L18846-04LFM | LFM | MS980526-6 | 6/16/98 12:00:00 A | 0.2 | | U | 0.193 | | mg/L | 96.5 | 70 | 130 | |
| Molybdenum | L18846-04LFMD | LFMD | MS980526-6 | 6/16/98 12:10:00 A | 0.2 | | U | 0.184 | | mg/L | 92 | 70 | 130 | |
| Silver | L18846-04LFM | LFM | MS980526-3 | 6/16/98 12:00:00 A | 0.05 | | U | 0.0480 | | mg/L | 96 | 70 | 130 | |
| Silver | L18846-04LFMD | LFMD | MS980526-3 | 6/16/98 12:10:00 A | 0.05 | | U | 0.0470 | | mg/L | 94 | 70 | 130 | |
| Uranium | L18846-04LFM | LFM | MS980526-6 | 6/16/98 12:00:00 A | 0.1 | 0.0013 | B | 0.105 | | mg/L | 103.7 | 70 | 130 | |
| Uranium | L18846-04LFMD | LFMD | MS980526-6 | 6/16/98 12:10:00 A | 0.1 | 0.0013 | B | 0.0990 | | mg/L | 97.7 | 70 | 130 | |
| Vanadium | L18846-04LFM | LFM | MS980526-6 | 6/16/98 12:00:00 A | 0.2 | | U | 0.181 | | mg/L | 90.5 | 70 | 130 | |
| Vanadium | L18846-04LFMD | LFMD | MS980526-6 | 6/16/98 12:10:00 A | 0.2 | | U | 0.175 | | mg/L | 87.5 | 70 | 130 | |

| ACZ | Client |
|---|---|
| √ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs. CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - ICPMS*
**QC Report** ***Spike Verification***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M6020 ICPMS

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | L18846-04LFM | LFM | MS980526-6 | 6/16/98 12:00:00 A | 0.1 | 0.011 | B | 0.107 | | mg/L | 96 | 70 | 130 | |
| Arsenic | L18846-04LFMD | LFMD | MS980526-6 | 6/16/98 12:10:00 A | 0.1 | 0.011 | B | 0.107 | | mg/L | 96 | 70 | 130 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Wet Chemistry*
**QC Report** ***Spike Verification***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Carbon, total organic (TOC)

Method M415.1 Oxidation/IR

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L18852-02AS | AS | WC970609-1 | 6/15/98 | 38 | 2 | B | 44.0 | | mg/L | 111 | 75 | 125 | Y |

## Chloride

Method M325.2 - Colorimetric (RFA)

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L18848-03AS | AS | WC980608-4 | 6/22/98 11:54:00 AM | 50 | | U | 48.4 | | mg/L | 96.9 | 75 | 125 | Y |

## Nitrate as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L18044-10AS | AS | PCN8033 | 6/15/98 | 2.25 | 0.02 | B | 2.33 | | mg/L | 103 | 80 | 120 | Y |

## Nitrite as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L18044-10AS | AS | PCN7072 | 6/15/98 | 3.04 | | U | 3.08 | | mg/L | 101 | 80 | 120 | Y |

## Nitrogen, ammonia

Method M350.1 - Automated Phenate

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L18802-14AS | AS | WC980401-2 | 6/19/98 11:17:49 PM | 0.5 | | U | 0.497 | | mg/L | 99.4 | 75 | 125 | Y |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Wet Chemistry*
**QC Report** ***Spike Verification***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Sulfide as S

Method SM427C - Modified, Methylene Blue

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L18852-03AS | AS | WC980615-1 | 6/15/98 | 0.535 | | U | 0.638 | | mg/L | 119 | 75 | 125 | Y |

ACZ / Client ✓

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

## Duplicate Verification

## Cover Page

| | |
|---|---|
| ACZ Project # | L18846 |
| QC Report ID | QC1759-E |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

| | Page |
|---|---|
| **Metal Analysis** | 44 |
| Metals - Hydride | |
| Total Recoverable Metals | |
| Metals - ICP | |
| Dissolved Metals | |
| Total Recoverable Metals | |
| Metals - ICPMS | |
| Dissolved Metals | |
| Total Recoverable Metals | |
| **Wet Chemistry** | 51 |
| Alphabetical by Parameter | |

Additional analytical runs may have been required as a result of matrix effects and/or instrumental problems.
Re-analysis data immediately follows initial QC data as outlined in above sequence.

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - Hydride*
**QC Report** ***Duplicate Verification***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Selenium, total recoverable

Method SM 3500-Se C, AA-Hydride

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) | | | | RPD | Control Limits, % | | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample | Q | Duplicate | Q | (%) | Lower | Upper | |
| L18795-10ASD | ASD | 6/25/98 2:18:00 PM | 0.0209 | | 0.0217 | | 3.8 | 0 | 20 | |
| L18861-01ASD | ASD | 6/25/98 2:37:00 PM | 0.0240 | | 0.0242 | | 0.8 | 0 | 20 | |

ACZ ✓ Client

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICP
**QC Report** ***Duplicate Verification***

| | |
|---|---|
| ACZ Project # | L18846 |
| QC Report ID | QC1759-E |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | L18846-03ASD | ASD | 1.07 | | 1.07 | | 0.1 | 0 | 20 | |
| Aluminum | L18791-09ASD | ASD | 1.01 | | 1.01 | | 0.4 | 0 | 20 | |
| Cadmium | L18846-03ASD | ASD | 0.455 | | 0.473 | | 3.7 | 0 | 20 | |
| Cadmium | L18791-09ASD | ASD | 0.489 | | 0.493 | | 1 | 0 | 20 | |
| Calcium | L18846-03ASD | ASD | 488 | | 502 | | 2.8 | 0 | 20 | |
| Calcium | L18791-09ASD | ASD | 89.4 | | 89.6 | | 0.3 | 0 | 20 | |
| Iron | L18846-03ASD | ASD | 131 | | 135 | | 2.7 | 0 | 20 | |
| Iron | L18791-09ASD | ASD | 1.05 | | 1.05 | | 0.2 | 0 | 20 | |
| Lead | L18846-03ASD | ASD | 0.940 | | 0.993 | | 5.6 | 0 | 20 | |
| Lead | L18791-09ASD | ASD | 1.02 | | 0.986 | | 3.7 | 0 | 20 | |
| Magnesium | L18795-08ASD | ASD | 51.7 | | 52.2 | | 1 | 0 | 20 | |
| Magnesium | L18040-11ASD | ASD | 51.9 | | 51.7 | | 0.2 | 0 | 20 | |
| Manganese | L18795-08ASD | ASD | 0.501 | | 0.486 | | 2.9 | 0 | 20 | |
| Manganese | L18040-11ASD | ASD | 0.521 | | 0.512 | | 1.6 | 0 | 20 | |
| Nickel | L18846-03ASD | ASD | 0.578 | | 0.597 | | 3.2 | 0 | 20 | |
| Nickel | L18791-09ASD | ASD | 0.484 | | 0.490 | | 1.4 | 0 | 20 | |
| Potassium | L18846-03ASD | ASD | 102 | | 103 | | 1.3 | 0 | 20 | |
| Potassium | L18791-09ASD | ASD | 105 | | 104 | | 1.1 | 0 | 20 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICP
**QC Report** ***Duplicate Verification***

| | |
|---|---|
| ACZ Project # | L18846 |
| QC Report ID | QC1759-E |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| Sodium | L18846-03ASD | ASD | 125 | | 126 | | 1.2 | 0 | 20 | |
| Sodium | L18791-09ASD | ASD | 269 | | 266 | | 1 | 0 | 20 | |
| Zinc | L18846-02ASD | ASD | 38.2 | | 38.6 | | 1 | 0 | 20 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - ICP*
**QC Report** ***Duplicate Verification***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | L18861-03LFMD | LFMD | 2.17 | | 2.37 | | 8.8 | 0 | 20 | |
| Cadmium | L18861-03LFMD | LFMD | 0.466 | | 0.464 | | 0.4 | 0 | 20 | |
| Iron | L18861-03LFMD | LFMD | 1.85 | | 1.98 | | 6.8 | 0 | 20 | |
| Lead | L18861-03LFMD | LFMD | 0.931 | | 0.953 | | 2.3 | 0 | 20 | |
| Manganese | L18861-03LFMD | LFMD | 0.653 | | 0.656 | | 0.5 | 0 | 20 | |
| Nickel | L18861-03LFMD | LFMD | 0.457 | | 0.456 | | 0.1 | 0 | 20 | |
| Zinc | L18852-01LFMD | LFMD | 161 | | 159 | | 1.2 | 0 | 20 | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICPMS*
**QC Report** | ***Duplicate Verification***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | L18846-01LFMD | LFMD | 0.0890 | | 0.0850 | | 4.6 | 0 | 20 | |
| Chromium | L18851-01LFMD | LFMD | 0.0970 | | 0.0990 | | 2 | 0 | 20 | |
| Copper | L18846-01LFMD | LFMD | 0.0900 | | 0.0880 | | 2.2 | 0 | 20 | |
| Silver | L18846-01LFMD | LFMD | 0.0940 | | 0.0940 | | 0 | 0 | 20 | |

ACZ ✓ Client

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - ICPMS*
**QC Report** ***Duplicate Verification***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | L18846-04LFMD | LFMD | 0.206 | | 0.200 | | 3 | 0 | 20 | |
| Chromium | L18846-04LFMD | LFMD | 0.180 | | 0.161 | | 11.1 | 0 | 20 | |
| Copper | L18846-04LFMD | LFMD | 0.286 | | 0.267 | | 6.9 | 0 | 20 | |
| Molybdenum | L18846-04LFMD | LFMD | 0.193 | | 0.184 | | 4.8 | 0 | 20 | |
| Silver | L18846-04LFMD | LFMD | 0.0480 | | 0.0470 | | 2.1 | 0 | 20 | |
| Uranium | L18846-04LFMD | LFMD | 0.105 | | 0.0990 | | 5.9 | 0 | 20 | |
| Vanadium | L18846-04LFMD | LFMD | 0.181 | | 0.175 | | 3.4 | 0 | 20 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICPMS*
**QC Report** | ***Duplicate Verification***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M6020 ICPMS

| Element | ACZ ID | QC Type | Concentration (mg/L) | | | | RPD | Control Limits, % | | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample | Q | Duplicate | Q | (%) | Lower | Upper | |
| Arsenic | L18846-04LFMD | LFMD | 0.107 | | 0.107 | | 0 | 0 | 20 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Wet Chemistry
**QC Report** ***Duplicate Verification***

| | |
|---|---|
| ACZ Project # | L18846 |
| QC Report ID | QC1759-E |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

## Alkalinity as CaCO3

Method M2320B

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| L18852-01DUP | DUP | 6/18/98 9:15:00 PM | 4.00 | B | 3.40 | B | 16.2 | 0 | 20 | |

## Carbon, total organic (TOC)

Method M415.1 Oxidation/IR

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| L18790-12DUP | DUP | 6/15/98 | 2.00 | B | 2.00 | B | 0 | 0 | 20 | |

## Chloride

Method M325.2 - Colorimetric (RFA)

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| L18848-03DUP | DUP | 6/22/98 11:52:40 AM | | U | | U | | 0 | 20 | |

## Conductivity @25C

Method M120.1 - Meter

| ACZ ID | QC Type | Analysis Date | Concentration (umhos/cm) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| L18812-11DUP | DUP | 6/18/98 7:07:00 PM | 787 | | 784 | | 0.4 | 0 | 20 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Wet Chemistry*
**QC Report** | ***Duplicate Verification***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Nitrate as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| L18044-10DUP | DUP | 6/15/98 | 0.0200 | B | 0.0300 | B | 40 | 0 | 20 | |

## Nitrite as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| L18044-10DUP | DUP | 6/15/98 | | U | | U | | 0 | 20 | |

## Nitrogen, ammonia

Method M350.1 - Automated Phenate

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| L18802-14DUP | DUP | 6/19/98 11:16:29 PM | | U | | U | | 0 | 20 | |

## pH (lab)

Method M150.1 - Electrometric

| ACZ ID | QC Type | Analysis Date | Concentration (units) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| L18852-01DUP | DUP | 6/18/98 9:13:00 PM | 4.70 | | 4.67 | | 0.6 | 0 | 20 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Wet Chemistry*
**QC Report** | ***Duplicate Verification***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Residue, Filterable (TDS) @180C

Method M160.1 - Gravimetric

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| L18846-03DUP | DUP | 6/11/98 | 3440 | | 3450 | | 0.3 | 0 | 20 | |

## Residue, Non-Filterable (TSS) @103-5C

Method M160.2 - Gravimetric

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| L18840-01DUP | DUP | 6/10/98 | | U | | U | | 0 | 20 | |

## Sulfate

Method M375.3 - Gravimetric

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| L18846-05DUP | DUP | 6/19/98 | 1680 | | 1720 | | 2.6 | 0 | 20 | |

## Sulfide as S

Method SM427C - Modified, Methylene Blue

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| L18852-03DUP | DUP | 6/15/98 | | U | | U | | 0 | 20 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

***Method Verification - Control Samples***

***Cover Page***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

| | Page |
|---|---|
| **Metal Analysis** | 55 |
| Metals - Hydride | |
| Total Recoverable Metals | |
| Metals - ICP | |
| Dissolved Metals | |
| Total Recoverable Metals | |
| Metals - ICPMS | |
| Dissolved Metals | |
| Total Recoverable Metals | |
| **Wet Chemistry** | 62 |
| Alphabetical by Parameter | |

Additional analytical runs may have been required as a result of matrix effects and/or instrumental problems.
Re-analysis data immediately follows initial QC data as outlined in above sequence.

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - Hydride
**QC Report** ***Method Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Selenium, total recoverable

Method SM 3500-Se C, AA-Hydride

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG63103LCSW | LCSW | II980316-6 | 6/25/98 2:11:00 PM | 0.02 | 0.0197 | | 98.5 | 80 | 120 | |
| WG63103LFB | LFB | II980316-5 | 6/25/98 2:13:00 PM | 0.02 | 0.0198 | | 99 | 80 | 120 | |

ACZ ✓ Client

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICP
**QC Report** ***Method Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | L18846 |
| QC Report ID | QC1759-E |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | WG62487LFB | LFB | II980423-1 | 6/12/98 12:17:00 AM | 1 | 1.01 | | 101 | 85 | 115 | |
| Aluminum | WG62484LFB | LFB | II980423-1 | 6/13/98 3:58:00 AM | 1 | 0.975 | | 97.5 | 85 | 115 | |
| Cadmium | WG62487LFB | LFB | II980509-1 | 6/12/98 12:17:00 AM | 0.5 | 0.493 | | 98.7 | 85 | 115 | |
| Cadmium | WG62484LFB | LFB | II980509-1 | 6/13/98 3:58:00 AM | 0.5 | 0.475 | | 94.9 | 85 | 115 | |
| Calcium | WG62487LFB | LFB | II980423-1 | 6/12/98 12:17:00 AM | 90 | 87.0 | | 96.7 | 85 | 115 | |
| Calcium | WG62484LFB | LFB | II980423-1 | 6/13/98 3:58:00 AM | 90 | 86.0 | | 95.6 | 85 | 115 | |
| Iron | WG62487LFB | LFB | II980509-1 | 6/12/98 12:17:00 AM | 1 | 0.985 | | 98.5 | 85 | 115 | |
| Iron | WG62484LFB | LFB | II980509-1 | 6/13/98 3:58:00 AM | 1 | 0.974 | | 97.4 | 85 | 115 | |
| Lead | WG62487LFB | LFB | II980509-1 | 6/12/98 12:17:00 AM | 1 | 0.979 | | 97.9 | 85 | 115 | |
| Lead | WG62484LFB | LFB | II980509-1 | 6/13/98 3:58:00 AM | 1 | 0.960 | | 96 | 85 | 115 | |
| Magnesium | WG62484LFB | LFB | II980423-1 | 6/13/98 3:58:00 AM | 50 | 47.2 | | 94.3 | 85 | 115 | |
| Magnesium | WG62859LFB | LFB | II980423-1 | 6/18/98 5:18:00 PM | 50 | 48.4 | | 96.8 | 85 | 115 | |
| Manganese | WG62484LFB | LFB | II980509-1 | 6/13/98 3:58:00 AM | 0.5 | 0.478 | | 95.7 | 85 | 115 | |
| Manganese | WG62859LFB | LFB | II980509-1 | 6/18/98 5:18:00 PM | 0.5 | 0.494 | | 98.8 | 85 | 115 | |
| Nickel | WG62487LFB | LFB | II980509-1 | 6/12/98 12:17:00 AM | 0.5 | 0.483 | | 96.6 | 85 | 115 | |
| Nickel | WG62484LFB | LFB | II980509-1 | 6/13/98 3:58:00 AM | 0.5 | 0.473 | | 94.6 | 85 | 115 | |
| Potassium | WG62487LFB | LFB | II980423-1 | 6/12/98 12:17:00 AM | 100 | 101 | | 101 | 85 | 115 | |
| Potassium | WG62484LFB | LFB | II980423-1 | 6/13/98 3:58:00 AM | 100 | 99.9 | | 99.9 | 85 | 115 | |

ACZ / Client ✓

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICP
**QC Report** ***Method Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sodium | WG62487LFB | LFB | II980423-1 | 6/12/98 12:17:00 AM | 116.4 | 117 | | 101 | 85 | 115 | |
| Sodium | WG62484LFB | LFB | II980423-1 | 6/13/98 3:58:00 AM | 116.4 | 117 | | 100 | 85 | 115 | |
| Zinc | WG62611LFB | LFB | II980423-1 | 6/15/98 6:06:00 PM | 0.5 | 0.495 | | 99.1 | 85 | 115 | |
| Zinc | WG62859LFB | LFB | II980423-1 | 6/18/98 5:18:00 PM | 0.5 | 0.498 | | 99.6 | 85 | 115 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICP
**QC Report** ***Method Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | L18846 |
| QC Report ID | QC1759-E |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

## Total Recoverable Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | WG63232LCSW | LCSW | II980608-2 | 6/24/98 9:20:00 PM | 1 | 0.976 | | 97.6 | 85 | 115 | |
| Aluminum | WG63232LFB | LFB | II980423-1 | 6/24/98 9:24:00 PM | 1 | 0.944 | | 94.4 | 85 | 115 | |
| Cadmium | WG63232LCSW | LCSW | II980608-2 | 6/24/98 9:20:00 PM | 1 | 0.978 | | 97.8 | 85 | 115 | |
| Cadmium | WG63232LFB | LFB | II980509-1 | 6/24/98 9:24:00 PM | 0.5 | 0.487 | | 97.4 | 85 | 115 | |
| Iron | WG63232LCSW | LCSW | II980608-2 | 6/24/98 9:20:00 PM | 1 | 0.951 | | 95.1 | 85 | 115 | |
| Iron | WG63232LFB | LFB | II980509-1 | 6/24/98 9:24:00 PM | 1 | 0.961 | | 96.1 | 85 | 115 | |
| Lead | WG63232LCSW | LCSW | II980608-2 | 6/24/98 9:20:00 PM | 1 | 0.963 | | 96.3 | 85 | 115 | |
| Lead | WG63232LFB | LFB | II980509-1 | 6/24/98 9:24:00 PM | 1 | 0.967 | | 96.7 | 85 | 115 | |
| Manganese | WG63232LCSW | LCSW | II980608-2 | 6/24/98 9:20:00 PM | 1 | 0.977 | | 97.7 | 85 | 115 | |
| Manganese | WG63232LFB | LFB | II980509-1 | 6/24/98 9:24:00 PM | 0.5 | 0.482 | | 96.3 | 85 | 115 | |
| Nickel | WG63232LCSW | LCSW | II980608-2 | 6/24/98 9:20:00 PM | 1 | 0.952 | | 95.2 | 85 | 115 | |
| Nickel | WG63232LFB | LFB | II980509-1 | 6/24/98 9:24:00 PM | 0.5 | 0.475 | | 95 | 85 | 115 | |
| Zinc | WG63330LCSW | LCSW | II980608-2 | 6/25/98 6:07:00 PM | 1 | 0.918 | | 91.8 | 85 | 115 | |
| Zinc | WG63330LFB | LFB | II980423-1 | 6/25/98 6:11:00 PM | 0.5 | 0.479 | | 95.8 | 85 | 115 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICPMS
**QC Report** ***Method Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | L18846 |
| QC Report ID | QC1759-E |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

## Dissolved Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | WG62476LFB | LFB | MS980526-6 | 6/16/98 5:50:00 AM | 0.1 | 0.0986 | | 98.6 | 85 | 115 | |
| Chromium | WG62688LFB | LFB | MS980526-6 | 6/16/98 11:57:00 PM | 0.1 | 0.100 | | 100 | 85 | 115 | |
| Copper | WG62476LFB | LFB | MS980526-6 | 6/16/98 5:50:00 AM | 0.1 | 0.1000 | | 100 | 85 | 115 | |
| Silver | WG62476LFB | LFB | MS980526-3 | 6/16/98 5:50:00 AM | 0.1 | 0.0963 | | 96.3 | 85 | 115 | |

ACZ / Client

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICPMS
**QC Report** ***Method Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | L18846 |
| QC Report ID | QC1759-E |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

## Total Recoverable Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | WG62478LFB | LFB | MS980526-6 | 6/15/98 9:24:00 PM | 0.2 | 0.199 | | 99.7 | 85 | 115 | |
| Antimony | WG62478LCSW | LCSW | II980610-1 | 6/15/98 9:41:00 PM | 0.1 | 0.101 | | 101 | 85 | 115 | |
| Chromium | WG62478LFB | LFB | MS980526-6 | 6/15/98 9:24:00 PM | 0.2 | 0.199 | | 99.3 | 85 | 115 | |
| Chromium | WG62478LCSW | LCSW | II980610-1 | 6/15/98 9:41:00 PM | 0.1 | 0.102 | | 102 | 85 | 115 | |
| Chromium | WG62660LFB | LFB | MS980526-6 | 6/16/98 9:38:00 PM | 0.2 | 0.191 | | 95.7 | 85 | 115 | |
| Copper | WG62478LFB | LFB | MS980526-6 | 6/15/98 9:24:00 PM | 0.2 | 0.192 | | 96.1 | 85 | 115 | |
| Copper | WG62478LCSW | LCSW | II980610-1 | 6/15/98 9:41:00 PM | 0.1 | 0.0990 | | 99 | 85 | 115 | |
| Molybdenum | WG62478LFB | LFB | MS980526-6 | 6/15/98 9:24:00 PM | 0.2 | 0.195 | | 97.4 | 85 | 115 | |
| Molybdenum | WG62478LCSW | LCSW | II980610-1 | 6/15/98 9:41:00 PM | 0.1 | 0.0990 | | 99 | 85 | 115 | |
| Silver | WG62478LFB | LFB | MS980526-3 | 6/15/98 9:24:00 PM | 0.05 | 0.0494 | | 98.7 | 85 | 115 | |
| Silver | WG62478LCSW | LCSW | II980610-1 | 6/15/98 9:41:00 PM | 0.1 | 0.0970 | | 97 | 85 | 115 | |
| Uranium | WG62478LFB | LFB | MS980526-6 | 6/15/98 9:24:00 PM | 0.1 | 0.0975 | | 97.5 | 85 | 115 | |
| Uranium | WG62478LCSW | LCSW | II980610-1 | 6/15/98 9:41:00 PM | 0.05 | 0.0490 | | 98 | 85 | 115 | |
| Vanadium | WG62478LFB | LFB | MS980526-6 | 6/15/98 9:24:00 PM | 0.2 | 0.196 | | 98 | 85 | 115 | |
| Vanadium | WG62478LCSW | LCSW | II980610-1 | 6/15/98 9:41:00 PM | 0.1 | 0.0990 | | 99 | 85 | 115 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICPMS
**QC Report** ***Method Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | L18846 |
| QC Report ID | QC1759-E |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

## Total Recoverable Metals

Method M6020 ICPMS

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | WG62478LFB | LFB | MS980526-6 | 6/15/98 9:24:00 PM | 0.1 | 0.0943 | | 94.3 | 85 | 115 | |
| Arsenic | WG62478LCSW | LCSW | II980610-1 | 6/15/98 9:41:00 PM | 0.1 | 0.0950 | | 95 | 85 | 115 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Wet Chemistry*
**QC Report** ***Method Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Alkalinity as CaCO3

Method M2320B

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62810LCSW3 | LCSW | WC980617-2 | 6/18/98 4:41:00 PM | 213.79 | 212 | | 99.4 | 90 | 110 | |
| WG62810LCSW6 | LCSW | WC980617-2 | 6/18/98 9:31:00 PM | 213.79 | 226 | | 105.7 | 90 | 110 | |
| WG62810LCSW9 | LCSW | WC980617-2 | 6/19/98 3:51:00 AM | 213.79 | 228 | | 106.7 | 90 | 110 | |
| WG62964LCSW3 | LCSW | WC980617-2 | 6/19/98 11:05:00 PM | 213.79 | 229 | | 107.1 | 90 | 110 | |
| WG62964LCSW6 | LCSW | WC980617-2 | 6/20/98 5:35:00 AM | 213.79 | 225 | | 105.4 | 90 | 110 | |

## Conductivity @25C

Method M120.1 - Meter

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (umhos/cm) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62810LCSW1 | LCSW | WC980617-2 | 6/18/98 4:29:00 PM | 1759.8 | 1720 | | 97.6 | 90 | 110 | |
| WG62810LCSW4 | LCSW | WC980617-2 | 6/18/98 9:18:00 PM | 1759.8 | 1710 | | 97.3 | 90 | 110 | |
| WG62810LCSW7 | LCSW | WC980617-2 | 6/19/98 3:26:00 AM | 1759.8 | 1720 | | 97.7 | 90 | 110 | |

## Nitrate as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62436LFB | LFB | PCN7072 | 6/15/98 | 2.25 | 2.34 | | 104 | 90 | 110 | |

## Nitrite as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62436LFB | LFB | PCN8033 | 6/15/98 | 3.04 | 3.10 | | 102 | 90 | 110 | |

ACZ / Client ✓

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Wet Chemistry*
**QC Report** ***Method Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## pH (lab)

Method M150.1 - Electrometric

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (units) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62810LCSW2 | LCSW | WC980617-2 | 6/18/98 4:31:00 PM | 9.22 | 9.22 | | 100 | 90 | 110 | |
| WG62810LCSW5 | LCSW | WC980617-2 | 6/18/98 9:21:00 PM | 9.22 | 9.22 | | 100 | 90 | 110 | |
| WG62810LCSW8 | LCSW | WC980617-2 | 6/19/98 3:41:00 AM | 9.22 | 9.26 | | 100.4 | 90 | 110 | |

## Residue, Filterable (TDS) @180C

Method M160.1 - Gravimetric

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62395LCSW | LCSW | WC980608-3 | 6/11/98 | 264.78 | 306 | | 115.6 | 80 | 120 | |

## Residue, Non-Filterable (TSS) @103-5C

Method M160.2 - Gravimetric

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62326LCSW | LCSW | WC980608-3 | 6/10/98 | 57.3 | 58.0 | | 101.2 | 80 | 120 | |

## Sulfate

Method M375.3 - Gravimetric

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62936LCSW | LCSW | WC980206-4 | 6/19/98 | 100 | 105 | | 104.5 | 80 | 120 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

***Method Verification - Blanks***

***Cover Page***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

| | Page |
|---|---|
| **Metal Analysis** | 65 |
| Metals - Hydride | |
| Total Recoverable Metals | |
| Metals - ICP | |
| Dissolved Metals | |
| Total Recoverable Metals | |
| Metals - ICPMS | |
| Dissolved Metals | |
| Total Recoverable Metals | |
| **Wet Chemistry** | 71 |
| Alphabetical by Parameter | |

Additional analytical runs may have been required as a result of matrix effects and/or instrumental problems.
Re-analysis data immediately follows initial QC data as outlined in above sequence.

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - Hydride
**QC Report** ***Method Verification-Blanks***

| | |
|---|---|
| ACZ Project # | L18846 |
| QC Report ID | QC1759-E |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

## Selenium, total recoverable

Method SM 3500-Se C, AA-Hydride

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) | | | Control Limits | | Q |
|---|---|---|---|---|---|---|---|---|
| | | | MDL | Found | Q | Lower | Upper | |
| WG63103PBW | PBW | 6/25/98 2:10:00 PM | 0.001 | 0.0001000 | | -0.002 | 0.002 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICP*
**QC Report** | ***Method Verification-Blank***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | Analysis Date | Concentration (mg/L) | | | Control Limits | | Q |
|---|---|---|---|---|---|---|---|---|---|
| | | | | MDL | Found | Q | Lower | Upper | |
| Magnesium | WG62859LRB | LRB | 6/18/98 5:13:00 PM | 0.2 | 0.03993 | | -0.44 | 0.44 | |
| Manganese | WG62859LRB | LRB | 6/18/98 5:13:00 PM | 0.005 | 0.00058 | | -0.011 | 0.011 | |
| Zinc | WG62859LRB | LRB | 6/18/98 5:13:00 PM | 0.01 | 0.00110 | | -0.022 | 0.022 | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICP*
**QC Report** | ***Method Verification-Blank***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | Analysis Date | Concentration (mg/L) MDL | Found | Q | Control Limits Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|
| Aluminum | WG63232LRB | LRB | 6/24/98 9:16:00 PM | 0.03 | -0.00083 | | -0.066 | 0.066 | |
| Cadmium | WG63232LRB | LRB | 6/24/98 9:16:00 PM | 0.003 | -0.00143 | | -0.0066 | 0.0066 | |
| Iron | WG63232LRB | LRB | 6/24/98 9:16:00 PM | 0.01 | 0.00154 | | -0.022 | 0.022 | |
| Lead | WG63232LRB | LRB | 6/24/98 9:16:00 PM | 0.04 | -0.01270 | | -0.088 | 0.088 | |
| Manganese | WG63232LRB | LRB | 6/24/98 9:16:00 PM | 0.005 | -0.00024 | | -0.011 | 0.011 | |
| Nickel | WG63232LRB | LRB | 6/24/98 9:16:00 PM | 0.01 | -0.00107 | | -0.022 | 0.022 | |
| Zinc | WG63330LRB | LRB | 6/25/98 6:02:00 PM | 0.01 | 0.00483 | | -0.022 | 0.022 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

| | |
|---|---|
| **Matrix** | *Aqueous* |
| **Analysis Group** | *Metals - ICPMS* |
| **QC Report** | ***Method Verification-Blank*** |

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | Analysis Date | Concentration (mg/L) | | | Control Limits | | Q |
|---|---|---|---|---|---|---|---|---|---|
| | | | | MDL | Found | Q | Lower | Upper | |
| Arsenic | WG62476LRB | LRB | 6/16/98 5:41:00 AM | 0.001 | -0.00003 | | -0.0022 | 0.0022 | |
| Chromium | WG62688LRB | LRB | 6/16/98 11:48:00 PM | 0.0002 | -0.00009 | | -0.00044 | 0.00044 | |
| Copper | WG62476LRB | LRB | 6/16/98 5:41:00 AM | 0.001 | 0.00008 | | -0.0022 | 0.0022 | |
| Silver | WG62476LRB | LRB | 6/16/98 5:41:00 AM | 0.0001 | 0.00000 | | -0.00022 | 0.00022 | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICPMS*
**QC Report** | ***Method Verification-Blank***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | Analysis Date | Concentration (mg/L) MDL | Found | Q | Control Limits Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|
| Antimony | WG62478LRB | LRB | 6/15/98 9:16:00 PM | 0.0002 | 0.00002 | | -0.00044 | 0.00044 | |
| Antimony | WG62478PBW | PBW | 6/15/98 9:33:00 PM | 0.0004 | 0.0000808 | | -0.00088 | 0.00088 | |
| Chromium | WG62478LRB | LRB | 6/15/98 9:16:00 PM | 0.0002 | -0.00004 | | -0.00044 | 0.00044 | |
| Chromium | WG62478PBW | PBW | 6/15/98 9:33:00 PM | 0.0004 | -0.0001388 | | -0.00088 | 0.00088 | |
| Chromium | WG62660LRB | LRB | 6/16/98 9:29:00 PM | 0.0002 | -0.00009 | | -0.00044 | 0.00044 | |
| Copper | WG62478LRB | LRB | 6/15/98 9:16:00 PM | 0.001 | 0.00008 | | -0.0022 | 0.0022 | |
| Copper | WG62478PBW | PBW | 6/15/98 9:33:00 PM | 0.002 | 0.0001783 | | -0.0044 | 0.0044 | |
| Molybdenum | WG62478LRB | LRB | 6/15/98 9:16:00 PM | 0.0002 | 0.00001 | | -0.00044 | 0.00044 | |
| Molybdenum | WG62478PBW | PBW | 6/15/98 9:33:00 PM | 0.0004 | 0.0000176 | | -0.00088 | 0.00088 | |
| Silver | WG62478LRB | LRB | 6/15/98 9:16:00 PM | 0.0001 | 0.00001 | | -0.00022 | 0.00022 | |
| Silver | WG62478PBW | PBW | 6/15/98 9:33:00 PM | 0.0002 | 0.0000136 | | -0.00044 | 0.00044 | |
| Uranium | WG62478LRB | LRB | 6/15/98 9:16:00 PM | 0.0001 | 0.00001 | | -0.00022 | 0.00022 | |
| Uranium | WG62478PBW | PBW | 6/15/98 9:33:00 PM | 0.0002 | 0.0000071 | | -0.00044 | 0.00044 | |
| Vanadium | WG62478LRB | LRB | 6/15/98 9:16:00 PM | 0.0002 | 0.00003 | | -0.00044 | 0.00044 | |
| Vanadium | WG62478PBW | PBW | 6/15/98 9:33:00 PM | 0.0004 | 0.0002721 | | -0.00088 | 0.00088 | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICPMS*
**QC Report** | ***Method Verification-Blank***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M6020 ICPMS

| Element | ACZ ID | QC Type | Analysis Date | Concentration (mg/L) | | | Control Limits | | Q |
|---|---|---|---|---|---|---|---|---|---|
| | | | | MDL | Found | Q | Lower | Upper | |
| Arsenic | WG62478LRB | LRB | 6/15/98 9:16:00 PM | 0.001 | 0.00000 | | -0.0022 | 0.0022 | |
| Arsenic | WG62478PBW | PBW | 6/15/98 9:33:00 PM | 0.002 | -0.0001471 | | -0.0044 | 0.0044 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Wet Chemistry
**QC Report** ***Method Verification-Blanks***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |

## Nitrate as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) MDL | Found | Q | Control Limits Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|
| WG62436LRB | LRB | 6/15/98 | 0.01 | 0.0000 | | -0.01 | 0.01 | |

## Nitrite as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) MDL | Found | Q | Control Limits Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|
| WG62436LRB | LRB | 6/15/98 | 0.01 | 0.0000 | | -0.01 | 0.01 | |

## Residue, Filterable (TDS) @180C

Method M160.1 - Gravimetric

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) MDL | Found | Q | Control Limits Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|
| WG62395PBW | PBW | 6/11/98 | 10 | -4.0000000 | | -20 | 20 | |

## Residue, Non-Filterable (TSS) @103-5C

Method M160.2 - Gravimetric

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) MDL | Found | Q | Control Limits Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|
| WG62326PBW | PBW | 6/10/98 | 5 | 2.0000000 | | -10 | 10 | |

## Sulfate

Method M375.3 - Gravimetric

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) MDL | Found | Q | Control Limits Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|
| WG62936PBW | PBW | 6/19/98 | 10 | -0.8232000 | | -10 | 10 | |

ACZ ✓ Client

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

***Analysis Run Log***

***Cover Page***

| | |
|---|---|
| ACZ Project # | *L18846* |
| QC Report ID | *QC1759-E* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/9/98* |
| Date Reported | *7/6/98* |


| | | Page |
|---|---|---|
| **Metal Analysis** | | 73 |
| Selenium (Total Recoverable) by Hydride | WG63103 | |
| Metals (Dissolved) by ICP | WG62484<br>WG62487<br>WG62611<br>WG62859 | |
| Metals (Total Recoverable) by ICP | WG63232<br>WG63330 | |
| Metals (Dissolved) by ICP-MS | WG62476<br>WG62688 | |
| Metals (Total) by ICP-MS | WG62478<br>WG62660 | |
| **Wet Chemistry** | | 87 |
| Alkalinity as CaCO3 | WG62810<br>WG62964 | |
| Ammonia by RFA | WG62972 | |
| Carbon, total organic (TOC) | WG62533 | |
| Chloride by RFA | WG63015 | |
| Electrical Conductivity @ 25C | WG62810 | |
| Ion Chromatography | WG62436 | |
| pH (lab) | WG62810 | |
| Residue, Filterable (TDS) @180C | WG62395 | |
| Sulfate (Gravimetric) | WG62936 | |
| Sulfide as S | WG62597 | |
| Sulfite | WG62258 | |
| TSS and TVS (Gravimetric) | WG62326 | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** | *Analysis Run Log*

**Analysis** | *Selenium (Total Recoverable) by Hydride*

| | |
|---|---|
| ACZ Project # | L18846 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

Workgroup: WG63103

| ACZ ID | Measure Date | Dilution | Se |
|---|---|---|---|
| WG63103ICV | 6/25/98 | 1 | X |
| WG63103ICB | 6/25/98 | 1 | X |
| WG63103PBW | 6/25/98 | 1 | X |
| WG63103LCSW | 6/25/98 | 1 | X |
| WG63103LFB | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| L18795-10AS | 6/25/98 | 1 | X |
| L18795-10ASD | 6/25/98 | 1 | X |
| L18846-01 | 6/25/98 | 1 | X |
| L18846-02 | 6/25/98 | 1 | X |
| L18846-03 | 6/25/98 | 1 | X |
| WG63103CCV1 | 6/25/98 | 1 | X |
| WG63103CCB1 | 6/25/98 | 1 | X |
| L18846-04 | 6/25/98 | 1 | X |
| L18846-05 | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| L18861-01AS | 6/25/98 | 1 | X |
| L18861-01ASD | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| WG63103CCV2 | 6/25/98 | 1 | X |
| WG63103CCB2 | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| WG63103CCV3 | 6/25/98 | 1 | X |
| WG63103CCB3 | 6/25/98 | 1 | X |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** | ***Analysis Run Log***

**Analysis** | ***Metals (Dissolved) by ICP***

ACZ Project # L18846
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/9/98
Date Reported 7/6/98

Workgroup: WG62484

| ACZ ID | Measure Date | Dilution | Al | Ca | Cd | Fe | K | Mg | Mn | Na | Ni | Pb |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WG62484ICV | 6/13/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| WG62484ICB | 6/13/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| WG62484LFB | 6/13/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| ZZZ | 6/13/98 | 1 | | | | | | | | | | X |
| ZZZ | 6/13/98 | 1 | | | | | | | | | | X |
| ZZZ | 6/13/98 | 1 | | | | | | | | | | X |
| ZZZ | 6/13/98 | 1 | | | | | | | | | | X |
| L18791-09AS | 6/13/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| L18791-09ASD | 6/13/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| ZZZ | 6/13/98 | 1 | | | | | | | | | | X |
| ZZZ | 6/13/98 | 1 | | | | | | | | | | X |
| ZZZ | 6/13/98 | 1 | | X | X | X | X | X | X | X | | X |
| WG62484CCV1 | 6/13/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| WG62484CCB1 | 6/13/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| ZZZ | 6/13/98 | 1 | | X | X | X | X | X | X | X | | X |
| ZZZ | 6/13/98 | 1 | | X | X | X | X | X | X | X | | X |
| ZZZ | 6/13/98 | 1 | X | X | X | X | X | X | X | X | | X |
| ZZZ | 6/13/98 | 1 | X | X | X | X | X | X | X | X | | X |
| L18795-08AS | 6/13/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| L18795-08ASD | 6/13/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| ZZZ | 6/13/98 | 1 | X | X | X | X | X | X | X | X | | X |
| ZZZ | 6/13/98 | 1 | X | | X | X | | | X | | | X |
| ZZZ | 6/13/98 | 1 | | X | | | | X | | | | |
| ZZZ | 6/13/98 | 1 | | X | | | | X | | X | | |
| WG62484CCV3 | 6/13/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| WG62484CCB13 | 6/13/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| ZZZ | 6/13/98 | 1 | | X | | | | X | | X | | |
| ZZZ | 6/13/98 | 1 | | | X | | | | | | | X |
| L18846-01 | 6/13/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| L18846-02 | 6/13/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| WG62484CCV5 | 6/13/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| WG62484CCB21 | 6/13/98 | 1 | X | X | X | X | X | X | X | X | X | X |

ACZ | Client
✓

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** | *Analysis Run Log*

**Analysis** | *Metals (Dissolved) by ICP*

ACZ Project # L18846
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/9/98
Date Reported 7/6/98

Workgroup: WG62487

| ACZ ID | Measure Date | Dilution | Al | Ca | Cd | Fe | K | Na | Ni | Pb |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62487ICV | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| WG62487ICB | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| WG62487LFB | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| ZZZ | 6/12/98 | 1 | | | | | | | X | |
| L18783-05AS | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| ZZZ | 6/12/98 | 1 | | | | | | | X | |
| L18783-06AS | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| ZZZ | 6/12/98 | 1 | | | | | | | X | |
| L18783-07AS | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| ZZZ | 6/12/98 | 1 | | | | | | | X | |
| L18783-08AS | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| L18846-03 | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| WG62487CCV1 | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| WG62487CCB1 | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| L18846-03AS | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| L18846-03ASD | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| L18846-04 | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| L18846-05 | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| ZZZ | 6/12/98 | 1 | | X | | | X | X | | |
| ZZZ | 6/12/98 | 1 | | X | | | X | X | | |
| ZZZ | 6/12/98 | 1 | | X | | X | X | X | | |
| ZZZ | 6/12/98 | 1 | | X | | X | X | X | | |
| L18848-02AS | 6/12/98 | 1 | X | X | | | X | X | X | X |
| L18848-02ASD | 6/12/98 | 1 | X | X | | | X | X | X | X |
| WG62487CCV2 | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| WG62487CCB2 | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| ZZZ | 6/12/98 | 1 | | X | | X | X | X | | |
| ZZZ | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| ZZZ | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| ZZZ | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| ZZZ | 6/12/98 | 1 | | | X | | | | X | X |
| ZZZ | 6/12/98 | 1 | | X | | | | X | | |
| WG62487CCV3 | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| WG62487CCB3 | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| ZZZ | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| ZZZ | 6/12/98 | 1 | | X | | X | X | X | | |

| ACZ | Client |
|---|---|
| ✓ | |

*30400 Downhill Drive*
*Steamboat Springs, CO 80487*
*(800) 334-5493*
*Fax: (970) 879-2216*

**QC Report** | ***Analysis Run Log***

**Analysis** | ***Metals (Dissolved) by ICP***

ACZ Project # L18846
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/9/98
Date Reported 7/6/98

Workgroup: WG62487 **(Continued)**

| ACZ ID | Measure Date | Dilution | Al | Ca | Cd | Fe | K | Na | Ni | Pb |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62487CCV4 | 6/12/98 | 1 | X | X | X | X | X | X | X | X |
| WG62487CCB4 | 6/12/98 | 1 | X | X | X | X | X | X | X | X |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Metals (Dissolved) by ICP*

| | |
|---|---|
| ACZ Project # | L18846 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

Workgroup: WG62611

| ACZ ID | Measure Date | Dilution | Zn |
|---|---|---|---|
| WG62611ICV | 6/15/98 | 1 | X |
| WG62611ICB | 6/15/98 | 1 | X |
| WG62611LFB | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 2 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| L18795-07AS | 6/15/98 | 1 | X |
| L18795-07ASD | 6/15/98 | 1 | X |
| WG62611CCV1 | 6/15/98 | 1 | X |
| WG62611CCB1 | 6/15/98 | 1 | X |
| L18846-01 | 6/15/98 | 5 | X |
| L18846-02 | 6/15/98 | 5 | X |
| L18846-02AS | 6/15/98 | 5 | X |
| L18846-02ASD | 6/15/98 | 5 | X |
| ZZZ | 6/15/98 | 1 | X |
| WG62611CCV2 | 6/15/98 | 1 | X |
| WG62611CCB2 | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| WG62611CCV3 | 6/15/98 | 1 | X |
| WG62611CCB3 | 6/15/98 | 1 | X |

# ACZ

**Inorganic QC Summary**

*30400 Downhill Drive*
*Steamboat Springs, CO 80487*
*(800) 334-5493*
*Fax: (970) 879-2216*

**QC Report** | ***Analysis Run Log***

**Analysis** | ***Metals (Dissolved) by ICP***

ACZ Project # L18846
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/9/98
Date Reported 7/6/98

Workgroup: WG62859

| ACZ ID | Measure Date | Dilution | Mg | Mn | Zn |
|---|---|---|---|---|---|
| WG62859ICV | 6/18/98 | 1 | X | X | X |
| WG62859ICB | 6/18/98 | 1 | X | X | X |
| WG62859LRB | 6/18/98 | 1 | X | X | X |
| WG62859LFB | 6/18/98 | 1 | X | X | X |
| L18040-11AS | 6/18/98 | 1 | X | X | X |
| L18040-11ASD | 6/18/98 | 1 | X | X | X |
| ZZZ | 6/18/98 | 5 | | X | |
| ZZZ | 6/18/98 | 2 | | X | |
| ZZZ | 6/18/98 | 1 | | | X |
| ZZZ | 6/18/98 | 1 | | X | |
| WG62859CCV1 | 6/18/98 | 1 | X | X | X |
| WG62859CCB1 | 6/18/98 | 1 | X | X | X |
| ZZZ | 6/18/98 | 1 | | X | |
| ZZZ | 6/18/98 | 1 | | | X |
| L18846-03 | 6/18/98 | 5 | X | X | X |
| L18846-03AS | 6/18/98 | 5 | X | X | X |
| L18846-04 | 6/18/98 | 5 | X | X | X |
| L18846-04AS | 6/18/98 | 5 | X | X | X |
| L18846-05 | 6/18/98 | 5 | X | X | X |
| L18846-05AS | 6/18/98 | 5 | X | X | X |
| ZZZ | 6/18/98 | 1 | X | | |
| L18847-01AS | 6/18/98 | 1 | X | X | X |
| WG62859CCV2 | 6/18/98 | 1 | X | X | X |
| WG62859CCB2 | 6/18/98 | 1 | X | X | X |
| ZZZ | 6/18/98 | 1 | X | | |
| L18847-02AS | 6/18/98 | 1 | X | X | X |
| ZZZ | 6/18/98 | 1 | X | X | |
| L18848-01AS | 6/18/98 | 1 | X | X | X |
| ZZZ | 6/18/98 | 1 | | X | |
| L18848-02AS | 6/18/98 | 1 | X | X | X |
| L18848-02ASD | 6/18/98 | 1 | X | X | X |
| ZZZ | 6/18/98 | 1 | | X | |
| ZZZ | 6/18/98 | 5 | | X | X |
| ZZZ | 6/18/98 | 5 | | X | X |
| WG62859CCV3 | 6/18/98 | 1 | X | X | X |
| WG62859CCB3 | 6/18/98 | 1 | X | X | X |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** | ***Analysis Run Log***

**Analysis** | ***Metals (Dissolved) by ICP***

| | |
|---|---|
| ACZ Project # | L18846 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

Workgroup: WG62859 **(Continued)**

| ACZ ID | Measure Date | Dilution | Mg | Mn | Zn |
|---|---|---|---|---|---|
| ZZZ | 6/18/98 | 1 | | X | |
| ZZZ | 6/18/98 | 2 | | X | |
| WG62859CCV4 | 6/18/98 | 1 | X | X | X |
| WG62859CCB4 | 6/18/98 | 1 | X | X | X |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** | *Analysis Run Log*

**Analysis** | *Metals (Total Recoverable) by ICP*

ACZ Project # L18846
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/9/98
Date Reported 7/6/98

Workgroup: WG63232

| ACZ ID | Measure Date | Dilution | Al | Cd | Fe | Mn | Ni | Pb |
|---|---|---|---|---|---|---|---|---|
| WG63232ICV | 6/24/98 | 1 | X | X | X | X | X | X |
| WG63232ICB | 6/24/98 | 1 | X | X | X | X | X | X |
| WG63232LRB | 6/24/98 | 1 | X | X | X | X | X | X |
| WG63232LCSW | 6/24/98 | 1 | X | X | X | X | X | X |
| WG63232LFB | 6/24/98 | 1 | X | X | X | X | X | X |
| ZZZ | 6/24/98 | 25 | | | | X | | |
| L18846-01 | 6/24/98 | 2 | X | X | X | X | X | X |
| L18846-02 | 6/24/98 | 2 | X | X | X | X | X | X |
| L18846-03 | 6/24/98 | 2 | X | X | X | X | X | X |
| L18846-04 | 6/24/98 | 2 | X | X | X | X | X | X |
| L18846-05 | 6/24/98 | 2 | X | X | X | X | X | X |
| ZZZ | 6/24/98 | 2 | X | X | X | X | X | X |
| WG63232CCV1 | 6/24/98 | 1 | X | X | X | X | X | X |
| WG63232CCB1 | 6/24/98 | 1 | X | X | X | X | X | X |
| ZZZ | 6/24/98 | 2 | X | X | X | X | X | X |
| ZZZ | 6/24/98 | 1 | X | X | X | X | X | X |
| ZZZ | 6/24/98 | 2 | X | | | | X | |
| ZZZ | 6/24/98 | 1 | X | | | | X | |
| ZZZ | 6/24/98 | 1 | | | | | X | |
| L18861-03LFM | 6/24/98 | 1 | X | X | X | X | X | X |
| L18861-03LFMD | 6/24/98 | 1 | X | X | X | X | X | X |
| ZZZ | 6/24/98 | 1 | | | | | X | |
| WG63232CCV2 | 6/24/98 | 1 | X | X | X | X | X | X |
| WG63232CCB2 | 6/24/98 | 1 | X | X | X | X | X | X |
| ZZZ | 6/24/98 | 2 | | | | | X | |
| ZZZ | 6/24/98 | 1 | | | | | X | |
| ZZZ | 6/24/98 | 1 | | | | X | | |
| ZZZ | 6/24/98 | 1 | | | | X | | |
| ZZZ | 6/24/98 | 1 | | | | X | | |
| ZZZ | 6/24/98 | 1 | | | | X | | |
| ZZZ | 6/24/98 | 1 | | | | X | | |
| ZZZ | 6/24/98 | 1 | | | X | X | | |
| WG63232CCV3 | 6/24/98 | 1 | X | X | X | X | X | X |
| WG63232CCB3 | 6/24/98 | 1 | X | X | X | X | X | X |
| WG63232CCV4 | 6/24/98 | 1 | X | X | X | X | X | X |
| WG63232CCB4 | 6/24/98 | 1 | X | X | X | X | X | X |

ACZ ✓ Client

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Metals (Total Recoverable) by ICP*

| | |
|---|---|
| ACZ Project # | L18846 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

Workgroup: WG63330

| ACZ ID | Measure Date | Dilution | Zn |
|---|---|---|---|
| WG63330ICV | 6/25/98 | 1 | X |
| WG63330ICB | 6/25/98 | 1 | X |
| WG63330LRB | 6/25/98 | 1 | X |
| WG63330LCSW | 6/25/98 | 1 | X |
| WG63330LFB | 6/25/98 | 1 | X |
| L18846-01 | 6/25/98 | 5 | X |
| L18846-02 | 6/25/98 | 5 | X |
| L18846-03 | 6/25/98 | 5 | X |
| L18846-04 | 6/25/98 | 5 | X |
| L18846-05 | 6/25/98 | 5 | X |
| ZZZ | 6/25/98 | 5 | X |
| L18852-01LFM | 6/25/98 | 5 | X |
| WG63330CCV1 | 6/25/98 | 1 | X |
| WG63330CCB1 | 6/25/98 | 1 | X |
| L18852-01LFMD | 6/25/98 | 5 | X |
| ZZZ | 6/25/98 | 5 | X |
| ZZZ | 6/25/98 | 1 | X |
| L18870-01LFM | 6/25/98 | 1 | X |
| L18870-01LFMD | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| WG63330CCV2 | 6/25/98 | 1 | X |
| WG63330CCB2 | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| L18896-02LFM | 6/25/98 | 1 | X |
| L18896-02LFMD | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |

ACZ ✓ Client

ACZ

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** | *Analysis Run Log*

**Analysis** | *Metals (Total Recoverable) by ICP*

| | |
|---|---|
| ACZ Project # | L18846 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

Workgroup: WG63330 **(Continued)**

| ACZ ID | Measure Date | Dilution | Zn |
|---|---|---|---|
| WG63330CCV3 | 6/25/98 | 1 | X |
| WG63330CCB3 | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| WG63330CCV4 | 6/25/98 | 1 | X |
| WG63330CCB4 | 6/25/98 | 1 | X |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Metals (Dissolved) by ICP-MS*

ACZ Project # L18846
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/9/98
Date Reported 7/6/98

Workgroup: WG62476

| ACZ ID | Measure Date | Dilution | Ag | As | Cu |
|---|---|---|---|---|---|
| WG62476ICS1 | 6/16/98 | 1 | X | X | X |
| WG62476ICB1 | 6/16/98 | 1 | X | X | X |
| WG62476QCS | 6/16/98 | 1 | X | X | X |
| WG62476LRB | 6/16/98 | 1 | X | X | X |
| WG62476LFB | 6/16/98 | 1 | X | X | X |
| ZZZ | 6/16/98 | 2 | | X | X |
| ZZZ | 6/16/98 | 5 | | X | X |
| ZZZ | 6/16/98 | 5 | | X | X |
| ZZZ | 6/16/98 | 5 | | X | X |
| ZZZ | 6/16/98 | 2 | | X | X |
| ZZZ | 6/16/98 | 5 | | X | X |
| WG62476ICS2 | 6/16/98 | 1 | X | X | X |
| WG62476ICB2 | 6/16/98 | 1 | X | X | X |
| ZZZ | 6/16/98 | 5 | | X | X |
| L18846-01 | 6/16/98 | 5 | X | X | X |
| L18846-01LFM | 6/16/98 | 1 | X | X | X |
| L18846-01LFMD | 6/16/98 | 1 | X | X | X |
| L18846-02 | 6/16/98 | 5 | X | X | X |
| L18846-03 | 6/16/98 | 5 | X | X | X |
| L18846-04 | 6/16/98 | 5 | X | X | X |
| L18846-05 | 6/16/98 | 5 | X | X | X |
| WG62476ICS3 | 6/16/98 | 1 | X | X | X |
| WG62476ICB3 | 6/16/98 | 1 | X | X | X |
| ZZZ | 6/16/98 | 5 | | X | X |
| L18851-01LFM | 6/16/98 | 1 | | X | X |
| L18851-01LFMD | 6/16/98 | 1 | | X | X |
| WG62476ICS4 | 6/16/98 | 1 | X | X | X |
| WG62476ICB4 | 6/16/98 | 1 | X | X | X |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Metals (Dissolved) by ICP-MS*

| | |
|---|---|
| ACZ Project # | L18846 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

Workgroup: WG62688

| ACZ ID | Measure Date | Dilution | Cr |
|---|---|---|---|
| WG62688ICS1 | 6/16/98 | 1 | X |
| WG62688ICB1 | 6/16/98 | 1 | X |
| WG62688QCS | 6/16/98 | 1 | X |
| WG62688LRB | 6/16/98 | 1 | X |
| WG62688LFB | 6/16/98 | 1 | X |
| ZZZ | 6/17/98 | 5 | X |
| L18846-01 | 6/17/98 | 10 | X |
| L18846-02 | 6/17/98 | 10 | X |
| L18846-03 | 6/17/98 | 10 | X |
| L18846-04 | 6/17/98 | 10 | X |
| L18846-05 | 6/17/98 | 10 | X |
| ZZZ | 6/17/98 | 2 | X |
| WG62688ICS2 | 6/17/98 | 1 | X |
| WG62688ICB2 | 6/17/98 | 1 | X |
| ZZZ | 6/17/98 | 2 | X |
| ZZZ | 6/17/98 | 2 | X |
| ZZZ | 6/17/98 | 10 | X |
| L18851-01LFM | 6/17/98 | 1 | X |
| L18851-01LFMD | 6/17/98 | 1 | X |
| WG62688ICS3 | 6/17/98 | 1 | X |
| WG62688ICB3 | 6/17/98 | 1 | X |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** | *Analysis Run Log*

**Analysis** | *Metals (Total) by ICP-MS*

ACZ Project # L18846
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/9/98
Date Reported 7/6/98

Workgroup: WG62478

| ACZ ID | Measure Date | Dilution | Ag | As | Cr | Cu | Mo | Sb | U | V |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62478ICS1 | 6/15/98 | 1 | X | X | X | X | X | X | X | X |
| WG62478ICB1 | 6/15/98 | 1 | X | X | X | X | X | X | X | X |
| WG62478QCS | 6/15/98 | 1 | X | X | X | X | X | X | X | X |
| WG62478LRB | 6/15/98 | 1 | X | X | X | X | X | X | X | X |
| WG62478LFB | 6/15/98 | 2 | X | X | X | X | X | X | X | X |
| WG62478PBW | 6/15/98 | 2 | X | X | X | X | X | X | X | X |
| WG62478LCSW | 6/15/98 | 2 | X | X | X | X | X | X | X | X |
| ZZZ | 6/15/98 | 5 | X | X | X | X | | X | | |
| L18688-01LFM | 6/15/98 | 5 | X | X | X | X | X | X | X | X |
| L18688-01LFMD | 6/15/98 | 5 | X | X | X | X | X | X | X | X |
| WG62478ICS2 | 6/15/98 | 1 | X | X | X | X | X | X | X | X |
| WG62478ICB2 | 6/15/98 | 1 | X | X | X | X | X | X | X | X |
| L18846-01 | 6/15/98 | 5 | X | X | | X | X | X | X | X |
| L18846-02 | 6/15/98 | 5 | X | X | | X | X | X | X | X |
| L18846-03 | 6/15/98 | 5 | X | X | | X | X | X | X | X |
| L18846-04 | 6/15/98 | 5 | X | X | | X | X | X | X | X |
| L18846-04LFM | 6/16/98 | 5 | X | X | | X | X | X | X | X |
| L18846-04LFMD | 6/16/98 | 5 | X | X | | X | X | X | X | X |
| WG62478ICS3 | 6/16/98 | 1 | X | X | X | X | X | X | X | X |
| WG62478ICB3 | 6/16/98 | 1 | X | X | X | X | X | X | X | X |
| L18846-05 | 6/16/98 | 5 | X | X | X | X | X | X | X | X |
| ZZZ | 6/16/98 | 5 | X | X | X | X | | X | | |
| ZZZ | 6/16/98 | 5 | X | X | X | X | X | X | X | X |
| ZZZ | 6/16/98 | 5 | X | X | X | X | X | X | X | X |
| ZZZ | 6/16/98 | 2 | X | X | X | X | X | X | X | X |
| WG62478ICS4 | 6/16/98 | 1 | X | X | X | X | X | X | X | X |
| WG62478ICB4 | 6/16/98 | 1 | X | X | X | X | X | X | X | X |

ACZ | Client
✓

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** | *Analysis Run Log*

**Analysis** | *Metals (Total) by ICP-MS*

ACZ Project # L18846
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/9/98
Date Reported 7/6/98

Workgroup: WG62660

| ACZ ID | Measure Date | Dilution | Cr |
|---|---|---|---|
| WG62660ICS1 | 6/16/98 | 1 | X |
| WG62660ICB1 | 6/16/98 | 1 | X |
| WG62660QCS | 6/16/98 | 1 | X |
| WG62660LRB | 6/16/98 | 1 | X |
| WG62660LFB | 6/16/98 | 2 | X |
| L18846-01 | 6/16/98 | 5 | X |
| L18846-02 | 6/16/98 | 5 | X |
| L18846-03 | 6/16/98 | 5 | X |
| L18846-04 | 6/16/98 | 5 | X |
| L18846-04LFM | 6/16/98 | 5 | X |
| L18846-04LFMD | 6/16/98 | 5 | X |
| WG62660ICS2 | 6/16/98 | 1 | X |
| WG62660ICB2 | 6/16/98 | 1 | X |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Alkalinity as CaCO3*

| | |
|---|---|
| ACZ Project # | L18846 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

Workgroup: WG62810

| ACZ ID | Measure Date | Dilution | ALK | EC | PH |
|---|---|---|---|---|---|
| L18846-01 | 6/18/98 | 1 | | X | X |
| L18846-02 | 6/18/98 | 1 | | X | X |
| L18846-03 | 6/18/98 | 1 | X | X | X |
| L18846-04 | 6/18/98 | 1 | | X | X |
| L18846-05 | 6/18/98 | 1 | | X | X |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Alkalinity as CaCO3*

ACZ Project # L18846
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/9/98
Date Reported 7/6/98

Workgroup: WG62964

| ACZ ID | Measure Date | Dilution | ALK |
|---|---|---|---|
| WG62964LCSW1 | 6/19/98 | 1 | X |
| WG62964LCSW2 | 6/19/98 | 1 | X |
| WG62964ICB | 6/19/98 | 1 | X |
| WG62964LCSW3 | 6/19/98 | 1 | X |
| WG62964ICB | 6/19/98 | 1 | X |
| WG62964ICB | 6/19/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| L18846-01 | 6/20/98 | 1 | X |
| L18846-02 | 6/20/98 | 1 | X |
| L18846-04 | 6/20/98 | 1 | X |
| L18846-05 | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| WG62964CCV1 | 6/20/98 | 1 | X |
| WG62964CCV2 | 6/20/98 | 1 | X |
| WG62964CCV3 | 6/20/98 | 1 | X |
| WG62964CCB1 | 6/20/98 | 1 | X |
| WG62964CCB2 | 6/20/98 | 1 | X |
| WG62964CCB3 | 6/20/98 | 1 | X |
| L18791-11DUP | 6/20/98 | 1 | X |
| L18791-11DUP | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| WG62964CCV4 | 6/20/98 | 1 | X |
| WG62964CCV5 | 6/20/98 | 1 | X |
| WG62964CCV6 | 6/20/98 | 1 | X |
| WG62964CCB4 | 6/20/98 | 1 | X |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

QC Report | *Analysis Run Log*

Analysis | *Alkalinity as CaCO3*

ACZ Project # L18846
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/9/98
Date Reported 7/6/98

Workgroup: WG62964 **(Continued)**

| ACZ ID | Measure Date | Dilution | ALK |
|---|---|---|---|
| WG62964CCB5 | 6/20/98 | 1 | X |
| WG62964CCB6 | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| L18894-01DUP | 6/20/98 | 1 | X |
| L18894-01DUP | 6/20/98 | 1 | X |
| L18894-01DUP | 6/20/98 | 1 | X |
| WG62964LCSW4 | 6/20/98 | 1 | X |
| WG62964LCSW5 | 6/20/98 | 1 | X |
| WG62964LCSW6 | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| WG62964CCV7 | 6/20/98 | 1 | X |
| WG62964CCV8 | 6/20/98 | 1 | X |
| WG62964CCV9 | 6/20/98 | 1 | X |
| WG62964CCB7 | 6/20/98 | 1 | X |
| WG62964CCB8 | 6/20/98 | 1 | X |
| WG62964CCB9 | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| L18940-08DUP | 6/20/98 | 1 | X |
| L18940-08DUP | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

QC Report | *Analysis Run Log*

Analysis | *Alkalinity as CaCO3*

ACZ Project # L18846
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/9/98
Date Reported 7/6/98

Workgroup: WG62964 **(Continued)**

| ACZ ID | Measure Date | Dilution | ALK |
|---|---|---|---|
| WG62964CCV10 | 6/20/98 | 1 | X |
| WG62964CCV11 | 6/20/98 | 1 | X |
| WG62964CCV12 | 6/20/98 | 1 | X |
| WG62964CCB10 | 6/20/98 | 1 | X |
| WG62964CCB11 | 6/20/98 | 1 | X |
| WG62964CCB12 | 6/20/98 | 1 | X |
| L18940-18DUP | 6/20/98 | 1 | X |
| WG62964CCV13 | 6/20/98 | 1 | X |
| WG62964CCV14 | 6/20/98 | 1 | X |
| WG62964CCV15 | 6/20/98 | 1 | X |
| WG62964CCB13 | 6/20/98 | 1 | X |
| WG62964CCB14 | 6/20/98 | 1 | X |
| WG62964CCB15 | 6/20/98 | 1 | X |
| WG62964CCV16 | 6/20/98 | 1 | X |
| WG62964CCV17 | 6/20/98 | 1 | X |
| WG62964CCV18 | 6/20/98 | 1 | X |
| WG62964CCB16 | 6/20/98 | 1 | X |
| WG62964CCB17 | 6/20/98 | 1 | X |
| WG62964CCB18 | 6/20/98 | 1 | X |
| L18940-18DUP | 6/20/98 | 1 | X |
| L18940-18DUP | 6/20/98 | 1 | X |
| L18940-18DUP | 6/20/98 | 1 | X |
| WG62964CCV19 | 6/20/98 | 1 | X |
| WG62964CCV20 | 6/20/98 | 1 | X |
| WG62964CCV21 | 6/20/98 | 1 | X |
| WG62964CCB19 | 6/20/98 | 1 | X |
| WG62964CCB20 | 6/20/98 | 1 | X |
| WG62964CCB21 | 6/20/98 | 1 | X |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

QC Report: *Analysis Run Log*

Analysis: *Ammonia by RFA*

| | |
|---|---|
| ACZ Project # | L18846 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

Workgroup: WG62972

| ACZ ID | Measure Date | Dilution | NH3 |
|---|---|---|---|
| WG62972ICV | 6/19/98 | 1 | X |
| WG62972ICB | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| WG62972CCV1 | 6/19/98 | 1 | X |
| WG62972CCB1 | 6/19/98 | 1 | X |
| L18802-14DUP | 6/19/98 | 1 | X |
| L18802-14AS | 6/19/98 | 1 | X |
| L18846-01 | 6/19/98 | 1 | X |
| L18846-02 | 6/19/98 | 1 | X |
| L18846-03 | 6/19/98 | 1 | X |
| L18846-04 | 6/19/98 | 1 | X |
| L18846-05 | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| WG62972CCV2 | 6/19/98 | 1 | X |
| WG62972CCB2 | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| L18872-03DUP | 6/19/98 | 1 | X |
| L18872-03AS | 6/19/98 | 1 | X |
| WG62972CCV3 | 6/19/98 | 1 | X |
| WG62972CCB3 | 6/19/98 | 1 | X |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Carbon, total organic (TOC)*

ACZ Project # L18846
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/9/98
Date Reported 7/6/98

Workgroup: WG62533

| ACZ ID | Measure Date | Dilution | TOC |
|---|---|---|---|
| WG62533ICV | 6/15/98 | 1 | X |
| WG62533ICB | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| WG62533CCV1 | 6/15/98 | 1 | X |
| WG62533CCB1 | 6/15/98 | 1 | X |
| L18790-12DUP | 6/15/98 | 1 | X |
| L18790-13AS | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| L18846-01 | 6/15/98 | 1 | X |
| L18846-02 | 6/15/98 | 1 | X |
| L18846-03 | 6/15/98 | 1 | X |
| L18846-04 | 6/15/98 | 1 | X |
| L18846-05 | 6/15/98 | 1 | X |
| WG62533CCV2 | 6/15/98 | 1 | X |
| WG62533CCB2 | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| L18852-01DUP | 6/15/98 | 1 | X |
| L18852-02AS | 6/15/98 | 1 | X |
| WG62533CCV3 | 6/15/98 | 1 | X |
| WG62533CCB3 | 6/15/98 | 1 | X |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Chloride by RFA*

ACZ Project # L18846
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/9/98
Date Reported 7/6/98

Workgroup: WG63015

| ACZ ID | Measure Date | Dilution | CL |
|---|---|---|---|
| WG63015ICV | 6/22/98 | 1 | X |
| WG63015ICB | 6/22/98 | 1 | X |
| L18846-01 | 6/22/98 | 1 | X |
| L18846-02 | 6/22/98 | 1 | X |
| L18846-03 | 6/22/98 | 1 | X |
| L18846-04 | 6/22/98 | 1 | X |
| L18846-05 | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| WG63015CCV1 | 6/22/98 | 1 | X |
| WG63015CCB1 | 6/22/98 | 1 | X |
| L18848-03DUP | 6/22/98 | 1 | X |
| L18848-03AS | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| WG63015CCV2 | 6/22/98 | 1 | X |
| WG63015CCB2 | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| L18856-02DUP | 6/22/98 | 1 | X |
| L18856-02AS | 6/22/98 | 1 | X |
| WG63015CCV3 | 6/22/98 | 1 | X |
| WG63015CCB3 | 6/22/98 | 1 | X |
| WG63015CCV4 | 6/22/98 | 1 | X |
| WG63015CCB4 | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 2 | X |
| L18856-02DUP | 6/22/98 | 2 | X |

ACZ ✓ Client

ACZ

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Chloride by RFA*

| | |
|---|---|
| ACZ Project # | L18846 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

Workgroup: WG63015 **(Continued)**

| ACZ ID | Measure Date | Dilution | CL |
|---|---|---|---|
| L18856-02AS | 6/22/98 | 5 | X |
| WG63015CCV5 | 6/22/98 | 1 | X |
| WG63015CCB5 | 6/22/98 | 1 | X |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Electrical Conductivity @ 25C*

| | |
|---|---|
| ACZ Project # | L18846 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

Workgroup: WG62810

| ACZ ID | Measure Date | Dilution | ALK | EC | PH |
|---|---|---|---|---|---|
| L18846-01 | 6/18/98 | 1 | | X | X |
| L18846-02 | 6/18/98 | 1 | | X | X |
| L18846-03 | 6/18/98 | 1 | X | X | X |
| L18846-04 | 6/18/98 | 1 | | X | X |
| L18846-05 | 6/18/98 | 1 | | X | X |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** | *Analysis Run Log*

**Analysis** | *Ion Chromatography*

ACZ Project # L18846
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/9/98
Date Reported 7/6/98

Workgroup: WG62436

| ACZ ID | Measure Date | Dilution | NO2 | NO3 |
|---|---|---|---|---|
| WG62436ICV | 6/15/98 | 1 | X | X |
| WG62436ICB | 6/15/98 | 1 | X | X |
| WG62436LRB | 6/15/98 | 1 | X | X |
| WG62436LFB | 6/15/98 | 1 | X | X |
| ZZZ | 6/15/98 | 10 | X | X |
| ZZZ | 6/15/98 | 10 | X | X |
| L18041-10DUP | 6/15/98 | 10 | X | X |
| L18041-10AS | 6/15/98 | 10 | X | X |
| WG62436CCV1 | 6/15/98 | 1 | X | X |
| WG62436CCB1 | 6/15/98 | 1 | X | X |
| ZZZ | 6/15/98 | 10 | X | X |
| ZZZ | 6/15/98 | 1 | X | X |
| ZZZ | 6/15/98 | 1 | X | X |
| L18044-10DUP | 6/15/98 | 1 | X | X |
| WG62436CCV2 | 6/15/98 | 1 | X | X |
| WG62436CCB2 | 6/15/98 | 1 | X | X |
| L18044-10AS | 6/15/98 | 1 | X | X |
| L18044-10AS | 6/15/98 | 1 | X | X |
| L18846-01 | 6/15/98 | 1 | X | X |
| L18846-02 | 6/15/98 | 1 | X | X |
| L18846-03 | 6/15/98 | 1 | X | X |
| L18846-04 | 6/15/98 | 1 | X | X |
| L18846-05 | 6/15/98 | 1 | X | X |
| ZZZ | 6/15/98 | 1 | X | X |
| ZZZ | 6/15/98 | 1 | X | X |
| L18852-02DUP | 6/15/98 | 1 | X | |
| L18852-02AS | 6/15/98 | 1 | X | |
| L18852-02AS | 6/15/98 | 1 | X | |
| WG62436CCV3 | 6/15/98 | 1 | X | X |
| WG62436CCB3 | 6/15/98 | 1 | X | X |
| ZZZ | 6/15/98 | 1 | X | |
| ZZZ | 6/15/98 | 1 | X | |
| ZZZ | 6/15/98 | 1 | X | |
| ZZZ | 6/15/98 | 1 | X | |
| WG62436CCV4 | 6/15/98 | 1 | X | X |
| WG62436CCB4 | 6/15/98 | 1 | X | X |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *pH (lab)*

ACZ Project # L18846
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/9/98
Date Reported 7/6/98

Workgroup: WG62810

| ACZ ID | Measure Date | Dilution | ALK | EC | PH |
|---|---|---|---|---|---|
| WG62810ICV | 6/18/98 | 1 | X | X | X |
| WG62810LCSW1 | 6/18/98 | 1 | X | X | X |
| WG62810LCSW2 | 6/18/98 | 1 | X | X | X |
| WG62810ICB | 6/18/98 | 1 | X | X | X |
| WG62810LCSW3 | 6/18/98 | 1 | X | X | X |
| WG62810ICB | 6/18/98 | 1 | X | X | X |
| ZZZ | 6/18/98 | 1 | | X | |
| ZZZ | 6/18/98 | 1 | X | | |
| ZZZ | 6/18/98 | 1 | X | | |
| ZZZ | 6/18/98 | 1 | X | | X |
| ZZZ | 6/18/98 | 1 | X | | X |
| ZZZ | 6/18/98 | 1 | X | | |
| ZZZ | 6/18/98 | 1 | X | | X |
| ZZZ | 6/18/98 | 1 | X | | X |
| ZZZ | 6/18/98 | 1 | X | | X |
| ZZZ | 6/18/98 | 1 | X | | X |
| ZZZ | 6/18/98 | 1 | X | | X |
| ZZZ | 6/18/98 | 1 | X | | X |
| ZZZ | 6/18/98 | 1 | X | | X |
| ZZZ | 6/18/98 | 1 | X | | X |
| ZZZ | 6/18/98 | 1 | X | | X |
| ZZZ | 6/18/98 | 1 | X | | X |
| ZZZ | 6/18/98 | 1 | X | | X |
| WG62810CCV1 | 6/18/98 | 1 | X | X | X |
| WG62810CCV2 | 6/18/98 | 1 | X | X | X |
| WG62810CCV3 | 6/18/98 | 1 | X | X | X |
| WG62810CCB1 | 6/18/98 | 1 | X | X | X |
| WG62810CCB2 | 6/18/98 | 1 | X | X | X |
| L18812-11DUP | 6/18/98 | 1 | X | X | X |
| L18812-11DUP | 6/18/98 | 1 | X | X | X |
| L18812-11DUP | 6/18/98 | 1 | X | X | X |
| ZZZ | 6/18/98 | 1 | X | | X |
| ZZZ | 6/18/98 | 1 | X | | X |
| L18846-01 | 6/18/98 | 1 | | X | X |
| L18846-02 | 6/18/98 | 1 | | X | X |
| L18846-03 | 6/18/98 | 1 | X | X | X |

ACZ ✓ Client

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *pH (lab)*

ACZ Project # L18846
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/9/98
Date Reported 7/6/98

Workgroup: WG62810 **(Continued)**

| ACZ ID | Measure Date | Dilution | ALK | EC | PH |
|---|---|---|---|---|---|
| L18846-04 | 6/18/98 | 1 | | X | X |
| L18846-05 | 6/18/98 | 1 | | X | X |
| ZZZ | 6/18/98 | 1 | X | | |
| ZZZ | 6/18/98 | 1 | | X | X |
| ZZZ | 6/18/98 | 1 | X | | |
| ZZZ | 6/18/98 | 1 | | X | X |
| ZZZ | 6/18/98 | 1 | | X | X |
| WG62810CCV4 | 6/18/98 | 1 | X | X | X |
| WG62810CCV5 | 6/18/98 | 1 | X | X | X |
| WG62810CCV6 | 6/18/98 | 1 | X | X | X |
| WG62810CCB3 | 6/18/98 | 1 | X | X | X |
| WG62810CCB4 | 6/18/98 | 1 | X | X | X |
| ZZZ | 6/18/98 | 1 | | X | X |
| ZZZ | 6/18/98 | 1 | | X | X |
| ZZZ | 6/18/98 | 1 | | X | X |
| L18852-01DUP | 6/18/98 | 1 | X | X | X |
| L18852-01DUP | 6/18/98 | 1 | X | X | X |
| L18852-01DUP | 6/18/98 | 1 | X | X | X |
| WG62810LCSW4 | 6/18/98 | 1 | X | X | X |
| WG62810LCSW5 | 6/18/98 | 1 | X | X | X |
| ZZZ | 6/18/98 | 1 | | X | X |
| WG62810LCSW6 | 6/18/98 | 1 | X | X | X |
| ZZZ | 6/18/98 | 1 | | X | X |
| ZZZ | 6/18/98 | 1 | | X | X |
| ZZZ | 6/18/98 | 1 | X | X | X |
| ZZZ | 6/18/98 | 1 | X | X | X |
| ZZZ | 6/18/98 | 1 | X | X | X |
| ZZZ | 6/18/98 | 1 | X | X | X |
| ZZZ | 6/18/98 | 1 | X | X | X |
| ZZZ | 6/18/98 | 1 | X | X | X |
| ZZZ | 6/18/98 | 1 | X | X | X |
| ZZZ | 6/18/98 | 1 | X | X | X |
| ZZZ | 6/18/98 | 1 | | X | X |
| ZZZ | 6/18/98 | 1 | X | X | X |
| ZZZ | 6/18/98 | 1 | | X | X |
| ZZZ | 6/18/98 | 1 | | X | X |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *pH (lab)*

ACZ Project # L18846
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/9/98
Date Reported 7/6/98

Workgroup: WG62810 **(Continued)**

| ACZ ID | Measure Date | Dilution | ALK | EC | PH |
|---|---|---|---|---|---|
| ZZZ | 6/18/98 | 1 | | X | X |
| ZZZ | 6/18/98 | 1 | X | | |
| WG62810CCV7 | 6/18/98 | 1 | X | X | X |
| WG62810CCV8 | 6/18/98 | 1 | X | X | X |
| WG62810CCV9 | 6/18/98 | 1 | X | X | X |
| WG62810CCB5 | 6/18/98 | 1 | X | X | X |
| WG62810CCB6 | 6/18/98 | 1 | X | X | X |
| WG62810CCB7 | 6/18/98 | 1 | X | X | X |
| ZZZ | 6/18/98 | 1 | | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| L18870-03DUP | 6/19/98 | 1 | X | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| L18870-03DUP | 6/19/98 | 1 | X | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| L18870-03DUP | 6/19/98 | 1 | X | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |

| ACZ | Client |
|---|---|
| √ | |

ACZ

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *pH (lab)*

| | |
|---|---|
| ACZ Project # | L18846 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

Workgroup: WG62810 **(Continued)**

| ACZ ID | Measure Date | Dilution | ALK | EC | PH |
|---|---|---|---|---|---|
| ZZZ | 6/19/98 | 1 | | X | X |
| WG62810CCV10 | 6/19/98 | 1 | X | X | X |
| WG62810CCV11 | 6/19/98 | 1 | X | X | X |
| WG62810CCV12 | 6/19/98 | 1 | X | X | X |
| WG62810CCB8 | 6/19/98 | 1 | X | X | X |
| WG62810CCB9 | 6/19/98 | 1 | X | X | X |
| WG62810CCB10 | 6/19/98 | 1 | X | X | X |
| ZZZ | 6/19/98 | 1 | | | X |
| ZZZ | 6/19/98 | 1 | | | X |
| ZZZ | 6/19/98 | 1 | | | X |
| ZZZ | 6/19/98 | 1 | | | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| L18916-01DUP | 6/19/98 | 1 | | X | X |
| L18916-01DUP | 6/19/98 | 1 | | X | X |
| WG62810LCSW7 | 6/19/98 | 1 | X | X | X |
| WG62810LCSW8 | 6/19/98 | 1 | X | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| WG62810LCSW9 | 6/19/98 | 1 | X | X | X |
| ZZZ | 6/19/98 | 1 | | X | X |
| L18791-11DUP | 6/19/98 | 1 | | X | |
| ZZZ | 6/19/98 | 1 | | X | X |
| L18791-11DUP | 6/19/98 | 1 | | X | |
| L18791-11DUP | 6/19/98 | 1 | | X | |
| WG62810CCV13 | 6/19/98 | 1 | X | X | X |
| WG62810CCV14 | 6/19/98 | 1 | X | X | X |
| WG62810CCV15 | 6/19/98 | 1 | X | X | X |
| WG62810CCB11 | 6/19/98 | 1 | X | X | X |
| WG62810CCB12 | 6/19/98 | 1 | X | X | X |
| WG62810CCB13 | 6/19/98 | 1 | X | X | X |
| L18791-11DUP | 6/20/98 | 1 | | X | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Residue, Filterable (TDS) @180C*

| | |
|---|---|
| ACZ Project # | L18846 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

Workgroup: WG62395

| ACZ ID | Measure Date | Dilution | TDS |
|---|---|---|---|
| WG62395PBW | 6/11/98 | 1 | X |
| WG62395LCSW | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| L18846-01 | 6/11/98 | 1 | X |
| L18846-02 | 6/11/98 | 1 | X |
| L18846-03 | 6/11/98 | 1 | X |
| L18846-03DUP | 6/11/98 | 1 | X |
| L18846-04 | 6/11/98 | 1 | X |
| L18846-05 | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| L18872-03DUP | 6/11/98 | 1 | X |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Sulfate (Gravimetric)*

| | |
|---|---|
| ACZ Project # | L18846 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

Workgroup: WG62936

| ACZ ID | Measure Date | Dilution | SO4 |
|---|---|---|---|
| WG62936PBW | 6/19/98 | 1 | X |
| WG62936LCSW | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| L18822-02DUP | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 10 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| L18846-01 | 6/19/98 | 1 | X |
| L18846-02 | 6/19/98 | 1 | X |
| L18846-03 | 6/19/98 | 1 | X |
| L18846-04 | 6/19/98 | 1 | X |
| L18846-05 | 6/19/98 | 1 | X |
| L18846-05DUP | 6/19/98 | 1 | X |

| ACZ | Client |
|---|---|
| √ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Sulfide as S*

| | |
|---|---|
| ACZ Project # | L18846 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

Workgroup: WG62597

| ACZ ID | Measure Date | Dilution | H2S |
|---|---|---|---|
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| L18846-01 | 6/15/98 | 1 | X |
| L18846-02 | 6/15/98 | 1 | X |
| L18846-03 | 6/15/98 | 1 | X |
| L18846-04 | 6/15/98 | 1 | X |
| L18846-05 | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| WG62597CCV1 | 6/15/98 | 1 | X |
| WG62597CCB1 | 6/15/98 | 1 | X |
| L18852-03DUP | 6/15/98 | 1 | X |
| L18852-03AS | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| WG62597CCV2 | 6/15/98 | 1 | X |
| WG62597CCB2 | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| L18884-04DUP | 6/15/98 | 1 | X |
| L18884-04AS | 6/15/98 | 1 | X |
| WG62597CCV3 | 6/15/98 | 1 | X |
| WG62597CCB3 | 6/15/98 | 1 | X |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Sulfite*

| | |
|---|---|
| ACZ Project # | L18846 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

Workgroup: WG62258

| ACZ ID | Measure Date | Dilution | SO3 |
|---|---|---|---|
| L18846-01 | 6/10/98 | 1 | X |
| L18846-02 | 6/10/98 | 1 | X |
| L18846-03 | 6/10/98 | 1 | X |
| L18846-04 | 6/10/98 | 1 | X |
| L18846-05 | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |

ACZ / Client

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *TSS and TVS (Gravimetric)*

| | |
|---|---|
| ACZ Project # | L18846 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/9/98 |
| Date Reported | 7/6/98 |

Workgroup: WG62326

| ACZ ID | Measure Date | Dilution | TSS |
|---|---|---|---|
| WG62326PBW | 6/10/98 | 1 | X |
| WG62326LCSW | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| L18840-01DUP | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| L18846-01 | 6/10/98 | 1 | X |
| L18846-01 | 6/10/98 | 2.5 | X |
| L18846-02 | 6/10/98 | 1 | X |
| L18846-02 | 6/10/98 | 1.6666667 | X |
| L18846-03 | 6/10/98 | 1 | X |
| L18846-04 | 6/10/98 | 1 | X |
| L18846-05 | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 5 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| L18852-02DUP | 6/10/98 | 1 | X |

ACZ
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216



# QC REFERENCE

## QC Report Types

| | | |
|---|---|---|
| (1) | Calibration Verification - Blanks | Verifies that there is no or minimal contamination in the instrument calibration. |
| (2) | Calibration Verification - Control Samples | Verifies the accuracy of the instrument calibration. |
| (3) | Method Verification - Blanks | Verifies that there is no or minimal contamination in the prep method procedure. |
| (4) | Method Verification - Control Samples | Verifies the accuracy of the method, including the prep procedure. |
| (5) | Spike Verification | Determines sample matrix interferences, if any. |
| (6) | Duplicate Verification | Verifies the precision of the instrument and/or method. |

## QC Sample Types

| | | | |
|---|---|---|---|
| ICV | Initial Calibration Verification | QCS | Quality Control Sample |
| CCV | Continuing Calibration Verification | ICS | Instrument Check Sample |
| LCSW | Laboratory Control Sample - Water | LFB | Laboratory Fortified Blank |
| LCSS | Laboratory Control Sample - Soil | LFM | Laboratory Fortified Matrix |
| ICB | Initial Calibration Blank | AS | Analytical (Post Digestion) Spike |
| CCB | Continuing Calibration Blank | MS | Matrix Spike |
| LRB | Laboratory Reagent Blank | LFMD | Laboratory Fortified Matrix Duplicate |
| PBW | Prep Blank - Water | ASD | Analytical Spike (Post Digestion) Duplicate |
| PBS | Prep Blank - Soil | MSD | Matrix Spike Duplicate |
| | | DUP | Sample Duplicate |

## Unique ACZ QC Summary Qualifiers (Q)

| | |
|---|---|
| Z | Poor spike recovery is accepted because sample concentration is four times greater than spike concentration. |
| Y | This sample, instead of one of yours, was used as the quality control sample for the workgroup batch. |
| X | QC is out of control. See Case Narrative. |
| W | Poor recovery for Silver quality control is accepted because Silver often precipitates with Chloride. |
| V | High blank data accepted because sample concentration is 10 times higher than blank concentration |
| T | High Relative Percent Difference (RPD) accepted because sample concentrations are less than 10x the MDL. |
| S | ICV/QCS sample not part of workgroup; analyzed immediately following instrument calibration as part of a prevous workgroup. |

## Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(4) EPA 600/4-80-032. Prescribed Procedures for Measurement of Radioactivity in Drinking Water, August 1980.
(5) EPA SW-846. Test Methods for Evaluating Solid Waste, Third Edition with Update II, September 1994.
(6) Standard Methods for the Examination of Water and Wastewater, 18th edition, 1992.

## Comments

(1) QC results calculated from raw data. Results may vary slightly if the reported (rounded) values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.
(4) All matrices for Organic analyses are reported on an "as received" basis, except for TPH-IR analyses on soils which are reported on a dry weight basis.
(5) The PCN/SCN header on the QC reports stands for Primary Control Number/Secondary Control Number. All stock chemicals are given a PCN and any reagent made at the bench level is assigned a SCN. These numbers track our standards and chemicals so that any reagent is traceable to a certificate of analysis.

This report is subject to the "Terms & Conditions" section in ACZ Laboratories, Inc. 1995 Analytical Services Fee Schedule.

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487



# SAMPLE RECEIPT FORM

:IENT: Amsco

DATE 6/9/98

:OJECT #: L18846

| | | | |
|---|---|---|---|
| Does this project require special handling procedures such as CLP protocol? | NA | YES | NO |
| Are the custody seals on the cooler intact? | NA | YES | NO |
| Are the custody seals on the sample containers intact? | NA | YES | NO |
| Is there a Chain of Custody (COC), or other directive shipping papers present? | | YES | NO |
| Is the COC complete?<br>Relinquished? Yes ____ No ____ Requested Analysis? Yes ____ No ____ | | YES | NO |
| Is the COC in agreement with the samples received?<br># of Samples: Yes ____ No ____ Sample ID: Yes ____ No ____<br>Matrix: Yes ____ No ____ # of Containers: Yes ____ No ____ | | YES | NO |
| Is there enough sample for all requested analysis? | | YES | NO |
| Are all samples within holding times for requested analysis? | | YES | NO |
| Were all sample containers received intact? | | YES | NO |
| ) Are samples requiring no headspace, headspace free? | NA | YES | NO |
| ) Do the samples require a Foriegn Soils Permit Label or quarantine? | | YES | NO |
| ) Do samples require special disposal/hold considerations?<br>Non-Hazardous: Yes ____ No ____ Hazardous: Yes ____ No ____ Hold: ____ months | | | |

:scribe "NO" items (except #1, 11, & 12): _____

as the client contacted? Yes ____ No ____

If yes: Date: _____ Name of person contacted: _____

:tions taken or client instructions: _____

Signature: PT

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487



# SAMPLE RECEIPT FORM

CLIENT: Angeo
PROJECT #: L18876

DATE 6/9/98
ANALYST: DF

## TEMPERATURE VERIFICATION SAMPLE CHECK (°C)

| CONTAINER ID | TEMP (°C) 2° to 6° | RAD µR/hr |
|---|---|---|
| 1267 | 3.1° | 13 |
| | | |
| | | |
| | | |

If container radioactivity is > 25 µR/hr then each sample must be screened.

## PRESERVATION CHECK (pH) & RADIOACTIVITY SCREEN

| SAMPLE | R <2 | G <2 | Y <2 | YG <2 | B <2 | BG <2 | O <2 | T >12 | P >12 | RAD µR/hr |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ✓ | ✓ | | ✓ | | | | ✗ | | |
| 2 | ✓ | ✓ | | ✓ | | | | ✗ | | |
| 3 | ✓ | ✓ | | ✓ | | | | ✗ | | |
| 4 | ✓ | ✓ | | ✓ | | | | ✗ | | |
| 5 | ✓ | ✓ | | ✓ | | | | ✗ | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

INTERNAL COMMENTS: All tar received with ph of 9-10

REPORT COMMENTS:

# CHAIN OF CUSTODY RECORD

Laboratory Sample Numbers (ACZ Use Only): L18846

COC # 14974

**ACZ Laboratories, Inc.**
30400 Downhill Drive
Steamboat Springs, CO 80487
(970) 879-6590 • (800) 334-5493

Name to Appear on Report and Invoice:
American Geological Services, Inc.
12477 W. Cedar Dr. #206
Lakewood, CO 80228
Attn: A. Morrissey Tel: 303-988-1845

cc: (Report) - (Invoice) to: (circle one or both)
Attn: Tel:

Project or P.O. #: French Gulch/Mine Shafts

Shipped Via: FED X ___ UPS ___ Hand X Other ___

| SAMPLE IDENTIFICATION | DATE | TIME | Sample Matrix* | # of CONTAINERS | Dissolved Metals | Total/Rec Metals | Anions | Alkalinity | Nitrate/Nitrite | Ammonia | Sulfate/Sulfide | TDS/TSS | TOC | Ferrous Iron | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0001 #3 Mine | 6/10/98 | 1445 | GW | 9 | X | X | X | X | X | X | X | X | X | X | Fe #3 added 1 ml sample instead of ½ |
| 0002 | 6/10/98 | 1445 | GW | 6 | X | X | X | X | X | X | X | X | X | | |
| 0003 ORO SHAFT | 6/10/98 | 1600 | GW | 9 | X | X | X | X | X | X | X | X | X | X | ORO-570 |
| 0004 ORO SHAFT | 6/10/98 | 1750 | GW | 9 | X | X | X | X | X | X | X | X | X | X | ORO-444 |
| 0005 ORO SHAFT | 6/10/98 | 1930 | GW | 9 | X | X | X | X | X | X | X | X | X | X | ORO-348 |
| | 6/11/98 | | | | | | | | | | | | | | |
| | PT | | | | | | | | | | | | | | |
| | 6/11/98 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |

* Matrix Options: SW (Surface water) • GW (Ground water) • WW (Wastewater) • DW (Drinking water) • SL (Sludge) • SOIL • OIL • Other (Specify)

**COMMENTS**
Std. QA/QC report

***SAMPLE DISPOSAL OPTIONS** - Please complete section A, or choose one option from sections B AND C.*
***Proper charges will be assessed.***

***(A) Long-term storage***
Hold until _____(date)
for future analysis.

***(B) If Sample Is Non-Hazardous***
1) Local Disposal
2) RCRA - Permitted Facility
3) Return to Client

***(C) If Sample Is Hazardous***
1) RCRA-Permitted Facility
2) Return to Client

| RELINQUISHED BY: (SIGNATURE) | DATE | TIME | RECEIVED BY: ( SIGNATURE) | DATE | TIME | PAGE # |
|---|---|---|---|---|---|---|
| Arthur M. Morrissey | 6-9-98 | 0800 | | | | 1 OF 1 |
| | | | | | | |
| | | | | 6/9/98 | 0800 | |

White - Return w/ sample Yellow - Return w/ sample Pink - Return w/ sample Gold - Keep for your records

ACZ Laboratories, Inc.

**CASE NARRATIVE**
July 9, 1998

| | |
|---|---|
| Client: | American Geological Services, Inc. |
| Project: | French Gulch. |
| Date Rec'd: | 06/10/98 |
| SDG#: | L18852 |
| Lab Nos.: | L18852-01 Through L18852-03 |

Three samples for this SDG were received on 6/10/98. The samples were received in good condition at 6.4 degrees C. These samples were then logged into ACZ's LIMS as projects L18852.

The samples for this SDG were analyzed for the parameters outlined in the scope of work attached with the Chain of Custody documentation. The list contained inorganic parameters.

The data package is separated into 4 sections as follows:

- Invoice and Case Narrative
- Inorganic Analytical Reports
- QC Summaries
- Chain of Custody Documentation

Items of note for this project:

1. A single Calibration Control Verification sample for Nitrate - N was determined out of control possibly to matrix interferences.

2. Poor spike recovery was accepted for total recoverable zinc due to sample concentrations were determined to be four time greater than the spike concentrations.

This set of samples meets ACZ's data quality objectives.

If you have any questions please do not hesitate to call me at (800) 334-5493.

Scott Gustin, Project Manager

*2773 Downhill Drive*
*Steamboat Springs, CO 80487*

*Phone (800) 334-5493*
*FAX No. (970) 879-2216*

# ACZ Laboratories, Inc.

**INVOICE**

30400 Downhill Drive
Steamboat Springs, CO 80487
(970) 879-6590

**Service Requests**
- (●) Normal
- ( ) 1-2 Days +200%
- ( ) 3-5 Days +100%
- ( ) 6-10 Days +50%

**Deliverable**
- (●) Standard
- ( ) Std with QC Summary
- ( ) CLP Format

BILL TO: American Geological Services, Inc.
A. Morrissey
12477 W. Cedar Dr.#206
Lakewood, CO 80228

REPORT TO: American Geological Services, Inc.
A. Morrissey
12477 W. Cedar Dr.#206
Lakewood, CO 80228

| Invoice No. | Invoice Date | Reference | Terms | ACZ Project | ACZ Quote | Client Project/P.O. Number |
|---|---|---|---|---|---|---|
| 17185 | 25-Jun-98 | C9999 | Net 30 | L18852 | | French Gulch |

| Qty | Analysis | Method | Matrix | Price | Total |
|---|---|---|---|---|---|
| 3 | Alkalinity as CaCO3 | M2320B | Ground Water | $7.50 | $22.50 |
| 3 | Aluminum, dissolved | M200.7 ICP | Ground Water | $7.50 | $22.50 |
| 3 | Aluminum, total recoverable | M200.7 ICP | Ground Water | $7.50 | $22.50 |
| 3 | Antimony, total recoverable | M200.8 ICP-MS | Ground Water | $15.50 | $46.50 |
| 3 | Arsenic, dissolved | M200.8 ICP-MS | Ground Water | $15.50 | $46.50 |
| 3 | Arsenic, total recoverable | M6020 ICPMS | Ground Water | $15.50 | $46.50 |
| 3 | Cadmium, dissolved | M200.7 ICP | Ground Water | $7.50 | $22.50 |
| 3 | Cadmium, total recoverable | M200.7 ICP | Ground Water | $7.50 | $22.50 |
| 3 | Calcium, dissolved | M200.7 ICP | Ground Water | $7.50 | $22.50 |
| 3 | Carbon, total organic (TOC) | M415.1 Oxidation/IR | Ground Water | $28.00 | $84.00 |
| 3 | Cation-Anion Balance | Calculation | Ground Water | $0.00 | $0.00 |
| 3 | Chloride | M325.2 - Colorimetric (RFA) | Ground Water | $7.50 | $22.50 |
| 3 | Chromium, dissolved | M200.8 ICP-MS | Ground Water | $15.50 | $46.50 |
| 3 | Chromium, total recoverable | M200.8 ICP-MS | Ground Water | $15.50 | $46.50 |
| 3 | Conductivity @25C | M120.1 - Meter | Ground Water | $5.50 | $16.50 |
| 3 | Copper, dissolved | M200.8 ICP-MS | Ground Water | $15.50 | $46.50 |
| 3 | Copper, total recoverable | M200.8 ICP-MS | Ground Water | $15.50 | $46.50 |
| 3 | Hardness as CaCO3 | Calculation based on dissolved | Ground Water | $0.00 | $0.00 |
| 3 | Iron, dissolved | M200.7 ICP | Ground Water | $7.50 | $22.50 |
| 2 | Iron, Ferric | Calculation (Dissolved Fe - Fer | Ground Water | $0.00 | $0.00 |
| 2 | Iron, Ferrous | SM315B(c) Phenanthroline | Ground Water | $20.00 | $40.00 |
| 3 | Iron, total recoverable | M200.7 ICP | Ground Water | $7.50 | $22.50 |
| 3 | Lead, dissolved | M200.7 ICP | Ground Water | $7.50 | $22.50 |
| 3 | Lead, total recoverable | M200.7 ICP | Ground Water | $7.50 | $22.50 |
| 3 | Magnesium, dissolved | M200.7 ICP | Ground Water | $7.50 | $22.50 |
| 3 | Manganese, dissolved | M200.7 ICP | Ground Water | $7.50 | $22.50 |
| 3 | Manganese, total recoverable | M200.7 ICP | Ground Water | $7.50 | $22.50 |
| 3 | Molybdenum, total recoverable | M200.8 ICP-MS | Ground Water | $15.50 | $46.50 |
| 3 | Nickel, dissolved | M200.7 ICP | Ground Water | $7.50 | $22.50 |
| 3 | Nickel, total recoverable | M200.7 ICP | Ground Water | $7.50 | $22.50 |
| 3 | Nitrate as N | M300.0 - Ion Chromatography | Ground Water | $11.00 | $33.00 |
| 3 | Nitrite as N | M300.0 - Ion Chromatography | Ground Water | $11.00 | $33.00 |
| 3 | Nitrogen, ammonia | M350.1 - Automated Phenate | Ground Water | $7.50 | $22.50 |
| 3 | pH (lab) | M150.1 - Electrometric | Ground Water | $5.50 | $16.50 |
| 3 | Potassium, dissolved | M200.7 ICP | Ground Water | $7.50 | $22.50 |
| 3 | Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | Ground Water | $7.50 | $22.50 |
| 3 | Residue, Non-Filterable (TSS) @103-5C | M160.2 - Gravimetric | Ground Water | $7.50 | $22.50 |
| 3 | Selenium, total recoverable | SM 3500-Se C, AA-Hydride | Ground Water | $20.00 | $60.00 |
| 3 | Silver, dissolved | M200.8 ICP-MS | Ground Water | $15.50 | $46.50 |
| 3 | Silver, total recoverable | M200.8 ICP-MS | Ground Water | $15.50 | $46.50 |
| 3 | Sodium, dissolved | M200.7 ICP | Ground Water | $7.50 | $22.50 |
| 3 | Sulfate | M375.3 - Gravimetric | Ground Water | $7.50 | $22.50 |
| 3 | Sulfide as S | SM427C - Modified, Methylen | Ground Water | $8.50 | $25.50 |
| 3 | Sulfite | M377.1 - Titrimetric | Ground Water | $15.00 | $45.00 |
| 3 | TDS (calculated) | Calculation | Ground Water | $0.00 | $0.00 |
| 3 | TDS (ratio - measured/calculated) | Calculation | Ground Water | $0.00 | $0.00 |
| 3 | Total Recoverable Digestion | M3005 ICP | Ground Water | $7.00 | $21.00 |
| 3 | Total Recoverable Digestion | M3005 ICP-MS | Ground Water | $0.00 | $0.00 |
| 3 | Uranium, total recoverable | M200.8 ICP-MS | Ground Water | $15.50 | $46.50 |
| 3 | Vanadium, total recoverable | M200.8 ICP-MS | Ground Water | $15.50 | $46.50 |
| 3 | Zinc, dissolved | M200.7 ICP | Ground Water | $7.50 | $22.50 |

| | | | | | |
|---|---|---|---|---|---|
| 3 | Zinc, total recoverable | M200.7 ICP | Ground Water | $7.50 | $22.50 |
| 1 | Quality Control Summary | | Miscellaneous | $0.00 | $0.00 |

| | |
|---|---|
| **SUBTOTAL** | $1,472.50 |
| **Discount** | 20% |
| **Service Surcharge** | |
| **PAY THIS AMOUNT** | **$1,178.00** |

If you have any questions concerning this invoice, call
Yvonne Baker - Controller (970) 879-6590
Federal Tax ID: 84-1108076

**MAKE CHECKS PAYABLE TO**
**ACZ Laboratories, Inc.**

A service charge of 1.5% (18% per anum) will be made on all unpaid invoices 31 (or more) days old. Should it be necessary to assign account balance to a collection agency or attorney for legal action, all subsequent charges and legal fees shall be paid by customer.

***THANK YOU FOR YOUR BUSINESS!***

ACZ

# Analytical Results

*ACZ Laboratories, Inc.*
*30400 Downhill Drive*
*Steamboat Springs, CO 80487*
*(800) 334-5493*

Lab Sample ID: *L18852-01*
Client Sample ID: *0006 ORO Shaft*
Client Project ID: *French Gulch*
ACZ Report ID: *RG70575*

American Geological Services, Inc.
12477 W. Cedar Dr. #206
Lakewood, CO 80228
A. Morrissey

Date Sampled: *6/9/98 11:05*
Date Received: *6/10/98*
Date Reported: *6/29/98*

Sample Matrix: *Ground Water*

## Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Aluminum, dissolved | M200.7 ICP | 0.80 | | mg/L | 0.03 | 0.2 | 6/12/98 | gg |
| Aluminum, total recoverable | M200.7 ICP | 0.90 | | mg/L | 0.06 | 0.3 | 6/24/98 | kr |
| Antimony, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.001 | 0.005 | 6/16/98 | fep |
| Arsenic, dissolved | M200.8 ICP-MS | 0.011 | | mg/L | 0.002 | 0.01 | 6/17/98 | fep |
| Arsenic, total recoverable | M6020 ICPMS | 0.011 | B | mg/L | 0.005 | 0.03 | 6/16/98 | fep |
| Cadmium, dissolved | M200.7 ICP | 0.294 | | mg/L | 0.003 | 0.02 | 6/12/98 | gg |
| Cadmium, total recoverable | M200.7 ICP | 0.232 | | mg/L | 0.006 | 0.03 | 6/24/98 | kr |
| Calcium, dissolved | M200.7 ICP | 289 | | mg/L | 0.2 | 1 | 6/12/98 | gg |
| Chromium, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0004 | 0.002 | 6/17/98 | fep |
| Chromium, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.001 | 0.005 | 6/16/98 | fep |
| Copper, dissolved | M200.8 ICP-MS | 0.133 | | mg/L | 0.002 | 0.01 | 6/17/98 | fep |
| Copper, total recoverable | M200.8 ICP-MS | 0.108 | | mg/L | 0.005 | 0.03 | 6/16/98 | fep |
| Iron, dissolved | M200.7 ICP | 118 | | mg/L | 0.01 | 0.05 | 6/12/98 | gg |
| Iron, Ferric | Calculation (Dissolved Fe - Ferrous Fe) | | U | mg/L | 0.8 | 4 | 6/29/98 | calc |
| Iron, Ferrous | SM315B(c) Phenanthroline | 123 | | mg/L | 0.8 | 4 | 6/10/98 | bk |
| Iron, total recoverable | M200.7 ICP | 119 | | mg/L | 0.02 | 0.1 | 6/24/98 | kr |
| Lead, dissolved | M200.7 ICP | 0.28 | | mg/L | 0.04 | 0.2 | 6/12/98 | gg |
| Lead, total recoverable | M200.7 ICP | 0.28 | B | mg/L | 0.08 | 0.4 | 6/24/98 | kr |
| Magnesium, dissolved | M200.7 ICP | 94.6 | | mg/L | 0.2 | 1 | 6/12/98 | gg |
| Manganese, dissolved | M200.7 ICP | 36.20 | | mg/L | 0.03 | 0.1 | 6/18/98 | gg |
| Manganese, total recoverable | M200.7 ICP | 35.60 | | mg/L | 0.01 | 0.05 | 6/24/98 | kr |
| Molybdenum, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.001 | 0.005 | 6/16/98 | fep |
| Nickel, dissolved | M200.7 ICP | 0.11 | | mg/L | 0.01 | 0.05 | 6/12/98 | gg |
| Nickel, total recoverable | M200.7 ICP | 0.11 | | mg/L | 0.02 | 0.1 | 6/24/98 | kr |
| Potassium, dissolved | M200.7 ICP | 3.1 | | mg/L | 0.3 | 1 | 6/12/98 | gg |
| Selenium, total recoverable | SM 3500-Se C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 6/25/98 | bg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0002 | 0.001 | 6/17/98 | fep |
| Silver, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.0005 | 0.003 | 6/16/98 | fep |
| Sodium, dissolved | M200.7 ICP | 12.2 | | mg/L | 0.3 | 1 | 6/12/98 | gg |
| Uranium, total recoverable | M200.8 ICP-MS | 0.0013 | B | mg/L | 0.0005 | 0.003 | 6/16/98 | fep |
| Vanadium, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.001 | 0.005 | 6/16/98 | fep |
| Zinc, dissolved | M200.7 ICP | 171 | | mg/L | 0.05 | 0.3 | 6/18/98 | gg |
| Zinc, total recoverable | M200.7 ICP | 162 | | mg/L | 0.05 | 0.3 | 6/25/98 | kr |

**Inorganic Qualifiers (based on EPA CLP 3/90)**

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RPoulsen

Vice President of Operations: Ralph Poulsen

**ACZ** **Analytical Results**

*ACZ Laboratories, Inc.*
*30400 Downhill Drive*
*Steamboat Springs, CO 80487*
*(800) 334-5493*

Lab Sample ID: *L18852-01*
Client Sample ID: *0006 ORO Shaft*
Client Project ID: *French Gulch*
ACZ Report ID: *RG70575*

American Geological Services, Inc.
12477 W. Cedar Dr. #206
Lakewood, CO 80228
A. Morrissey

Date Sampled: *6/9/98 11:05*
Date Received: *6/10/98*
Date Reported: *6/29/98*

Sample Matrix: *Ground Water*

## Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M3005 ICP | | | | | | 6/24/98 | laa |
| Total Recoverable Digestion | M3005 ICP-MS | | | | | | 6/12/98 | laa |

## Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Alkalinity as CaCO3 | M2320B | | | | | | | |
| Bicarbonate as CaCO3 | | | U | mg/L | 2 | 10 | 6/20/98 | sts |
| Carbonate as CaCO3 | | | U | mg/L | 2 | 10 | 6/20/98 | sts |
| Hydroxide as CaCO3 | | | U | mg/L | 2 | 10 | 6/20/98 | sts |
| Total Alkalinity | | | U | mg/L | 2 | 10 | 6/20/98 | sts |
| Carbon, total organic (TOC) | M415.1 Oxidation/IR | 2 | B | mg/L | 1 | 5 | 6/15/98 | bg |
| Cation-Anion Balance | Calculation | | | | | | | |
| Cation-Anion Balance | | 5.2 | | % | | | 6/29/98 | calc |
| Sum of Anions | | 33.4 | | meq/L | 0.1 | 0.5 | 6/29/98 | calc |
| Sum of Cations | | 37.1 | | meq/L | 0.1 | 0.5 | 6/29/98 | calc |
| Chloride | M325.2 - Colorimetric (RFA) | 2 | B | mg/L | 1 | 5 | 6/22/98 | mh |
| Conductivity @25C | M120.1 - Meter | 2230 | | umhos/cm | 1 | 10 | 6/18/98 | sts |
| Hardness as CaCO3 | Calculation based on dissolved Ca & Mg | 1110 | | mg/L | 1 | 7 | 6/29/98 | calc |
| Nitrate as N | M300.0 - Ion Chromatography | 0.05 | | mg/L | 0.01 | 0.05 | 6/15/98 | fp |
| Nitrite as N | M300.0 - Ion Chromatography | | U | mg/L | 0.01 | 0.05 | 6/15/98 | fp |
| Nitrogen, ammonia | M350.1 - Automated Phenate | 0.41 | | mg/L | 0.05 | 0.3 | 6/19/98 | ss |
| pH (lab) | M150.1 - Electrometric | 4.7 | | units | 0.1 | 0.1 | 6/18/98 | sts |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 2530 | | mg/L | 10 | 20 | 6/11/98 | ss/cj |
| Residue, Non-Filterable (TSS) @103-5C | M160.2 - Gravimetric | 48 | | mg/L | 5 | 20 | 6/10/98 | ss/bk |
| Sulfate | M375.3 - Gravimetric | 1590 | | mg/L | 10 | 20 | 6/19/98 | cj |
| Sulfide as S | SM427C - Modified, Methylene Blue | | U | mg/L | 0.02 | 0.1 | 6/15/98 | cj |
| Sulfite | M377.1 - Titrimetric | | U | mg/L | 2 | 10 | 6/10/98 | bk |
| TDS (calculated) | Calculation | 2320 | | mg/L | 10 | 50 | 6/29/98 | calc |
| TDS (ratio - measured/calculated) | Calculation | 1.09 | | | | | 6/29/98 | calc |

**Note: Field measured Ferrous Iron = 140 mg/L.**

**Inorganic Qualifiers (based on EPA CLP 3/90)**

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RVP

Vice President of Operations: Ralph Poulsen

# ACZ

## Analytical Results

*ACZ Laboratories, Inc.*
*30400 Downhill Drive*
*Steamboat Springs, CO 80487*
*(800) 334-5493*

Lab Sample ID: *L18852-02*
Client Sample ID: *0007 ORO Shaft*
Client Project ID: *French Gulch*
ACZ Report ID: *RG70576*

American Geological Services, Inc.
12477 W. Cedar Dr. #206
Lakewood, CO 80228
A. Morrissey

Date Sampled: *6/9/98 11:05*
Date Received: *6/10/98*
Date Reported: *6/29/98*

Sample Matrix: *Ground Water*

### Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Aluminum, dissolved | M200.7 ICP | 0.85 | | mg/L | 0.03 | 0.2 | 6/12/98 | gg |
| Aluminum, total recoverable | M200.7 ICP | 1.02 | | mg/L | 0.06 | 0.3 | 6/24/98 | kr |
| Antimony, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.001 | 0.005 | 6/16/98 | fep |
| Arsenic, dissolved | M200.8 ICP-MS | 0.014 | | mg/L | 0.002 | 0.01 | 6/17/98 | fep |
| Arsenic, total recoverable | M6020 ICPMS | 0.011 | B | mg/L | 0.005 | 0.03 | 6/16/98 | fep |
| Cadmium, dissolved | M200.7 ICP | 0.226 | | mg/L | 0.003 | 0.02 | 6/12/98 | gg |
| Cadmium, total recoverable | M200.7 ICP | 0.265 | | mg/L | 0.006 | 0.03 | 6/24/98 | kr |
| Calcium, dissolved | M200.7 ICP | 316 | | mg/L | 0.2 | 1 | 6/12/98 | gg |
| Chromium, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0004 | 0.002 | 6/17/98 | fep |
| Chromium, total recoverable | M200.8 ICP-MS | 0.001 | B | mg/L | 0.001 | 0.005 | 6/16/98 | fep |
| Copper, dissolved | M200.8 ICP-MS | 0.100 | | mg/L | 0.002 | 0.01 | 6/17/98 | fep |
| Copper, total recoverable | M200.8 ICP-MS | 0.130 | | mg/L | 0.005 | 0.03 | 6/16/98 | fep |
| Iron, dissolved | M200.7 ICP | 134 | | mg/L | 0.01 | 0.05 | 6/12/98 | gg |
| Iron, Ferric | Calculation (Dissolved Fe - Ferrous Fe) | 9.0 | | mg/L | 0.8 | 4 | 6/29/98 | calc |
| Iron, Ferrous | SM315B(c) Phenanthroline | 125 | | mg/L | 0.8 | 4 | 6/10/98 | bk |
| Iron, total recoverable | M200.7 ICP | 110 | | mg/L | 0.02 | 0.1 | 6/24/98 | kr |
| Lead, dissolved | M200.7 ICP | 0.20 | | mg/L | 0.04 | 0.2 | 6/12/98 | gg |
| Lead, total recoverable | M200.7 ICP | 0.34 | B | mg/L | 0.08 | 0.4 | 6/24/98 | kr |
| Magnesium, dissolved | M200.7 ICP | 102 | | mg/L | 0.2 | 1 | 6/12/98 | gg |
| Manganese, dissolved | M200.7 ICP | 37.70 | | mg/L | 0.03 | 0.1 | 6/18/98 | gg |
| Manganese, total recoverable | M200.7 ICP | 33.40 | | mg/L | 0.01 | 0.05 | 6/24/98 | kr |
| Molybdenum, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.001 | 0.005 | 6/16/98 | fep |
| Nickel, dissolved | M200.7 ICP | 0.11 | | mg/L | 0.01 | 0.05 | 6/12/98 | gg |
| Nickel, total recoverable | M200.7 ICP | 0.11 | | mg/L | 0.02 | 0.1 | 6/24/98 | kr |
| Potassium, dissolved | M200.7 ICP | 2.8 | | mg/L | 0.3 | 1 | 6/12/98 | gg |
| Selenium, total recoverable | SM 3500-Se C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 6/25/98 | bg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0002 | 0.001 | 6/17/98 | fep |
| Silver, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.0005 | 0.003 | 6/16/98 | fep |
| Sodium, dissolved | M200.7 ICP | 11.6 | | mg/L | 0.3 | 1 | 6/12/98 | gg |
| Uranium, total recoverable | M200.8 ICP-MS | 0.0013 | B | mg/L | 0.0005 | 0.003 | 6/16/98 | fep |
| Vanadium, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.001 | 0.005 | 6/16/98 | fep |
| Zinc, dissolved | M200.7 ICP | 177 | | mg/L | 0.05 | 0.3 | 6/18/98 | gg |
| Zinc, total recoverable | M200.7 ICP | 159 | | mg/L | 0.05 | 0.3 | 6/25/98 | kr |

**Inorganic Qualifiers (based on EPA CLP 3/90)**

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RV Poulsen

Vice President of Operations: Ralph Poulsen

**ACZ**

**Analytical Results**

*ACZ Laboratories, Inc.*
*30400 Downhill Drive*
*Steamboat Springs, CO 80487*
*(800) 334-5493*

Lab Sample ID: ***L18852-02***
Client Sample ID: *0007 ORO Shaft*
Client Project ID: *French Gulch*
ACZ Report ID: *RG70576*

American Geological Services, Inc.
12477 W. Cedar Dr. #206
Lakewood, CO 80228
A. Morrissey

Date Sampled: *6/9/98 11:05*
Date Received: *6/10/98*
Date Reported: *6/29/98*

Sample Matrix: *Ground Water*

## Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M3005 ICP | | | | | | 6/24/98 | laa |
| Total Recoverable Digestion | M3005 ICP-MS | | | | | | 6/12/98 | laa |

## Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Alkalinity as CaCO3 | M2320B | | | | | | | |
| Bicarbonate as CaCO3 | | 3 | B | mg/L | 2 | 10 | 6/20/98 | sts |
| Carbonate as CaCO3 | | | U | mg/L | 2 | 10 | 6/20/98 | sts |
| Hydroxide as CaCO3 | | | U | mg/L | 2 | 10 | 6/20/98 | sts |
| Total Alkalinity | | 3 | B | mg/L | 2 | 10 | 6/20/98 | sts |
| Carbon, total organic (TOC) | M415.1 Oxidation/IR | 2 | B | mg/L | 1 | 5 | 6/15/98 | bg |
| Cation-Anion Balance | Calculation | | | | | | | |
| Cation-Anion Balance | | 12.3 | | % | | | 6/29/98 | calc |
| Sum of Anions | | 31.4 | | meq/L | 0.1 | 0.5 | 6/29/98 | calc |
| Sum of Cations | | 40.2 | | meq/L | 0.1 | 0.5 | 6/29/98 | calc |
| Chloride | M325.2 - Colorimetric (RFA) | 2 | B | mg/L | 1 | 5 | 6/22/98 | mh |
| Conductivity @25C | M120.1 - Meter | 2280 | | umhos/cm | 1 | 10 | 6/18/98 | sts |
| Hardness as CaCO3 | Calculation based on dissolved Ca & Mg | 1210 | | mg/L | 1 | 7 | 6/29/98 | calc |
| Nitrate as N | M300.0 - Ion Chromatography | 0.06 | | mg/L | 0.01 | 0.05 | 6/15/98 | fp |
| Nitrite as N | M300.0 - Ion Chromatography | | U | mg/L | 0.01 | 0.05 | 6/15/98 | fp |
| Nitrogen, ammonia | M350.1 - Automated Phenate | 0.53 | | mg/L | 0.05 | 0.3 | 6/22/98 | mh |
| pH (lab) | M150.1 - Electrometric | 4.8 | | units | 0.1 | 0.1 | 6/18/98 | sts |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 2570 | | mg/L | 10 | 20 | 6/15/98 | cj |
| Residue, Non-Filterable (TSS) @103-5C | M160.2 - Gravimetric | 46 | | mg/L | 5 | 20 | 6/10/98 | ss/bk |
| Sulfate | M375.3 - Gravimetric | 1490 | | mg/L | 100 | 200 | 6/19/98 | cj |
| Sulfide as S | SM427C - Modified, Methylene Blue | | U | mg/L | 0.02 | 0.1 | 6/15/98 | cj |
| Sulfite | M377.1 - Titrimetric | | U | mg/L | 2 | 10 | 6/10/98 | bk |
| TDS (calculated) | Calculation | 2280 | | mg/L | 10 | 50 | 6/29/98 | calc |
| TDS (ratio - measured/calculated) | Calculation | 1.13 | | | | | 6/29/98 | calc |

**Note: Field measured Ferrous Iron = 130 mg/L.**

**Inorganic Qualifiers (based on EPA CLP 3/90)**

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RVP

Vice President of Operations: Ralph Poulsen

**ACZ**

# Analytical Results

*ACZ Laboratories, Inc.*
*30400 Downhill Drive*
*Steamboat Springs, CO 80487*
*(800) 334-5493*

Lab Sample ID: *L18852-03*
Client Sample ID: *0008 ORO Shaft*
Client Project ID: *French Gulch*
ACZ Report ID: *RG70577*

American Geological Services, Inc.
12477 W. Cedar Dr. #206
Lakewood, CO 80228
A. Morrissey

Date Sampled: *6/9/98 11:05*
Date Received: *6/10/98*
Date Reported: *6/29/98*

Sample Matrix: *Ground Water*

## Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Aluminum, dissolved | M200.7 ICP | | U | mg/L | 0.03 | 0.2 | 6/12/98 | gg |
| Aluminum, total recoverable | M200.7 ICP | | U | mg/L | 0.03 | 0.2 | 6/24/98 | kr |
| Antimony, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.0004 | 0.002 | 6/16/98 | fep |
| Arsenic, dissolved | M200.8 ICP-MS | | U | mg/L | 0.002 | 0.01 | 6/17/98 | fep |
| Arsenic, total recoverable | M6020 ICPMS | | U | mg/L | 0.002 | 0.01 | 6/16/98 | fep |
| Cadmium, dissolved | M200.7 ICP | | U | mg/L | 0.003 | 0.02 | 6/12/98 | gg |
| Cadmium, total recoverable | M200.7 ICP | | U | mg/L | 0.003 | 0.02 | 6/24/98 | kr |
| Calcium, dissolved | M200.7 ICP | | U | mg/L | 0.2 | 1 | 6/12/98 | gg |
| Chromium, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0004 | 0.002 | 6/17/98 | fep |
| Chromium, total recoverable | M200.8 ICP-MS | 0.0006 | B | mg/L | 0.0004 | 0.002 | 6/16/98 | fep |
| Copper, dissolved | M200.8 ICP-MS | | U | mg/L | 0.002 | 0.01 | 6/17/98 | fep |
| Copper, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.002 | 0.01 | 6/16/98 | fep |
| Iron, dissolved | M200.7 ICP | 0.02 | B | mg/L | 0.01 | 0.05 | 6/12/98 | gg |
| Iron, total recoverable | M200.7 ICP | 0.03 | B | mg/L | 0.01 | 0.05 | 6/24/98 | kr |
| Lead, dissolved | M200.7 ICP | | U | mg/L | 0.04 | 0.2 | 6/12/98 | gg |
| Lead, total recoverable | M200.7 ICP | | U | mg/L | 0.04 | 0.2 | 6/24/98 | kr |
| Magnesium, dissolved | M200.7 ICP | | U | mg/L | 0.2 | 1 | 6/12/98 | gg |
| Manganese, dissolved | M200.7 ICP | | U | mg/L | 0.005 | 0.03 | 6/18/98 | gg |
| Manganese, total recoverable | M200.7 ICP | 0.006 | B | mg/L | 0.005 | 0.03 | 6/24/98 | kr |
| Molybdenum, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.0004 | 0.002 | 6/16/98 | fep |
| Nickel, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 6/12/98 | gg |
| Nickel, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 6/24/98 | kr |
| Potassium, dissolved | M200.7 ICP | | U | mg/L | 0.3 | 1 | 6/12/98 | gg |
| Selenium, total recoverable | SM 3500-Se C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 6/25/98 | bg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0002 | 0.001 | 6/17/98 | fep |
| Silver, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.0002 | 0.001 | 6/16/98 | fep |
| Sodium, dissolved | M200.7 ICP | | U | mg/L | 0.3 | 1 | 6/12/98 | gg |
| Uranium, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.0002 | 0.001 | 6/16/98 | fep |
| Vanadium, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.0004 | 0.002 | 6/16/98 | fep |
| Zinc, dissolved | M200.7 ICP | 0.04 | B | mg/L | 0.01 | 0.05 | 6/12/98 | gg |
| Zinc, total recoverable | M200.7 ICP | 0.04 | B | mg/L | 0.01 | 0.05 | 6/24/98 | kr |

## Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M3005 ICP | | | | | | 6/24/98 | laa |
| Total Recoverable Digestion | M3005 ICP-MS | | | | | | 6/12/98 | laa |

**Inorganic Qualifiers (based on EPA CLP 3/90)**

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RVPoulsen

Vice President of Operations: Ralph Poulsen

**ACZ**

**Analytical Results**

*ACZ Laboratories, Inc.*
*30400 Downhill Drive*
*Steamboat Springs, CO 80487*
*(800) 334-5493*

Lab Sample ID: *L18852-03*
Client Sample ID: *0008 ORO Shaft*
Client Project ID: *French Gulch*
ACZ Report ID: *RG70577*

American Geological Services, Inc.
12477 W. Cedar Dr. #206
Lakewood, CO 80228
A. Morrissey

Date Sampled: *6/9/98 11:05*
Date Received: *6/10/98*
Date Reported: *6/29/98*

Sample Matrix: *Ground Water*

## Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Alkalinity as CaCO3 | M2320B | | | | | | | |
| Bicarbonate as CaCO3 | | | U | mg/L | 2 | 10 | 6/20/98 | sts |
| Carbonate as CaCO3 | | | U | mg/L | 2 | 10 | 6/20/98 | sts |
| Hydroxide as CaCO3 | | | U | mg/L | 2 | 10 | 6/20/98 | sts |
| Total Alkalinity | | | U | mg/L | 2 | 10 | 6/20/98 | sts |
| Carbon, total organic (TOC) | M415.1 Oxidation/IR | 13 | | mg/L | 1 | 5 | 6/26/98 | bg |
| Cation-Anion Balance | Calculation | | | | | | | |
| Cation-Anion Balance | | n/a | | % | | | 6/29/98 | calc |
| Sum of Anions | | 0.4 | B | meq/L | 0.1 | 0.5 | 6/29/98 | calc |
| Sum of Cations | | 0.1 | B | meq/L | 0.1 | 0.5 | 6/29/98 | calc |
| Chloride | M325.2 - Colorimetric (RFA) | | U | mg/L | 1 | 5 | 6/22/98 | mh |
| Conductivity @25C | M120.1 - Meter | 32 | | umhos/cm | 1 | 10 | 6/18/98 | sts |
| Hardness as CaCO3 | Calculation based on dissolved Ca & Mg | | U | mg/L | 1 | 7 | 6/29/98 | calc |
| Nitrate as N | M300.0 - Ion Chromatography | 0.07 | | mg/L | 0.01 | 0.05 | 6/16/98 | fp |
| Nitrite as N | M300.0 - Ion Chromatography | | U | mg/L | 0.01 | 0.05 | 6/15/98 | fp |
| Nitrogen, ammonia | M350.1 - Automated Phenate | 2.3 | | mg/L | 0.1 | 0.5 | 6/22/98 | mh |
| pH (lab) | M150.1 - Electrometric | 4.5 | | units | 0.1 | 0.1 | 6/18/98 | sts |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 10 | B | mg/L | 10 | 20 | 6/15/98 | cj |
| Residue, Non-Filterable (TSS) @103-5C | M160.2 - Gravimetric | | U | mg/L | 5 | 20 | 6/15/98 | cj |
| Sulfate | M375.3 - Gravimetric | 20 | | mg/L | 10 | 20 | 6/19/98 | cj |
| Sulfide as S | SM427C - Modified, Methylene Blue | | U | mg/L | 0.02 | 0.1 | 6/15/98 | cj |
| Sulfite | M377.1 - Titrimetric | | U | mg/L | 2 | 10 | 6/10/98 | bk |
| TDS (calculated) | Calculation | 22 | B | mg/L | 10 | 50 | 6/29/98 | calc |
| TDS (ratio - measured/calculated) | Calculation | 0.45 | | | | | 6/29/98 | calc |

**Inorganic Qualifiers (based on EPA CLP 3/90)**

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RVP

Vice President of Operations: Ralph Poulsen

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report ID:** QC1764-C

**ACZ Project ID:** L18852

**REPORT TO:**

**A. Morrissey**
**American Geological Services, Inc.**
**12477 W. Cedar Dr. #206**
**Lakewood, CO 80228**
**Monday, July 06, 1998**

BWCraig
Bradley W. Craig, Quality Assurance Officer

7.06.98
Date

Scott Gustin
Scott Gustin, Project Manager

7-8-98
Date

REPQC001.07.97.03

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

| | |
|---|---|
| ACZ Project # | L18852 |
| QC Report ID | QC1764-C |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

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ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

## Sample Identification

| | |
|---|---|
| ACZ Project # | L18852 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

| ACZ Lab ID | Client Sample ID | Sample Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| L18852-01 | 0006 ORO Shaft | Ground Water | 6/9/98 11:05:00 AM | 6/10/98 |
| L18852-02 | 0007 ORO Shaft | Ground Water | 6/9/98 11:05:00 AM | 6/10/98 |
| L18852-03 | 0008 ORO Shaft | Ground Water | 6/9/98 11:05:00 AM | 6/10/98 |

Comments:



REPQC001.07.97.03

# ACZ

## Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

### Project Summary

ACZ Project # L18852
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/10/98
Date Reported 7/6/98

**ACZ Lab ID: L18852-**

| Product Description | Method | 01 | 02 | 03 |
|---|---|---|---|---|
| Alkalinity as CaCO3 | M2320B | X | X | X |
| Aluminum, dissolved | M200.7 ICP | X | X | X |
| Aluminum, total recoverable | M200.7 ICP | X | X | X |
| Antimony, total recoverable | M200.8 ICP-MS | X | X | X |
| Arsenic, dissolved | M200.8 ICP-MS | X | X | X |
| Arsenic, total recoverable | M6020 ICPMS | X | X | X |
| Cadmium, dissolved | M200.7 ICP | X | X | X |
| Cadmium, total recoverable | M200.7 ICP | X | X | X |
| Calcium, dissolved | M200.7 ICP | X | X | X |
| Carbon, total organic (TOC) | M415.1 Oxidation/IR | X | X | X |
| Chloride | M325.2 - Colorimetric (RFA) | X | X | X |
| Chromium, dissolved | M200.8 ICP-MS | X | X | X |
| Chromium, total recoverable | M200.8 ICP-MS | X | X | X |
| Conductivity @25C | M120.1 - Meter | X | X | X |
| Copper, dissolved | M200.8 ICP-MS | X | X | X |
| Copper, total recoverable | M200.8 ICP-MS | X | X | X |
| Iron, dissolved | M200.7 ICP | X | X | X |
| Iron, Ferrous | SM315B(c) Phenanthroline | X | X | |
| Iron, total recoverable | M200.7 ICP | X | X | X |
| Lead, dissolved | M200.7 ICP | X | X | X |
| Lead, total recoverable | M200.7 ICP | X | X | X |
| Magnesium, dissolved | M200.7 ICP | X | X | X |
| Manganese, dissolved | M200.7 ICP | X | X | X |
| Manganese, total recoverable | M200.7 ICP | X | X | X |
| Molybdenum, total recoverable | M200.8 ICP-MS | X | X | X |
| Nickel, dissolved | M200.7 ICP | X | X | X |
| Nickel, total recoverable | M200.7 ICP | X | X | X |
| Nitrate as N | M300.0 - Ion Chromatography | X | X | X |
| Nitrite as N | M300.0 - Ion Chromatography | X | X | X |
| Nitrogen, ammonia | M350.1 - Automated Phenate | X | X | X |
| pH (lab) | M150.1 - Electrometric | X | X | X |
| Potassium, dissolved | M200.7 ICP | X | X | X |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | X | X | X |
| Residue, Non-Filterable (TSS) @103-5C | M160.2 - Gravimetric | X | X | X |
| Selenium, total recoverable | SM 3500-Se C, AA-Hydride | X | X | X |
| Silver, dissolved | M200.8 ICP-MS | X | X | X |
| Silver, total recoverable | M200.8 ICP-MS | X | X | X |

ACZ

# Inorganic QC Summary

*30400 Downhill Drive*
*Steamboat Springs, CO 80487*
*(800) 334-5493*
*Fax: (970) 879-2216*

## *Project Summary*

| | |
|---|---|
| ACZ Project # | L18852 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

**ACZ Lab ID: L18852-**

| Product Description | Method | 01 | 02 | 03 |
|---|---|---|---|---|
| Sodium, dissolved | M200.7 ICP | X | X | X |
| Sulfate | M375.3 - Gravimetric | X | X | X |
| Sulfide as S | SM427C - Modified, Methylene Blue | X | X | X |
| Sulfite | M377.1 - Titrimetric | X | X | X |
| Uranium, total recoverable | M200.8 ICP-MS | X | X | X |
| Vanadium, total recoverable | M200.8 ICP-MS | X | X | X |
| Zinc, dissolved | M200.7 ICP | X | X | X |
| Zinc, total recoverable | M200.7 ICP | X | X | X |



REPQC001.07.97.03

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# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
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Fax: (970) 879-2216

***Calibration Verification - Control Samples***

***Cover Page***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

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Additional analytical runs may have been required as a result of matrix effects and/or instrumental problems.
Re-analysis data immediately follows initial QC data as outlined in above sequence.

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - Hydride*
**QC Report** ***Calibration Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Selenium, total recoverable

Method SM 3500-Se C, AA-Hydride

| QC ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) | | | Control Limits, % | | Q |
|---|---|---|---|---|---|---|---|---|---|
| | | | | True | Found | Q Rec (%) | Lower | Upper | |
| WG63103ICV | ICV | II980316-6 | 6/25/98 2:07:00 PM | 0.02 | 0.0203 | 101.5 | 90 | 110 | |
| WG63103CCV1 | CCV | II980316-6 | 6/25/98 2:24:00 PM | 0.02 | 0.0196 | 98 | 90 | 110 | |
| WG63103CCV2 | CCV | II980316-6 | 6/25/98 2:42:00 PM | 0.02 | 0.0198 | 99 | 90 | 110 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - ICP*
**QC Report** ***Calibration Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | WG62487ICV | ICV | II980611-3 | 6/12/98 12:08:00 AM | 1 | 1.01 | | 101.1 | 95 | 105 | |
| Aluminum | WG62487CCV2 | CCV | II980611-3 | 6/12/98 1:58:00 AM | 1 | 1.00 | | 100.3 | 90 | 110 | |
| Aluminum | WG62487CCV3 | CCV | II980611-3 | 6/12/98 2:53:00 AM | 1 | 1.02 | | 101.6 | 90 | 110 | |
| Cadmium | WG62487ICV | ICV | II980611-3 | 6/12/98 12:08:00 AM | 1 | 0.985 | | 98.5 | 95 | 105 | |
| Cadmium | WG62487CCV2 | CCV | II980611-3 | 6/12/98 1:58:00 AM | 1 | 1.07 | | 106.7 | 90 | 110 | |
| Cadmium | WG62487CCV3 | CCV | II980611-3 | 6/12/98 2:53:00 AM | 1 | 1.07 | | 106.6 | 90 | 110 | |
| Calcium | WG62487ICV | ICV | II980611-3 | 6/12/98 12:08:00 AM | 51 | 48.7 | | 95.5 | 95 | 105 | |
| Calcium | WG62487CCV2 | CCV | II980611-3 | 6/12/98 1:58:00 AM | 51 | 52.4 | | 102.7 | 90 | 110 | |
| Calcium | WG62487CCV3 | CCV | II980611-3 | 6/12/98 2:53:00 AM | 51 | 52.5 | | 102.9 | 90 | 110 | |
| Iron | WG62487ICV | ICV | II980611-3 | 6/12/98 12:08:00 AM | 1 | 0.971 | | 97.1 | 95 | 105 | |
| Iron | WG62487CCV2 | CCV | II980611-3 | 6/12/98 1:58:00 AM | 1 | 1.04 | | 104 | 90 | 110 | |
| Iron | WG62487CCV3 | CCV | II980611-3 | 6/12/98 2:53:00 AM | 1 | 1.03 | | 102.6 | 90 | 110 | |
| Lead | WG62487ICV | ICV | II980611-3 | 6/12/98 12:08:00 AM | 1 | 0.983 | | 98.3 | 95 | 105 | |
| Lead | WG62487CCV2 | CCV | II980611-3 | 6/12/98 1:58:00 AM | 1 | 1.07 | | 107.2 | 90 | 110 | |
| Lead | WG62487CCV3 | CCV | II980611-3 | 6/12/98 2:53:00 AM | 1 | 1.09 | | 109.1 | 90 | 110 | |
| Magnesium | WG62487ICV | ICV | II980611-3 | 6/12/98 12:08:00 AM | 51 | 48.6 | | 95.4 | 95 | 105 | |
| Magnesium | WG62487CCV2 | CCV | II980611-3 | 6/12/98 1:58:00 AM | 51 | 49.1 | | 96.3 | 90 | 110 | |
| Magnesium | WG62487CCV3 | CCV | II980611-3 | 6/12/98 2:53:00 AM | 51 | 49.6 | | 97.2 | 90 | 110 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICP
**QC Report** ***Calibration Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | L18852 |
| QC Report ID | QC1764-C |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec.(%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Manganese | WG62859ICV | ICV | II980617-1 | 6/18/98 5:04:00 PM | 1 | 0.994 | | 99.4 | 95 | 105 | |
| Manganese | WG62859CCV2 | CCV | II980617-1 | 6/18/98 6:53:00 PM | 1 | 0.987 | | 98.7 | 90 | 110 | |
| Manganese | WG62859CCV3 | CCV | II980617-1 | 6/18/98 7:48:00 PM | 1 | 0.989 | | 98.9 | 90 | 110 | |
| Manganese | WG62859CCV4 | CCV | II980617-1 | 6/18/98 8:06:00 PM | 1 | 1.01 | | 100.6 | 90 | 110 | |
| Nickel | WG62487ICV | ICV | II980611-3 | 6/12/98 12:08:00 AM | 1 | 0.967 | | 96.7 | 95 | 105 | |
| Nickel | WG62487CCV2 | CCV | II980611-3 | 6/12/98 1:58:00 AM | 1 | 1.04 | | 103.8 | 90 | 110 | |
| Nickel | WG62487CCV3 | CCV | II980611-3 | 6/12/98 2:53:00 AM | 1 | 1.03 | | 102.8 | 90 | 110 | |
| Potassium | WG62487ICV | ICV | II980611-3 | 6/12/98 12:08:00 AM | 60 | 60.3 | | 100.5 | 95 | 105 | |
| Potassium | WG62487CCV2 | CCV | II980611-3 | 6/12/98 1:58:00 AM | 60 | 58.7 | | 97.8 | 90 | 110 | |
| Potassium | WG62487CCV3 | CCV | II980611-3 | 6/12/98 2:53:00 AM | 60 | 58.9 | | 98.2 | 90 | 110 | |
| Sodium | WG62487ICV | ICV | II980611-3 | 6/12/98 12:08:00 AM | 51 | 52.0 | | 102 | 95 | 105 | |
| Sodium | WG62487CCV2 | CCV | II980611-3 | 6/12/98 1:58:00 AM | 51 | 49.9 | | 97.9 | 90 | 110 | |
| Sodium | WG62487CCV3 | CCV | II980611-3 | 6/12/98 2:53:00 AM | 51 | 50.6 | | 99.2 | 90 | 110 | |
| Zinc | WG62487ICV | ICV | II980611-3 | 6/12/98 12:08:00 AM | 1 | 0.995 | | 99.5 | 95 | 105 | |
| Zinc | WG62487CCV2 | CCV | II980611-3 | 6/12/98 1:58:00 AM | 1 | 1.07 | | 106.9 | 90 | 110 | |
| Zinc | WG62487CCV3 | CCV | II980611-3 | 6/12/98 2:53:00 AM | 1 | 1.07 | | 106.6 | 90 | 110 | |
| Zinc | WG62859ICV | ICV | II980617-1 | 6/18/98 5:04:00 PM | 1 | 0.987 | | 98.7 | 95 | 105 | |
| Zinc | WG62859CCV2 | CCV | II980617-1 | 6/18/98 6:53:00 PM | 1 | 0.978 | | 97.8 | 90 | 110 | |
| Zinc | WG62859CCV3 | CCV | II980617-1 | 6/18/98 7:48:00 PM | 1 | 0.984 | | 98.4 | 90 | 110 | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICP
**QC Report** ***Calibration Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | L18852 |
| QC Report ID | QC1764-C |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

## Total Recoverable Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | WG63232ICV | ICV | II980617-1 | 6/24/98 9:07:00 PM | 1 | 0.976 | | 97.6 | 95 | 105 | |
| Aluminum | WG63232CCV1 | CCV | II980617-1 | 6/24/98 9:59:00 PM | 1 | 0.968 | | 96.8 | 90 | 110 | |
| Aluminum | WG63232CCV2 | CCV | II980617-1 | 6/24/98 10:52:00 PM | 1 | 0.985 | | 98.5 | 90 | 110 | |
| Cadmium | WG63232ICV | ICV | II980617-1 | 6/24/98 9:07:00 PM | 1 | 0.996 | | 99.6 | 95 | 105 | |
| Cadmium | WG63232CCV1 | CCV | II980617-1 | 6/24/98 9:59:00 PM | 1 | 1.02 | | 101.5 | 90 | 110 | |
| Cadmium | WG63232CCV2 | CCV | II980617-1 | 6/24/98 10:52:00 PM | 1 | 1.03 | | 102.7 | 90 | 110 | |
| Iron | WG63232ICV | ICV | II980617-1 | 6/24/98 9:07:00 PM | 1 | 0.967 | | 96.7 | 95 | 105 | |
| Iron | WG63232CCV1 | CCV | II980617-1 | 6/24/98 9:59:00 PM | 1 | 0.989 | | 98.9 | 90 | 110 | |
| Iron | WG63232CCV2 | CCV | II980617-1 | 6/24/98 10:52:00 PM | 1 | 0.984 | | 98.4 | 90 | 110 | |
| Lead | WG63232ICV | ICV | II980617-1 | 6/24/98 9:07:00 PM | 1 | 0.994 | | 99.4 | 95 | 105 | |
| Lead | WG63232CCV1 | CCV | II980617-1 | 6/24/98 9:59:00 PM | 1 | 1.00 | | 100.5 | 90 | 110 | |
| Lead | WG63232CCV2 | CCV | II980617-1 | 6/24/98 10:52:00 PM | 1 | 1.02 | | 102.5 | 90 | 110 | |
| Manganese | WG63232ICV | ICV | II980617-1 | 6/24/98 9:07:00 PM | 1 | 0.992 | | 99.2 | 95 | 105 | |
| Manganese | WG63232CCV1 | CCV | II980617-1 | 6/24/98 9:59:00 PM | 1 | 1.01 | | 100.8 | 90 | 110 | |
| Manganese | WG63232CCV2 | CCV | II980617-1 | 6/24/98 10:52:00 PM | 1 | 1.02 | | 101.6 | 90 | 110 | |
| Nickel | WG63232ICV | ICV | II980617-1 | 6/24/98 9:07:00 PM | 1 | 0.972 | | 97.2 | 95 | 105 | |
| Nickel | WG63232CCV1 | CCV | II980617-1 | 6/24/98 9:59:00 PM | 1 | 0.991 | | 99.1 | 90 | 110 | |
| Nickel | WG63232CCV2 | CCV | II980617-1 | 6/24/98 10:52:00 PM | 1 | 1.00 | | 100.1 | 90 | 110 | |

| ACZ | Client |
|---|---|
| √ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - ICP*
**QC Report** ***Calibration Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) | | | Control Limits,% | | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | True | Found | Q | Rec (%) | Lower | Upper | |
| Zinc | WG63232ICV | ICV | II980617-1 | 6/24/98 9:07:00 PM | 1 | 0.976 | | 97.6 | 95 | 105 | |
| Zinc | WG63232CCV1 | CCV | II980617-1 | 6/24/98 9:59:00 PM | 1 | 0.995 | | 99.5 | 90 | 110 | |
| Zinc | WG63232CCV2 | CCV | II980617-1 | 6/24/98 10:52:00 PM | 1 | 0.990 | | 99 | 90 | 110 | |
| Zinc | WG63330ICV | ICV | II980617-1 | 6/25/98 5:54:00 PM | 1 | 0.968 | | 96.8 | 95 | 105 | |
| Zinc | WG63330CCV1 | CCV | II980617-1 | 6/25/98 6:46:00 PM | 1 | 0.975 | | 97.5 | 90 | 110 | |
| Zinc | WG63330CCV2 | CCV | II980617-1 | 6/25/98 7:39:00 PM | 1 | 0.960 | | 96 | 90 | 110 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - ICPMS*
**QC Report** ***Calibration Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | WG62476QCS | QCS | MS980526-9 | 6/16/98 5:33:00 AM | 0.05 | 0.0494 | | 98.7 | 90 | 110 | S |
| Arsenic | WG62656ICS1 | ICS | MS980526-6 | 6/17/98 2:44:00 AM | 0.1 | 0.101 | | 101.1 | 90 | 110 | |
| Arsenic | WG62656QCS | QCS | MS980526-9 | 6/17/98 3:01:00 AM | 0.05 | 0.0499 | | 99.8 | 90 | 110 | |
| Arsenic | WG62656ICS2 | ICS | MS980526-6 | 6/17/98 4:27:00 AM | 0.1 | 0.105 | | 104.5 | 90 | 110 | |
| Chromium | WG62688QCS | QCS | MS980526-9 | 6/16/98 11:40:00 PM | 0.05 | 0.0505 | | 101 | 90 | 110 | S |
| Chromium | WG62656ICS1 | ICS | MS980526-6 | 6/17/98 2:44:00 AM | 0.1 | 0.103 | | 102.5 | 90 | 110 | |
| Chromium | WG62656QCS | QCS | MS980526-9 | 6/17/98 3:01:00 AM | 0.05 | 0.0509 | | 101.8 | 90 | 110 | |
| Chromium | WG62656ICS2 | ICS | MS980526-6 | 6/17/98 4:27:00 AM | 0.1 | 0.103 | | 103.4 | 90 | 110 | |
| Copper | WG62476QCS | QCS | MS980526-9 | 6/16/98 5:33:00 AM | 0.05 | 0.0497 | | 99.4 | 90 | 110 | S |
| Copper | WG62656ICS1 | ICS | MS980526-6 | 6/17/98 2:44:00 AM | 0.1 | 0.103 | | 103.4 | 90 | 110 | |
| Copper | WG62656QCS | QCS | MS980526-9 | 6/17/98 3:01:00 AM | 0.05 | 0.0507 | | 101.4 | 90 | 110 | |
| Copper | WG62656ICS2 | ICS | MS980526-6 | 6/17/98 4:27:00 AM | 0.1 | 0.103 | | 103.3 | 90 | 110 | |
| Silver | WG62688QCS | QCS | MS980526-9 | 6/16/98 11:40:00 PM | 0.05 | 0.0496 | | 99.3 | 90 | 110 | S |
| Silver | WG62656ICS1 | ICS | MS980526-3 | 6/17/98 2:44:00 AM | 0.1 | 0.0995 | | 99.5 | 90 | 110 | |
| Silver | WG62656QCS | QCS | MS980526-9 | 6/17/98 3:01:00 AM | 0.05 | 0.0497 | | 99.4 | 90 | 110 | |
| Silver | WG62656ICS2 | ICS | MS980526-3 | 6/17/98 4:27:00 AM | 0.1 | 0.0985 | | 98.5 | 90 | 110 | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - ICPMS*
**QC Report** ***Calibration Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | WG62478QCS | QCS | MS980526-9 | 6/15/98 9:07:00 PM | 0.05 | 0.0510 | | 102.1 | 90 | 110 | |
| Antimony | WG62478ICS3 | ICS | MS980526-6 | 6/16/98 12:18:00 AM | 0.1 | 0.102 | | 101.7 | 90 | 110 | |
| Antimony | WG62478ICS4 | ICS | MS980526-6 | 6/16/98 1:19:00 AM | 0.1 | 0.102 | | 102 | 90 | 110 | |
| Chromium | WG62478QCS | QCS | MS980526-9 | 6/15/98 9:07:00 PM | 0.05 | 0.0502 | | 100.4 | 90 | 110 | |
| Chromium | WG62478ICS3 | ICS | MS980526-6 | 6/16/98 12:18:00 AM | 0.1 | 0.0978 | | 97.8 | 90 | 110 | |
| Chromium | WG62478ICS4 | ICS | MS980526-6 | 6/16/98 1:19:00 AM | 0.1 | 0.0973 | | 97.3 | 90 | 110 | |
| Copper | WG62478QCS | QCS | MS980526-9 | 6/15/98 9:07:00 PM | 0.05 | 0.0491 | | 98.2 | 90 | 110 | |
| Copper | WG62478ICS3 | ICS | MS980526-6 | 6/16/98 12:18:00 AM | 0.1 | 0.105 | | 104.5 | 90 | 110 | |
| Copper | WG62478ICS4 | ICS | MS980526-6 | 6/16/98 1:19:00 AM | 0.1 | 0.105 | | 104.6 | 90 | 110 | |
| Molybdenum | WG62478QCS | QCS | MS980526-9 | 6/15/98 9:07:00 PM | 0.05 | 0.0501 | | 100.2 | 90 | 110 | |
| Molybdenum | WG62478ICS3 | ICS | MS980526-6 | 6/16/98 12:18:00 AM | 0.1 | 0.0983 | | 98.3 | 90 | 110 | |
| Molybdenum | WG62478ICS4 | ICS | MS980526-6 | 6/16/98 1:19:00 AM | 0.1 | 0.0956 | | 95.6 | 90 | 110 | |
| Silver | WG62478QCS | QCS | MS980526-9 | 6/15/98 9:07:00 PM | 0.05 | 0.0503 | | 100.5 | 90 | 110 | |
| Silver | WG62478ICS3 | ICS | MS980526-3 | 6/16/98 12:18:00 AM | 0.1 | 0.0981 | | 98.1 | 90 | 110 | |
| Silver | WG62478ICS4 | ICS | MS980526-3 | 6/16/98 1:19:00 AM | 0.1 | 0.0972 | | 97.2 | 90 | 110 | |
| Uranium | WG62478QCS | QCS | MS980526-9 | 6/15/98 9:07:00 PM | 0.05 | 0.0496 | | 99.2 | 90 | 110 | |
| Uranium | WG62478ICS3 | ICS | MS980526-6 | 6/16/98 12:18:00 AM | 0.1 | 0.101 | | 101.3 | 90 | 110 | |
| Uranium | WG62478ICS4 | ICS | MS980526-6 | 6/16/98 1:19:00 AM | 0.1 | 0.104 | | 104.1 | 90 | 110 | |
| Vanadium | WG62478QCS | QCS | MS980526-9 | 6/15/98 9:07:00 PM | 0.05 | 0.0502 | | 100.5 | 90 | 110 | |
| Vanadium | WG62478ICS3 | ICS | MS980526-6 | 6/16/98 12:18:00 AM | 0.1 | 0.0986 | | 98.6 | 90 | 110 | |
| Vanadium | WG62478ICS4 | ICS | MS980526-6 | 6/16/98 1:19:00 AM | 0.1 | 0.0980 | | 98 | 90 | 110 | |

| ACZ | Client |
|---|---|
| √ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICPMS
**QC Report** ***Calibration Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M6020 ICPMS

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | WG62478QCS | QCS | MS980526-9 | 6/15/98 9:07:00 PM | 0.05 | 0.0487 | | 97.4 | 90 | 110 | |
| Arsenic | WG62478ICS3 | ICS | MS980526-6 | 6/16/98 12:18:00 AM | 0.1 | 0.104 | | 104.1 | 90 | 110 | |
| Arsenic | WG62478ICS4 | ICS | MS980526-6 | 6/16/98 1:19:00 AM | 0.1 | 0.104 | | 103.5 | 90 | 110 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Wet Chemistry*
**QC Report** ***Calibration Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Alkalinity as CaCO3

Method M2320B

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62964CCV1 | CCV | WC980508-1 | 6/20/98 2:39:00 AM | 82 | 88.9 | | 108.4 | 90 | 110 | |
| WG62964CCV4 | CCV | WC980508-1 | 6/20/98 4:41:00 AM | 82 | 89.4 | | 109.1 | 90 | 110 | |

## Carbon, total organic (TOC)

Method M415.1 Oxidation/IR

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62533ICV | ICV | WC980528-2 | 6/15/98 | 71 | 72.0 | | 101.4 | 90 | 110 | |
| WG62533CCV2 | CCV | WC970609-1 | 6/15/98 | 40 | 42.0 | | 105 | 90 | 110 | |
| WG62533CCV3 | CCV | WC970609-1 | 6/15/98 | 40 | 42.0 | | 105 | 90 | 110 | |
| WG63371ICV | ICV | WC980528-2 | 6/26/98 | 71 | 72.0 | | 101.4 | 90 | 110 | |
| WG63371CCV1 | CCV | WC980611-1 | 6/26/98 | 40 | 43.0 | | 107.5 | 90 | 110 | |

## Chloride

Method M325.2 - Colorimetric (RFA)

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG63015ICV | ICV | WC980613-5 | 6/22/98 11:34:01 AM | 51.6 | 48.0 | | 93 | 90 | 110 | |
| WG63015CCV1 | CCV | WC980613-5 | 6/22/98 11:50:00 AM | 50 | 49.2 | | 98.3 | 90 | 110 | |
| WG63015CCV2 | CCV | WC980613-5 | 6/22/98 12:05:59 PM | 50 | 49.0 | | 97.9 | 90 | 110 | |

# ACZ

## Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Wet Chemistry*
**QC Report** | ***Calibration Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Conductivity @25C

Method M120.1 - Meter

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (umhos/cm) True | Found | Q | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62810CCV3 | CCV | WC980617-2 | 6/18/98 6:55:00 PM | 1413 | 1460 | | 103.1 | 90 | 110 | |
| WG62810CCV6 | CCV | WC980617-2 | 6/18/98 8:51:00 PM | 1413 | 1420 | | 100.6 | 90 | 110 | |
| WG62810CCV9 | CCV | WC980617-2 | 6/18/98 11:43:00 PM | 1413 | 1440 | | 101.6 | 90 | 110 | |

## Nitrate as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62436ICV | ICV | IC980609-2 | 6/15/98 | 3.62 | 3.66 | | 101.1 | 90 | 110 | |
| WG62436CCV2 | CCV | IC980609-1 | 6/15/98 | 2.26 | 2.42 | | 107.1 | 90 | 110 | |
| WG62436CCV3 | CCV | IC980609-1 | 6/15/98 | 2.26 | 2.44 | | 108 | 90 | 110 | |
| WG62436CCV4 | CCV | IC980609-1 | 6/15/98 | 2.26 | 2.51 | | 111.1 | 90 | 110 | X |
| WG62653ICV | ICV | IC980616-2 | 6/16/98 | 3.62 | 3.42 | | 94.5 | 90 | 110 | |
| WG62653CCV1 | CCV | IC980616-1 | 6/16/98 | 2.26 | 2.22 | | 98.2 | 90 | 110 | |

## Nitrite as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62436CCV2 | CCV | IC980609-1 | 6/15/98 | 3.04 | 3.20 | | 105.3 | 90 | 110 | |
| WG62436CCV3 | CCV | IC980609-1 | 6/15/98 | 3.04 | 3.24 | | 106.6 | 90 | 110 | |
| WG62436CCV4 | CCV | IC980609-1 | 6/15/98 | 3.04 | 3.19 | | 104.9 | 90 | 110 | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Wet Chemistry
**QC Report** Calibration Verification-Control Samples

| | |
|---|---|
| ACZ Project # | L18852 |
| QC Report ID | QC1764-C |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

## Nitrogen, ammonia

Method M350.1 - Automated Phenate

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62972ICV | ICV | WC980520-2 | 6/19/98 10:57:51 PM | 1.55 | 1.57 | | 101.5 | 90 | 110 | |
| WG62972CCV2 | CCV | WC980401-2 | 6/19/98 11:29:48 PM | 1.5 | 1.49 | | 99.3 | 90 | 110 | |
| WG62972CCV3 | CCV | WC980401-2 | 6/19/98 11:37:48 PM | 1.5 | 1.53 | | 102.1 | 90 | 110 | |
| WG63044ICV | ICV | WC980520-2 | 6/22/98 3:39:23 PM | 1.55 | 1.70 | | 109.5 | 90 | 110 | |
| WG63044CCV1 | CCV | WC980401-2 | 6/22/98 3:55:21 PM | 1.5 | 1.53 | | 102.3 | 90 | 110 | |
| WG63044CCV2 | CCV | WC980401-2 | 6/22/98 4:11:20 PM | 1.5 | 1.45 | | 96.5 | 90 | 110 | |
| WG63044CCV3 | CCV | WC980401-2 | 6/22/98 4:20:39 PM | 1.5 | 1.59 | | 105.9 | 90 | 110 | |
| WG63044CCV4 | CCV | WC980401-2 | 6/22/98 4:44:35 PM | 1.5 | 1.63 | | 108.5 | 90 | 110 | |
| WG63044CCV5 | CCV | WC980401-2 | 6/22/98 4:52:34 PM | 1.5 | 1.53 | | 102.3 | 90 | 110 | |

## pH (lab)

Method M150.1 - Electrometric

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (units) True | Found | Q | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62810ICV | ICV | WC980617-2 | 6/18/98 3:45:00 PM | 7 | 7.03 | | 100.4 | 90 | 110 | |
| WG62810CCV2 | CCV | WC980617-2 | 6/18/98 6:50:00 PM | 7 | 7.02 | | 100.3 | 90 | 110 | |
| WG62810CCV5 | CCV | WC980617-2 | 6/18/98 8:46:00 PM | 7 | 7.02 | | 100.3 | 90 | 110 | |
| WG62810CCV8 | CCV | WC980617-2 | 6/18/98 11:39:00 PM | 7 | 7.02 | | 100.3 | 90 | 110 | |

## Sulfide as S

Method SM427C - Modified, Methylene Blue

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62597CCV1 | CCV | WC980615-1 | 6/15/98 | 0.214 | 0.202 | | 94.4 | 90 | 110 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

***Calibration Verification - Blanks***

***Cover Page***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

| | Page |
|---|---|
| **Metal Analysis** | 19 |
| Metals - Hydride | |
| Total Recoverable Metals | |
| Metals - ICP | |
| Dissolved Metals | |
| Total Recoverable Metals | |
| Metals - ICPMS | |
| Dissolved Metals | |
| Total Recoverable Metals | |
| **Wet Chemistry** | 28 |
| Alphabetical by Parameter | |

Additional analytical runs may have been required as a result of matrix effects and/or instrumental problems.
Re-analysis data immediately follows initial QC data as outlined in above sequence.

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - Hydride*
**QC Report** ***Calibration Verification-Blanks***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Selenium, total recoverable

Method SM 3500-Se C, AA-Hydride

| ACZ ID | QC Type | Analysis Date | Concentration | | | Control Limits | | Units | Q |
|---|---|---|---|---|---|---|---|---|---|
| | | | MDL | Found | Q | Lower | Upper | | |
| WG63103ICB | ICB | 6/25/98 2:08:00 PM | 0.001 | 0.0001 | | -0.002 | 0.002 | mg/L | |
| WG63103CCB1 | CCB | 6/25/98 2:26:00 PM | 0.001 | 0.0000 | | -0.002 | 0.002 | mg/L | |
| WG63103CCB2 | CCB | 6/25/98 2:43:00 PM | 0.001 | 0.0000 | | -0.002 | 0.002 | mg/L | |

ACZ | Client
✓

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICP*
**QC Report** | ***Calibration Verification-Blanks***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | Analysis Date | Concentration MDL | Found | Q | Control Limits Lower | Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | WG62487ICB | ICB | 6/12/98 12:12:00 AM | 0.03 | -0.01476 | | -0.03 | 0.03 | mg/L | |
| Aluminum | WG62487CCB2 | CCB | 6/12/98 2:02:00 AM | 0.03 | 0.00058 | | -0.03 | 0.03 | mg/L | |
| Aluminum | WG62487CCB3 | CCB | 6/12/98 2:57:00 AM | 0.03 | -0.00460 | | -0.03 | 0.03 | mg/L | |
| Cadmium | WG62487ICB | ICB | 6/12/98 12:12:00 AM | 0.003 | -0.00047 | | -0.003 | 0.003 | mg/L | |
| Cadmium | WG62487CCB2 | CCB | 6/12/98 2:02:00 AM | 0.003 | -0.00047 | | -0.003 | 0.003 | mg/L | |
| Cadmium | WG62487CCB3 | CCB | 6/12/98 2:57:00 AM | 0.003 | 0.00047 | | -0.003 | 0.003 | mg/L | |
| Calcium | WG62487ICB | ICB | 6/12/98 12:12:00 AM | 0.2 | 0.01203 | | -0.2 | 0.2 | mg/L | |
| Calcium | WG62487CCB2 | CCB | 6/12/98 2:02:00 AM | 0.2 | 0.01604 | | -0.2 | 0.2 | mg/L | |
| Calcium | WG62487CCB3 | CCB | 6/12/98 2:57:00 AM | 0.2 | 0.01871 | | -0.2 | 0.2 | mg/L | |
| Iron | WG62487ICB | ICB | 6/12/98 12:12:00 AM | 0.01 | 0.00003 | | -0.01 | 0.01 | mg/L | |
| Iron | WG62487CCB2 | CCB | 6/12/98 2:02:00 AM | 0.01 | -0.00336 | | -0.01 | 0.01 | mg/L | |
| Iron | WG62487CCB3 | CCB | 6/12/98 2:57:00 AM | 0.01 | -0.00507 | | -0.01 | 0.01 | mg/L | |
| Lead | WG62487ICB | ICB | 6/12/98 12:12:00 AM | 0.04 | -0.03038 | | -0.04 | 0.04 | mg/L | |
| Lead | WG62487CCB2 | CCB | 6/12/98 2:02:00 AM | 0.04 | -0.02514 | | -0.04 | 0.04 | mg/L | |
| Lead | WG62487CCB3 | CCB | 6/12/98 2:57:00 AM | 0.04 | 0.02620 | | -0.04 | 0.04 | mg/L | |
| Magnesium | WG62487ICB | ICB | 6/12/98 12:12:00 AM | 0.2 | -0.01674 | | -0.2 | 0.2 | mg/L | |
| Magnesium | WG62487CCB2 | CCB | 6/12/98 2:02:00 AM | 0.2 | 0.02422 | | -0.2 | 0.2 | mg/L | |
| Magnesium | WG62487CCB3 | CCB | 6/12/98 2:57:00 AM | 0.2 | -0.01106 | | -0.2 | 0.2 | mg/L | |

| ACZ | Client |
|---|---|
| √ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICP*
**QC Report** | ***Calibration Verification-Blanks***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | Analysis Date | Concentration MDL | Found | Q | Control Limits Lower | Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| Manganese | WG62859ICB | ICB | 6/18/98 5:09:00 PM | 0.005 | 0.00069 | | -0.005 | 0.005 | mg/L | |
| Manganese | WG62859CCB2 | CCB | 6/18/98 6:58:00 PM | 0.005 | 0.00069 | | -0.005 | 0.005 | mg/L | |
| Manganese | WG62859CCB3 | CCB | 6/18/98 7:53:00 PM | 0.005 | 0.00035 | | -0.005 | 0.005 | mg/L | |
| Manganese | WG62859CCB4 | CCB | 6/18/98 8:11:00 PM | 0.005 | 0.00161 | | -0.005 | 0.005 | mg/L | |
| Nickel | WG62487ICB | ICB | 6/12/98 12:12:00 AM | 0.01 | 0.00000 | | -0.01 | 0.01 | mg/L | |
| Nickel | WG62487CCB2 | CCB | 6/12/98 2:02:00 AM | 0.01 | -0.00206 | | -0.01 | 0.01 | mg/L | |
| Nickel | WG62487CCB3 | CCB | 6/12/98 2:57:00 AM | 0.01 | -0.00082 | | -0.01 | 0.01 | mg/L | |
| Potassium | WG62487ICB | ICB | 6/12/98 12:12:00 AM | 0.3 | -0.01249 | | -0.3 | 0.3 | mg/L | |
| Potassium | WG62487CCB2 | CCB | 6/12/98 2:02:00 AM | 0.3 | -0.02915 | | -0.3 | 0.3 | mg/L | |
| Potassium | WG62487CCB3 | CCB | 6/12/98 2:57:00 AM | 0.3 | -0.00416 | | -0.3 | 0.3 | mg/L | |
| Sodium | WG62487ICB | ICB | 6/12/98 12:12:00 AM | 0.3 | -0.01034 | | -0.3 | 0.3 | mg/L | |
| Sodium | WG62487CCB2 | CCB | 6/12/98 2:02:00 AM | 0.3 | 0.01361 | | -0.3 | 0.3 | mg/L | |
| Sodium | WG62487CCB3 | CCB | 6/12/98 2:57:00 AM | 0.3 | 0.02286 | | -0.3 | 0.3 | mg/L | |
| Zinc | WG62487ICB | ICB | 6/12/98 12:12:00 AM | 0.01 | -0.00004 | | -0.01 | 0.01 | mg/L | |
| Zinc | WG62487CCB2 | CCB | 6/12/98 2:02:00 AM | 0.01 | 0.00125 | | -0.01 | 0.01 | mg/L | |
| Zinc | WG62487CCB3 | CCB | 6/12/98 2:57:00 AM | 0.01 | 0.00078 | | -0.01 | 0.01 | mg/L | |
| Zinc | WG62859ICB | ICB | 6/18/98 5:09:00 PM | 0.01 | -0.00039 | | -0.01 | 0.01 | mg/L | |
| Zinc | WG62859CCB2 | CCB | 6/18/98 6:58:00 PM | 0.01 | 0.00037 | | -0.01 | 0.01 | mg/L | |
| Zinc | WG62859CCB3 | CCB | 6/18/98 7:53:00 PM | 0.01 | 0.00036 | | -0.01 | 0.01 | mg/L | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICP
**QC Report** Calibration Verification-Blanks

| | |
|---|---|
| ACZ Project # | L18852 |
| QC Report ID | QC1764-C |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

## Total Recoverable Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | Analysis Date | Concentration MDL | Found | Q | Control Limits Lower | Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | WG63232ICB | ICB | 6/24/98 9:11:00 PM | 0.03 | -0.01502 | | -0.03 | 0.03 | mg/L | |
| Aluminum | WG63232CCB1 | CCB | 6/24/98 10:04:00 PM | 0.03 | -0.01584 | | -0.03 | 0.03 | mg/L | |
| Aluminum | WG63232CCB2 | CCB | 6/24/98 10:56:00 PM | 0.03 | -0.01585 | | -0.03 | 0.03 | mg/L | |
| Cadmium | WG63232ICB | ICB | 6/24/98 9:11:00 PM | 0.003 | -0.00143 | | -0.003 | 0.003 | mg/L | |
| Cadmium | WG63232CCB1 | CCB | 6/24/98 10:04:00 PM | 0.003 | -0.00271 | | -0.003 | 0.003 | mg/L | |
| Cadmium | WG63232CCB2 | CCB | 6/24/98 10:56:00 PM | 0.003 | -0.00229 | | -0.003 | 0.003 | mg/L | |
| Iron | WG63232ICB | ICB | 6/24/98 9:11:00 PM | 0.01 | 0.00038 | | -0.01 | 0.01 | mg/L | |
| Iron | WG63232CCB1 | CCB | 6/24/98 10:04:00 PM | 0.01 | 0.00308 | | -0.01 | 0.01 | mg/L | |
| Iron | WG63232CCB2 | CCB | 6/24/98 10:56:00 PM | 0.01 | 0.00192 | | -0.01 | 0.01 | mg/L | |
| Lead | WG63232ICB | ICB | 6/24/98 9:11:00 PM | 0.04 | -0.00846 | | -0.04 | 0.04 | mg/L | |
| Lead | WG63232CCB1 | CCB | 6/24/98 10:04:00 PM | 0.04 | -0.00916 | | -0.04 | 0.04 | mg/L | |
| Lead | WG63232CCB2 | CCB | 6/24/98 10:56:00 PM | 0.04 | -0.00634 | | -0.04 | 0.04 | mg/L | |
| Manganese | WG63232ICB | ICB | 6/24/98 9:11:00 PM | 0.005 | -0.00048 | | -0.005 | 0.005 | mg/L | |
| Manganese | WG63232CCB1 | CCB | 6/24/98 10:04:00 PM | 0.005 | 0.00048 | | -0.005 | 0.005 | mg/L | |
| Manganese | WG63232CCB2 | CCB | 6/24/98 10:56:00 PM | 0.005 | -0.00012 | | -0.005 | 0.005 | mg/L | |
| Nickel | WG63232ICB | ICB | 6/24/98 9:11:00 PM | 0.01 | -0.00155 | | -0.01 | 0.01 | mg/L | |
| Nickel | WG63232CCB1 | CCB | 6/24/98 10:04:00 PM | 0.01 | 0.00221 | | -0.01 | 0.01 | mg/L | |
| Nickel | WG63232CCB2 | CCB | 6/24/98 10:56:00 PM | 0.01 | -0.00158 | | -0.01 | 0.01 | mg/L | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICP
**QC Report** ***Calibration Verification-Blanks***

| | |
|---|---|
| ACZ Project # | L18852 |
| QC Report ID | QC1764-C |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

## Total Recoverable Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | Analysis Date | Concentration | | | Control Limits | | Units | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | MDL | Found | Q | Lower | Upper | | |
| Zinc | WG63232ICB | ICB | 6/24/98 9:11:00 PM | 0.01 | 0.00015 | | -0.01 | 0.01 | mg/L | |
| Zinc | WG63232CCB1 | CCB | 6/24/98 10:04:00 PM | 0.01 | 0.00390 | | -0.01 | 0.01 | mg/L | |
| Zinc | WG63232CCB2 | CCB | 6/24/98 10:56:00 PM | 0.01 | 0.00340 | | -0.01 | 0.01 | mg/L | |
| Zinc | WG63330ICB | ICB | 6/25/98 5:58:00 PM | 0.01 | -0.00008 | | -0.01 | 0.01 | mg/L | |
| Zinc | WG63330CCB1 | CCB | 6/25/98 6:51:00 PM | 0.01 | 0.00085 | | -0.01 | 0.01 | mg/L | |
| Zinc | WG63330CCB2 | CCB | 6/25/98 7:43:00 PM | 0.01 | 0.00013 | | -0.01 | 0.01 | mg/L | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICPMS*
**QC Report** | ***Calibration Verification-Blanks***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | Analysis Date | Concentration MDL | Concentration Found | Q | Control Limits Lower | Control Limits Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | WG62656ICB1 | ICB | 6/17/98 2:53:00 AM | 0.001 | 0.00002 | | -0.0022 | 0.0022 | mg/L | |
| Arsenic | WG62656ICB2 | ICB | 6/17/98 4:35:00 AM | 0.001 | -0.00002 | | -0.0022 | 0.0022 | mg/L | |
| Arsenic | WG62656ICB3 | ICB | 6/17/98 5:51:00 AM | 0.001 | 0.00008 | | -0.0022 | 0.0022 | mg/L | |
| Chromium | WG62656ICB1 | ICB | 6/17/98 2:53:00 AM | 0.0002 | -0.00012 | | -0.00044 | 0.00044 | mg/L | |
| Chromium | WG62656ICB2 | ICB | 6/17/98 4:35:00 AM | 0.0002 | 0.00008 | | -0.00044 | 0.00044 | mg/L | |
| Chromium | WG62656ICB3 | ICB | 6/17/98 5:51:00 AM | 0.0002 | -0.00030 | | -0.00044 | 0.00044 | mg/L | |
| Copper | WG62656ICB1 | ICB | 6/17/98 2:53:00 AM | 0.001 | 0.00021 | | -0.0022 | 0.0022 | mg/L | |
| Copper | WG62656ICB2 | ICB | 6/17/98 4:35:00 AM | 0.001 | 0.00010 | | -0.0022 | 0.0022 | mg/L | |
| Copper | WG62656ICB3 | ICB | 6/17/98 5:51:00 AM | 0.001 | 0.00010 | | -0.0022 | 0.0022 | mg/L | |
| Silver | WG62656ICB1 | ICB | 6/17/98 2:53:00 AM | 0.0001 | 0.00013 | | -0.00022 | 0.00022 | mg/L | |
| Silver | WG62656ICB2 | ICB | 6/17/98 4:35:00 AM | 0.0001 | 0.00008 | | -0.00022 | 0.00022 | mg/L | |
| Silver | WG62656ICB3 | ICB | 6/17/98 5:51:00 AM | 0.0001 | 0.00006 | | -0.00022 | 0.00022 | mg/L | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - ICPMS*
**QC Report** ***Calibration Verification-Blanks***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | Analysis Date | Concentration MDL | Concentration Found | Q | Control Limits Lower | Control Limits Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | WG62478ICB1 | ICB | 6/15/98 8:59:00 PM | 0.0002 | 0.00002 | | -0.00044 | 0.00044 | mg/L | |
| Antimony | WG62478ICB2 | ICB | 6/15/98 10:41:00 PM | 0.0002 | 0.00001 | | -0.00044 | 0.00044 | mg/L | |
| Antimony | WG62478ICB3 | ICB | 6/16/98 12:27:00 AM | 0.0002 | 0.00002 | | -0.00044 | 0.00044 | mg/L | |
| Antimony | WG62478ICB4 | ICB | 6/16/98 1:28:00 AM | 0.0002 | 0.00001 | | -0.00044 | 0.00044 | mg/L | |
| Chromium | WG62478ICB1 | ICB | 6/15/98 8:59:00 PM | 0.0002 | -0.00003 | | -0.00044 | 0.00044 | mg/L | |
| Chromium | WG62478ICB2 | ICB | 6/15/98 10:41:00 PM | 0.0002 | -0.00013 | | -0.00044 | 0.00044 | mg/L | |
| Chromium | WG62478ICB3 | ICB | 6/16/98 12:27:00 AM | 0.0002 | 0.00047 | | -0.00044 | 0.00044 | mg/L | X |
| Chromium | WG62478ICB4 | ICB | 6/16/98 1:28:00 AM | 0.0002 | 0.00040 | | -0.00044 | 0.00044 | mg/L | |
| Copper | WG62478ICB1 | ICB | 6/15/98 8:59:00 PM | 0.001 | -0.00003 | | -0.0022 | 0.0022 | mg/L | |
| Copper | WG62478ICB2 | ICB | 6/15/98 10:41:00 PM | 0.001 | 0.00089 | | -0.0022 | 0.0022 | mg/L | |
| Copper | WG62478ICB3 | ICB | 6/16/98 12:27:00 AM | 0.001 | 0.00022 | | -0.0022 | 0.0022 | mg/L | |
| Copper | WG62478ICB4 | ICB | 6/16/98 1:28:00 AM | 0.001 | 0.00017 | | -0.0022 | 0.0022 | mg/L | |
| Molybdenum | WG62478ICB1 | ICB | 6/15/98 8:59:00 PM | 0.0002 | 0.00000 | | -0.00044 | 0.00044 | mg/L | |
| Molybdenum | WG62478ICB2 | ICB | 6/15/98 10:41:00 PM | 0.0002 | 0.00001 | | -0.00044 | 0.00044 | mg/L | |
| Molybdenum | WG62478ICB3 | ICB | 6/16/98 12:27:00 AM | 0.0002 | 0.00000 | | -0.00044 | 0.00044 | mg/L | |
| Molybdenum | WG62478ICB4 | ICB | 6/16/98 1:28:00 AM | 0.0002 | 0.00000 | | -0.00044 | 0.00044 | mg/L | |
| Silver | WG62478ICB1 | ICB | 6/15/98 8:59:00 PM | 0.0001 | 0.00001 | | -0.00022 | 0.00022 | mg/L | |
| Silver | WG62478ICB2 | ICB | 6/15/98 10:41:00 PM | 0.0001 | 0.00001 | | -0.00022 | 0.00022 | mg/L | |
| Silver | WG62478ICB3 | ICB | 6/16/98 12:27:00 AM | 0.0001 | 0.00001 | | -0.00022 | 0.00022 | mg/L | |
| Silver | WG62478ICB4 | ICB | 6/16/98 1:28:00 AM | 0.0001 | 0.00000 | | -0.00022 | 0.00022 | mg/L | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICPMS
**QC Report** ***Calibration Verification-Blanks***

| | |
|---|---|
| ACZ Project # | L18852 |
| QC Report ID | QC1764-C |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

## Total Recoverable Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | Analysis Date | Concentration MDL | Concentration Found | Q | Control Limits Lower | Control Limits Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| Uranium | WG62478ICB1 | ICB | 6/15/98 8:59:00 PM | 0.0001 | 0.00000 | | -0.00022 | 0.00022 | mg/L | |
| Uranium | WG62478ICB2 | ICB | 6/15/98 10:41:00 PM | 0.0001 | 0.00001 | | -0.00022 | 0.00022 | mg/L | |
| Uranium | WG62478ICB3 | ICB | 6/16/98 12:27:00 AM | 0.0001 | 0.00001 | | -0.00022 | 0.00022 | mg/L | |
| Uranium | WG62478ICB4 | ICB | 6/16/98 1:28:00 AM | 0.0001 | 0.00001 | | -0.00022 | 0.00022 | mg/L | |
| Vanadium | WG62478ICB1 | ICB | 6/15/98 8:59:00 PM | 0.0002 | 0.00004 | | -0.00044 | 0.00044 | mg/L | |
| Vanadium | WG62478ICB2 | ICB | 6/15/98 10:41:00 PM | 0.0002 | -0.00014 | | -0.00044 | 0.00044 | mg/L | |
| Vanadium | WG62478ICB3 | ICB | 6/16/98 12:27:00 AM | 0.0002 | 0.00014 | | -0.00044 | 0.00044 | mg/L | |
| Vanadium | WG62478ICB4 | ICB | 6/16/98 1:28:00 AM | 0.0002 | 0.00011 | | -0.00044 | 0.00044 | mg/L | |

ACZ ✓ Client

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - ICPMS*
**QC Report** ***Calibration Verification-Blanks***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M6020 ICPMS

| Element | ACZ ID | QC Type | Analysis Date | Concentration | | | Control Limits | | Units | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | MDL | Found | Q | Lower | Upper | | |
| Arsenic | WG62478ICB1 | ICB | 6/15/98 8:59:00 PM | 0.001 | -0.00008 | | -0.0022 | 0.0022 | mg/L | |
| Arsenic | WG62478ICB2 | ICB | 6/15/98 10:41:00 PM | 0.001 | 0.00006 | | -0.0022 | 0.0022 | mg/L | |
| Arsenic | WG62478ICB3 | ICB | 6/16/98 12:27:00 AM | 0.001 | 0.00029 | | -0.0022 | 0.0022 | mg/L | |
| Arsenic | WG62478ICB4 | ICB | 6/16/98 1:28:00 AM | 0.001 | 0.00007 | | -0.0022 | 0.0022 | mg/L | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Wet Chemistry
**QC Report** ***Calibration Verification-Blanks***

| | |
|---|---|
| ACZ Project # | L18852 |
| QC Report ID | QC1764-C |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

## Alkalinity as CaCO3

Method M2320B

| ACZ ID | QC Type | Analysis Date | Concentration MDL | Found | Q | Control Limits Lower | Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|
| WG62964ICB | ICB | 6/19/98 11:11:00 PM | 2 | 3.4500 | | -4 | 4 | mg/L | |
| WG62964CCB3 | CCB | 6/20/98 2:56:00 AM | 2 | 3.0000 | | -4 | 4 | mg/L | |
| WG62964CCB6 | CCB | 6/20/98 4:58:00 AM | 2 | 3.8100 | | -4 | 4 | mg/L | |

## Carbon, total organic (TOC)

Method M415.1 Oxidation/IR

| ACZ ID | QC Type | Analysis Date | Concentration MDL | Found | Q | Control Limits Lower | Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|
| WG62533ICB | ICB | 6/15/98 | 1 | 0.000 | | -1 | 1 | mg/L | |
| WG62533CCB2 | CCB | 6/15/98 | 1 | 0.000 | | -1 | 1 | mg/L | |
| WG62533CCB3 | CCB | 6/15/98 | 1 | 0.000 | | -1 | 1 | mg/L | |
| WG63371ICB | ICB | 6/26/98 | 1 | 0.000 | | -1 | 1 | mg/L | |
| WG63371CCB1 | CCB | 6/26/98 | 1 | 0.000 | | -1 | 1 | mg/L | |

## Chloride

Method M325.2 - Colorimetric (RFA)

| ACZ ID | QC Type | Analysis Date | Concentration MDL | Found | Q | Control Limits Lower | Upper | Units | Q |
|---|---|---|---|---|---|---|---|---|---|
| WG63015ICB | ICB | 6/22/98 11:35:21 AM | 1 | -1.1750 | | -2 | 2 | mg/L | |
| WG63015CCB1 | CCB | 6/22/98 11:51:20 AM | 1 | -1.1350 | | -2 | 2 | mg/L | |
| WG63015CCB2 | CCB | 6/22/98 12:07:19 PM | 1 | -1.0920 | | -2 | 2 | mg/L | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Wet Chemistry*
**QC Report** ***Calibration Verification-Blanks***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Conductivity @25C

Method M120.1 - Meter

| ACZ ID | QC Type | Analysis Date | Concentration | | | Control Limits | | Units | Q |
|---|---|---|---|---|---|---|---|---|---|
| | | | MDL | Found | Q | Lower | Upper | | |
| WG62810ICB | ICB | 6/18/98 4:36:00 PM | 1 | 2.7470 | | -5 | 5 | hos/cm | |
| WG62810CCB1 | CCB | 6/18/98 6:59:00 PM | 1 | 2.8990 | | -5 | 5 | hos/cm | |
| WG62810CCB3 | CCB | 6/18/98 8:55:00 PM | 1 | 3.0390 | | -5 | 5 | hos/cm | |
| WG62810CCB5 | CCB | 6/18/98 11:47:00 PM | 1 | 2.7720 | | -5 | 5 | hos/cm | |

## Nitrate as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | Analysis Date | Concentration | | | Control Limits | | Units | Q |
|---|---|---|---|---|---|---|---|---|---|
| | | | MDL | Found | Q | Lower | Upper | | |
| WG62436ICB | ICB | 6/15/98 | 0.01 | 0.0160 | | -0.02 | 0.02 | mg/L | |
| WG62436CCB2 | CCB | 6/15/98 | 0.01 | 0.0160 | | -0.02 | 0.02 | mg/L | |
| WG62436CCB3 | CCB | 6/15/98 | 0.01 | 0.0000 | | -0.02 | 0.02 | mg/L | |
| WG62436CCB4 | CCB | 6/15/98 | 0.01 | 0.0000 | | -0.02 | 0.02 | mg/L | |
| WG62653ICB | ICB | 6/16/98 | 0.01 | 0.0150 | | -0.02 | 0.02 | mg/L | |
| WG62653CCB1 | CCB | 6/16/98 | 0.01 | 0.0000 | | -0.02 | 0.02 | mg/L | |

## Nitrite as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | Analysis Date | Concentration | | | Control Limits | | Units | Q |
|---|---|---|---|---|---|---|---|---|---|
| | | | MDL | Found | Q | Lower | Upper | | |
| WG62436ICB | ICB | 6/15/98 | 0.01 | 0.0110 | | -0.02 | 0.02 | mg/L | |
| WG62436CCB2 | CCB | 6/15/98 | 0.01 | 0.0140 | | -0.02 | 0.02 | mg/L | |
| WG62436CCB3 | CCB | 6/15/98 | 0.01 | 0.0000 | | -0.02 | 0.02 | mg/L | |
| WG62436CCB4 | CCB | 6/15/98 | 0.01 | 0.0000 | | -0.02 | 0.02 | mg/L | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Wet Chemistry*
**QC Report** ***Calibration Verification-Blanks***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Nitrogen, ammonia

Method M350.1 - Automated Phenate

| ACZ ID | QC Type | Analysis Date | Concentration | | | Control Limits | | Units | Q |
|---|---|---|---|---|---|---|---|---|---|
| | | | MDL | Found | Q | Lower | Upper | | |
| WG62972ICB | ICB | 6/19/98 10:59:11 PM | 0.05 | 0.0100 | | -0.1 | 0.1 | mg/L | |
| WG62972CCB2 | CCB | 6/19/98 11:31:08 PM | 0.05 | -0.0030 | | -0.1 | 0.1 | mg/L | |
| WG62972CCB3 | CCB | 6/19/98 11:39:08 PM | 0.05 | 0.0060 | | -0.1 | 0.1 | mg/L | |
| WG63044ICB | ICB | 6/22/98 3:40:43 PM | 0.05 | 0.0070 | | -0.1 | 0.1 | mg/L | |
| WG63044CCB1 | CCB | 6/22/98 3:56:41 PM | 0.05 | 0.0000 | | -0.1 | 0.1 | mg/L | |
| WG63044CCB2 | CCB | 6/22/98 4:12:40 PM | 0.05 | 0.0010 | | -0.1 | 0.1 | mg/L | |
| WG63044CCB3 | CCB | 6/22/98 4:21:59 PM | 0.05 | 0.0050 | | -0.1 | 0.1 | mg/L | |
| WG63044CCB4 | CCB | 6/22/98 4:45:55 PM | 0.05 | 0.0000 | | -0.1 | 0.1 | mg/L | |
| WG63044CCB5 | CCB | 6/22/98 4:53:54 PM | 0.05 | -0.0050 | | -0.1 | 0.1 | mg/L | |

## Sulfide as S

Method SM427C - Modified, Methylene Blue

| ACZ ID | QC Type | Analysis Date | Concentration | | | Control Limits | | Units | Q |
|---|---|---|---|---|---|---|---|---|---|
| | | | MDL | Found | Q | Lower | Upper | | |
| WG62597CCB1 | CCB | 6/15/98 | 0.02 | 0.000 | | -0.04 | 0.04 | mg/L | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

***Spike Verification***

***Cover Page***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

| | Page |
|---|---|
| **Metal Analysis** | 32 |
| Metals - Hydride | |
| Total Recoverable Metals | |
| Metals - ICP | |
| Dissolved Metals | |
| Total Recoverable Metals | |
| Metals - ICPMS | |
| Dissolved Metals | |
| Total Recoverable Metals | |
| **Wet Chemistry** | 39 |
| Alphabetical by Parameter | |

Additional analytical runs may have been required as a result of matrix effects and/or instrumental problems.
Re-analysis data immediately follows initial QC data as outlined in above sequence.

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - Hydride*
**QC Report** ***Spike Verification***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Selenium, total recoverable

Method SM 3500-Se C, AA-Hydride

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L18861-01AS | AS | II980316-5 | 6/25/98 2:36:00 PM | 0.02 | 0.004 | B | 0.0240 | | mg/L | 100 | 75 | 125 | Y |
| L18861-01ASD | ASD | II980316-5 | 6/25/98 2:37:00 PM | 0.02 | 0.004 | B | 0.0242 | | mg/L | 101 | 75 | 125 | Y |

ACZ / Client ✓

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICP*
**QC Report** | ***Spike Verification***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | L18848-02AS | AS | II980423-1 | 6/12/98 1:49:00 AM | 1 | 0.04 | B | 1.06 | | mg/L | 102.3 | 85 | 115 | Y |
| Aluminum | L18848-02ASD | ASD | II980423-1 | 6/12/98 1:53:00 AM | 1 | 0.04 | B | 1.07 | | mg/L | 103.1 | 85 | 115 | Y |
| Cadmium | L18846-03AS | AS | II980509-1 | 6/12/98 1:12:00 AM | 0.5 | 0.009 | B | 0.455 | | mg/L | 89.3 | 85 | 115 | Y |
| Cadmium | L18846-03ASD | ASD | II980509-1 | 6/12/98 1:17:00 AM | 0.5 | 0.009 | B | 0.473 | | mg/L | 92.7 | 85 | 115 | Y |
| Calcium | L18848-02AS | AS | II980423-1 | 6/12/98 1:49:00 AM | 90 | 5.6 | | 99.7 | | mg/L | 104.5 | 85 | 115 | Y |
| Calcium | L18848-02ASD | ASD | II980423-1 | 6/12/98 1:53:00 AM | 90 | 5.6 | | 101 | | mg/L | 105.6 | 85 | 115 | Y |
| Iron | L18846-03AS | AS | II980509-1 | 6/12/98 1:12:00 AM | 1 | 142 | | 131 | | mg/L | -1060 | 85 | 115 | Y |
| Iron | L18846-03ASD | ASD | II980509-1 | 6/12/98 1:17:00 AM | 1 | 142 | | 135 | | mg/L | -691 | 85 | 115 | Y |
| Lead | L18848-02AS | AS | II980509-1 | 6/12/98 1:49:00 AM | 1 | | U | 1.07 | | mg/L | 106.8 | 85 | 115 | Y |
| Lead | L18848-02ASD | ASD | II980509-1 | 6/12/98 1:53:00 AM | 1 | | U | 1.06 | | mg/L | 106.3 | 85 | 115 | Y |
| Magnesium | L18846-03ASD | ASD | II980423-1 | 6/12/98 1:17:00 AM | 50 | 132 | | 169 | | mg/L | 74 | 85 | 115 | Y |
| Manganese | L18848-02AS | AS | II980509-1 | 6/18/98 7:25:00 PM | 0.5 | 0.007 | B | 0.509 | | mg/L | 100.5 | 85 | 115 | Y |
| Manganese | L18848-02ASD | ASD | II980509-1 | 6/18/98 7:30:00 PM | 0.5 | 0.007 | B | 0.522 | | mg/L | 103.1 | 85 | 115 | Y |
| Nickel | L18848-02AS | AS | II980509-1 | 6/12/98 1:49:00 AM | 0.5 | | U | 0.509 | | mg/L | 101.9 | 85 | 115 | Y |
| Nickel | L18848-02ASD | ASD | II980509-1 | 6/12/98 1:53:00 AM | 0.5 | | U | 0.517 | | mg/L | 103.4 | 85 | 115 | Y |
| Potassium | L18848-02AS | AS | II980423-1 | 6/12/98 1:49:00 AM | 100 | 0.9 | B | 102 | | mg/L | 101.4 | 85 | 115 | Y |
| Potassium | L18848-02ASD | ASD | II980423-1 | 6/12/98 1:53:00 AM | 100 | 0.9 | B | 105 | | mg/L | 104.1 | 85 | 115 | Y |

ACZ / Client ✓

ACZ

# Inorganic
## QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICP*
**QC Report** | ***Spike Verification***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sodium | L18848-02AS | AS | II980423-1 | 6/12/98 1:49:00 AM | 116.4 | 2.5 | | 117 | | mg/L | 98.5 | 85 | 115 | Y |
| Sodium | L18848-02ASD | ASD | II980423-1 | 6/12/98 1:53:00 AM | 116.4 | 2.5 | | 120 | | mg/L | 101.1 | 85 | 115 | Y |
| Zinc | L18848-02AS | AS | II980423-1 | 6/18/98 7:25:00 PM | 0.5 | | U | 0.525 | | mg/L | 105 | 85 | 115 | Y |
| Zinc | L18848-02ASD | ASD | II980423-1 | 6/18/98 7:30:00 PM | 0.5 | | U | 0.532 | | mg/L | 106.4 | 85 | 115 | Y |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - ICP*
**QC Report** ***Spike Verification***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | L18861-03LFM | LFM | II980423-1 | 6/24/98 10:39:00 P | 1 | 0.7 | | 2.17 | | mg/L | 146.8 | 70 | 130 | Y |
| Aluminum | L18861-03LFMD | LFMD | II980423-1 | 6/24/98 10:43:00 P | 1 | 0.7 | | 2.37 | | mg/L | 166.7 | 70 | 130 | Y |
| Cadmium | L18861-03LFM | LFM | II980509-1 | 6/24/98 10:39:00 P | 0.5 | | U | 0.466 | | mg/L | 93.2 | 70 | 130 | Y |
| Cadmium | L18861-03LFMD | LFMD | II980509-1 | 6/24/98 10:43:00 P | 0.5 | | U | 0.464 | | mg/L | 92.8 | 70 | 130 | Y |
| Iron | L18861-03LFM | LFM | II980509-1 | 6/24/98 10:39:00 P | 1 | 0.74 | | 1.85 | | mg/L | 110.6 | 70 | 130 | Y |
| Iron | L18861-03LFMD | LFMD | II980509-1 | 6/24/98 10:43:00 P | 1 | 0.74 | | 1.98 | | mg/L | 123.5 | 70 | 130 | Y |
| Lead | L18861-03LFM | LFM | II980509-1 | 6/24/98 10:39:00 P | 1 | | U | 0.931 | | mg/L | 93.1 | 70 | 130 | Y |
| Lead | L18861-03LFMD | LFMD | II980509-1 | 6/24/98 10:43:00 P | 1 | | U | 0.953 | | mg/L | 95.3 | 70 | 130 | Y |
| Manganese | L18861-03LFM | LFM | II980509-1 | 6/24/98 10:39:00 P | 0.5 | 0.189 | | 0.653 | | mg/L | 92.7 | 70 | 130 | Y |
| Manganese | L18861-03LFMD | LFMD | II980509-1 | 6/24/98 10:43:00 P | 0.5 | 0.189 | | 0.656 | | mg/L | 93.4 | 70 | 130 | Y |
| Nickel | L18861-03LFM | LFM | II980509-1 | 6/24/98 10:39:00 P | 0.5 | | U | 0.457 | | mg/L | 91.4 | 70 | 130 | Y |
| Nickel | L18861-03LFMD | LFMD | II980509-1 | 6/24/98 10:43:00 P | 0.5 | | U | 0.456 | | mg/L | 91.3 | 70 | 130 | Y |
| Zinc | L18852-01LFM | LFM | II980423-1 | 6/25/98 6:42:00 PM | 0.5 | 162 | | 161 | | mg/L | -195 | 70 | 130 | Z |
| Zinc | L18852-01LFMD | LFMD | II980423-1 | 6/25/98 6:55:00 PM | 0.5 | 162 | | 159 | | mg/L | -588 | 70 | 130 | Z |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICPMS*
**QC Report** | ***Spike Verification***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | L18856-01LFM | LFM | MS980526-6 | 6/17/98 5:18:00 AM | 0.1 | 0.056 | | 0.135 | | mg/L | 107 | 70 | 130 | Y |
| Arsenic | L18856-01LFMD | LFMD | MS980526-6 | 6/17/98 5:26:00 AM | 0.1 | 0.056 | | 0.131 | | mg/L | 103 | 70 | 130 | Y |
| Chromium | L18856-01LFM | LFM | MS980526-6 | 6/17/98 5:18:00 AM | 0.1 | 0.957 | | 0.602 | | mg/L | 123.5 | 70 | 130 | Y |
| Chromium | L18856-01LFMD | LFMD | MS980526-6 | 6/17/98 5:26:00 AM | 0.1 | 0.957 | | 0.595 | | mg/L | 116.5 | 70 | 130 | Y |
| Copper | L18856-01LFM | LFM | MS980526-6 | 6/17/98 5:18:00 AM | 0.1 | 0.06 | | 0.129 | | mg/L | 99 | 70 | 130 | Y |
| Copper | L18856-01LFMD | LFMD | MS980526-6 | 6/17/98 5:26:00 AM | 0.1 | 0.06 | | 0.129 | | mg/L | 99 | 70 | 130 | Y |
| Silver | L18856-01LFM | LFM | MS980526-3 | 6/17/98 5:18:00 AM | 0.1 | 0.0214 | | 0.0930 | | mg/L | 82.3 | 70 | 130 | Y |
| Silver | L18856-01LFMD | LFMD | MS980526-3 | 6/17/98 5:26:00 AM | 0.1 | 0.0214 | | 0.0920 | | mg/L | 81.3 | 70 | 130 | Y |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICPMS*
**QC Report** | ***Spike Verification***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | L18846-04LFM | LFM | MS980526-6 | 6/16/98 12:00:00 A | 0.2 | | U | 0.206 | | mg/L | 103 | 70 | 130 | Y |
| Antimony | L18846-04LFMD | LFMD | MS980526-6 | 6/16/98 12:10:00 A | 0.2 | | U | 0.200 | | mg/L | 100 | 70 | 130 | Y |
| Chromium | L18688-01LFM | LFM | MS980526-6 | 6/15/98 9:58:00 PM | 0.2 | 0.002 | B | 0.192 | | mg/L | 95 | 70 | 130 | Y |
| Chromium | L18688-01LFMD | LFMD | MS980526-6 | 6/15/98 10:06:00 P | 0.2 | 0.002 | B | 0.191 | | mg/L | 94.5 | 70 | 130 | Y |
| Copper | L18846-04LFM | LFM | MS980526-6 | 6/16/98 12:00:00 A | 0.2 | 0.088 | | 0.286 | | mg/L | 99 | 70 | 130 | Y |
| Copper | L18846-04LFMD | LFMD | MS980526-6 | 6/16/98 12:10:00 A | 0.2 | 0.088 | | 0.267 | | mg/L | 89.5 | 70 | 130 | Y |
| Molybdenum | L18846-04LFM | LFM | MS980526-6 | 6/16/98 12:00:00 A | 0.2 | | U | 0.193 | | mg/L | 96.5 | 70 | 130 | Y |
| Molybdenum | L18846-04LFMD | LFMD | MS980526-6 | 6/16/98 12:10:00 A | 0.2 | | U | 0.184 | | mg/L | 92 | 70 | 130 | Y |
| Silver | L18846-04LFM | LFM | MS980526-3 | 6/16/98 12:00:00 A | 0.05 | | U | 0.0480 | | mg/L | 96 | 70 | 130 | Y |
| Silver | L18846-04LFMD | LFMD | MS980526-3 | 6/16/98 12:10:00 A | 0.05 | | U | 0.0470 | | mg/L | 94 | 70 | 130 | Y |
| Uranium | L18846-04LFM | LFM | MS980526-6 | 6/16/98 12:00:00 A | 0.1 | 0.0013 | B | 0.105 | | mg/L | 103.7 | 70 | 130 | Y |
| Uranium | L18846-04LFMD | LFMD | MS980526-6 | 6/16/98 12:10:00 A | 0.1 | 0.0013 | B | 0.0990 | | mg/L | 97.7 | 70 | 130 | Y |
| Vanadium | L18846-04LFM | LFM | MS980526-6 | 6/16/98 12:00:00 A | 0.2 | | U | 0.181 | | mg/L | 90.5 | 70 | 130 | Y |
| Vanadium | L18846-04LFMD | LFMD | MS980526-6 | 6/16/98 12:10:00 A | 0.2 | | U | 0.175 | | mg/L | 87.5 | 70 | 130 | Y |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - ICPMS*
**QC Report** ***Spike Verification***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M6020 ICPMS

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | L18846-04LFM | LFM | MS980526-6 | 6/16/98 12:00:00 A | 0.1 | 0.011 | B | 0.107 | | mg/L | 96 | 70 | 130 | Y |
| Arsenic | L18846-04LFMD | LFMD | MS980526-6 | 6/16/98 12:10:00 A | 0.1 | 0.011 | B | 0.107 | | mg/L | 96 | 70 | 130 | Y |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Wet Chemistry*
**QC Report** ***Spike Verification***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Carbon, total organic (TOC)

Method M415.1 Oxidation/IR

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L18852-02AS | AS | WC970609-1 | 6/15/98 | 38 | 2 | B | 44.0 | | mg/L | 111 | 75 | 125 | |

## Chloride

Method M325.2 - Colorimetric (RFA)

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L18848-03AS | AS | WC980608-4 | 6/22/98 11:54:00 AM | 50 | | U | 48.4 | | mg/L | 96.9 | 75 | 125 | Y |

## Nitrate as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L18856-02AS | AS | PCN8034 | 6/16/98 | 2.25 | 0.22 | | 2.44 | | mg/L | 98.7 | 80 | 120 | Y |

## Nitrite as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L18852-02AS | AS | PCN7072 | 6/15/98 | 3.04 | | U | 1.34 | | mg/L | 44.1 | 80 | 120 | X |

## Nitrogen, ammonia

Method M350.1 - Automated Phenate

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L18802-14AS | AS | WC980401-2 | 6/19/98 11:17:49 PM | 0.5 | | U | 0.497 | | mg/L | 99.4 | 75 | 125 | Y |
| L18865-02AS | AS | WC980401-2 | 6/22/98 3:59:21 PM | 0.5 | 0.82 | | 1.31 | | mg/L | 97.8 | 75 | 125 | Y |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Wet Chemistry*
**QC Report** ***Spike Verification***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Sulfide as S

Method SM427C - Modified, Methylene Blue

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration Added | Sample | Q | Spike | Q | Units | Rec (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L18852-03AS | AS | WC980615-1 | 6/15/98 | 0.535 | | U | 0.638 | | mg/L | 119 | 75 | 125 | |

ACZ / Client ✓

ACZ FORM IV - IN



REPQC001.07.97.03

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

***Duplicate Verification***

***Cover Page***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

| | Page |
|---|---|
| **Metal Analysis** | 42 |
| Metals - Hydride | |
| Total Recoverable Metals | |
| Metals - ICP | |
| Dissolved Metals | |
| Total Recoverable Metals | |
| Metals - ICPMS | |
| Dissolved Metals | |
| Total Recoverable Metals | |
| **Wet Chemistry** | 48 |
| Alphabetical by Parameter | |

Additional analytical runs may have been required as a result of matrix effects and/or instrumental problems.
Re-analysis data immediately follows initial QC data as outlined in above sequence.

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - Hydride*
**QC Report** ***Duplicate Verification***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Selenium, total recoverable

Method SM 3500-Se C, AA-Hydride

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) | | | | RPD | Control Limits, % | | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample | Q | Duplicate | Q | (%) | Lower | Upper | |
| L18861-01ASD | ASD | 6/25/98 2:37:00 PM | 0.0240 | | 0.0242 | | 0.8 | 0 | 20 | |

ACZ | Client

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICP*
**QC Report** | ***Duplicate Verification***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | L18848-02ASD | ASD | 1.06 | | 1.07 | | 0.8 | 0 | 20 | |
| Cadmium | L18846-03ASD | ASD | 0.455 | | 0.473 | | 3.7 | 0 | 20 | |
| Calcium | L18848-02ASD | ASD | 99.7 | | 101 | | 1 | 0 | 20 | |
| Iron | L18846-03ASD | ASD | 131 | | 135 | | 2.7 | 0 | 20 | |
| Lead | L18848-02ASD | ASD | 1.07 | | 1.06 | | 0.5 | 0 | 20 | |
| Magnesium | L18846-03ASD | ASD | 166 | | 169 | | 1.5 | 0 | 20 | |
| Manganese | L18848-02ASD | ASD | 0.509 | | 0.522 | | 2.5 | 0 | 20 | |
| Nickel | L18848-02ASD | ASD | 0.509 | | 0.517 | | 1.5 | 0 | 20 | |
| Potassium | L18848-02ASD | ASD | 102 | | 105 | | 2.6 | 0 | 20 | |
| Sodium | L18848-02ASD | ASD | 117 | | 120 | | 2.6 | 0 | 20 | |
| Zinc | L18848-02ASD | ASD | 0.525 | | 0.532 | | 1.4 | 0 | 20 | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - ICP*
**QC Report** ***Duplicate Verification***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | L18861-03LFMD | LFMD | 2.17 | | 2.37 | | 8.8 | 0 | 20 | |
| Cadmium | L18861-03LFMD | LFMD | 0.466 | | 0.464 | | 0.4 | 0 | 20 | |
| Iron | L18861-03LFMD | LFMD | 1.85 | | 1.98 | | 6.8 | 0 | 20 | |
| Lead | L18861-03LFMD | LFMD | 0.931 | | 0.953 | | 2.3 | 0 | 20 | |
| Manganese | L18861-03LFMD | LFMD | 0.653 | | 0.656 | | 0.5 | 0 | 20 | |
| Nickel | L18861-03LFMD | LFMD | 0.457 | | 0.456 | | 0.1 | 0 | 20 | |
| Zinc | L18852-01LFMD | LFMD | 161 | | 159 | | 1.2 | 0 | 20 | |

ACZ Client ✓

ACZ FORM VI - IN



REPQC001.07.97.03

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - ICPMS*
**QC Report** ***Duplicate Verification***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | L18856-01DUP | DUP | 0.0560 | | 0.0570 | | 1.8 | 0 | 20 | |
| Arsenic | L18856-01LFMD | LFMD | 0.135 | | 0.131 | | 3 | 0 | 20 | |
| Chromium | L18856-01DUP | DUP | 0.957 | | 0.958 | | 0.1 | 0 | 20 | |
| Chromium | L18856-01LFMD | LFMD | 0.602 | | 0.595 | | 1.2 | 0 | 20 | |
| Copper | L18856-01DUP | DUP | 0.0600 | | 0.0580 | | 3.4 | 0 | 20 | |
| Copper | L18856-01LFMD | LFMD | 0.129 | | 0.129 | | 0 | 0 | 20 | |
| Silver | L18856-01DUP | DUP | 0.0214 | | 0.0210 | | 1.9 | 0 | 20 | |
| Silver | L18856-01LFMD | LFMD | 0.0930 | | 0.0920 | | 1.1 | 0 | 20 | |

ACZ ✓ Client

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICPMS
**QC Report** ***Duplicate Verification***

| | |
|---|---|
| ACZ Project # | L18852 |
| QC Report ID | QC1764-C |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

## Total Recoverable Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | L18846-04LFMD | LFMD | 0.206 | | 0.200 | | 3 | 0 | 20 | |
| Chromium | L18688-01LFMD | LFMD | 0.192 | | 0.191 | | 0.5 | 0 | 20 | |
| Copper | L18846-04LFMD | LFMD | 0.286 | | 0.267 | | 6.9 | 0 | 20 | |
| Molybdenum | L18846-04LFMD | LFMD | 0.193 | | 0.184 | | 4.8 | 0 | 20 | |
| Silver | L18846-04LFMD | LFMD | 0.0480 | | 0.0470 | | 2.1 | 0 | 20 | |
| Uranium | L18846-04LFMD | LFMD | 0.105 | | 0.0990 | | 5.9 | 0 | 20 | |
| Vanadium | L18846-04LFMD | LFMD | 0.181 | | 0.175 | | 3.4 | 0 | 20 | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - ICPMS*
**QC Report** ***Duplicate Verification***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M6020 ICPMS

| Element | ACZ ID | QC Type | Concentration (mg/L) | | | | RPD | Control Limits, % | | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample | Q | Duplicate | Q | (%) | Lower | Upper | |
| Arsenic | L18846-04LFMD | LFMD | 0.107 | | 0.107 | | 0 | 0 | 20 | |

ACZ Client ✓

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Wet Chemistry*
**QC Report** ***Duplicate Verification***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Alkalinity as CaCO3

Method M2320B

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| L18791-11DUP | DUP | 6/20/98 3:10:00 AM | 296 | | 285 | | 3.7 | 0 | 20 | |

## Carbon, total organic (TOC)

Method M415.1 Oxidation/IR

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| L18852-01DUP | DUP | 6/15/98 | 2.00 | B | 2.00 | B | 0 | 0 | 20 | |

## Chloride

Method M325.2 - Colorimetric (RFA)

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| L18856-02DUP | DUP | 6/22/98 12:11:19 PM | 90.0 | | | U | | 0 | 20 | |

## Conductivity @25C

Method M120.1 - Meter

| ACZ ID | QC Type | Analysis Date | Concentration (umhos/cm) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| L18852-01DUP | DUP | 6/18/98 9:11:00 PM | 2230 | | 2210 | | 0.8 | 0 | 20 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Wet Chemistry*
**QC Report** ***Duplicate Verification***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Nitrate as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) | | | | RPD | Control Limits, % | | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample | Q | Duplicate | Q | (%) | Lower | Upper | |
| L18856-02DUP | DUP | 6/16/98 | 2.20 | | 2.00 | | 9.5 | 0 | 20 | |

## Nitrite as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) | | | | RPD | Control Limits, % | | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample | Q | Duplicate | Q | (%) | Lower | Upper | |
| L18852-02DUP | DUP | 6/15/98 | | U | | U | | 0 | 20 | |

## Nitrogen, ammonia

Method M350.1 - Automated Phenate

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) | | | | RPD | Control Limits, % | | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample | Q | Duplicate | Q | (%) | Lower | Upper | |
| L18865-02DUP | DUP | 6/22/98 3:58:01 PM | 0.820 | | 0.755 | | 8.3 | 0 | 20 | |

## pH (lab)

Method M150.1 - Electrometric

| ACZ ID | QC Type | Analysis Date | Concentration (units) | | | | RPD | Control Limits, % | | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample | Q | Duplicate | Q | (%) | Lower | Upper | |
| L18852-01DUP | DUP | 6/18/98 9:13:00 PM | 4.70 | | 4.67 | | 0.6 | 0 | 20 | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Wet Chemistry*
**QC Report** ***Duplicate Verification***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Residue, Filterable (TDS) @180C

Method M160.1 - Gravimetric

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| L18852-01DUP | DUP | 6/11/98 | 2530 | | 2580 | | 1.9 | 0 | 20 | |

## Residue, Non-Filterable (TSS) @103-5C

Method M160.2 - Gravimetric

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| L18852-02DUP | DUP | 6/10/98 | 46.0 | | 42.0 | | 9.1 | 0 | 20 | |

## Sulfate

Method M375.3 - Gravimetric

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| L18861-02DUP | DUP | 6/19/98 | 390 | | 389 | | 0.4 | 0 | 20 | |

## Sulfide as S

Method SM427C - Modified, Methylene Blue

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) Sample | Q | Duplicate | Q | RPD (%) | Control Limits, % Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| L18852-03DUP | DUP | 6/15/98 | | U | | U | | 0 | 20 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

***Method Verification - Control Samples***

***Cover Page***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

| | Page |
|---|---|
| **Metal Analysis** | 52 |
| Metals - Hydride | |
| Total Recoverable Metals | |
| Metals - ICP | |
| Dissolved Metals | |
| Total Recoverable Metals | |
| Metals - ICPMS | |
| Dissolved Metals | |
| Total Recoverable Metals | |
| **Wet Chemistry** | 58 |
| Alphabetical by Parameter | |

Additional analytical runs may have been required as a result of matrix effects and/or instrumental problems.
Re-analysis data immediately follows initial QC data as outlined in above sequence.

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - Hydride*
**QC Report** | ***Method Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Selenium, total recoverable

Method SM 3500-Se C, AA-Hydride

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG63103LCSW | LCSW | II980316-6 | 6/25/98 2:11:00 PM | 0.02 | 0.0197 | | 98.5 | 80 | 120 | |
| WG63103LFB | LFB | II980316-5 | 6/25/98 2:13:00 PM | 0.02 | 0.0198 | | 99 | 80 | 120 | |

ACZ ✓ Client

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICP
**QC Report** ***Method Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | WG62487LFB | LFB | II980423-1 | 6/12/98 12:17:00 AM | 1 | 1.01 | | 101 | 85 | 115 | |
| Cadmium | WG62487LFB | LFB | II980509-1 | 6/12/98 12:17:00 AM | 0.5 | 0.493 | | 98.7 | 85 | 115 | |
| Calcium | WG62487LFB | LFB | II980423-1 | 6/12/98 12:17:00 AM | 90 | 87.0 | | 96.7 | 85 | 115 | |
| Iron | WG62487LFB | LFB | II980509-1 | 6/12/98 12:17:00 AM | 1 | 0.985 | | 98.5 | 85 | 115 | |
| Lead | WG62487LFB | LFB | II980509-1 | 6/12/98 12:17:00 AM | 1 | 0.979 | | 97.9 | 85 | 115 | |
| Magnesium | WG62487LFB | LFB | II980423-1 | 6/12/98 12:17:00 AM | 50 | 47.5 | | 95 | 85 | 115 | |
| Manganese | WG62859LFB | LFB | II980509-1 | 6/18/98 5:18:00 PM | 0.5 | 0.494 | | 98.8 | 85 | 115 | |
| Nickel | WG62487LFB | LFB | II980509-1 | 6/12/98 12:17:00 AM | 0.5 | 0.483 | | 96.6 | 85 | 115 | |
| Potassium | WG62487LFB | LFB | II980423-1 | 6/12/98 12:17:00 AM | 100 | 101 | | 101 | 85 | 115 | |
| Sodium | WG62487LFB | LFB | II980423-1 | 6/12/98 12:17:00 AM | 116.4 | 117 | | 101 | 85 | 115 | |
| Zinc | WG62487LFB | LFB | II980423-1 | 6/12/98 12:17:00 AM | 0.5 | 0.502 | | 100 | 85 | 115 | |
| Zinc | WG62859LFB | LFB | II980423-1 | 6/18/98 5:18:00 PM | 0.5 | 0.498 | | 99.6 | 85 | 115 | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** *Aqueous*
**Analysis Group** *Metals - ICP*
**QC Report** ***Method Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | WG63232LCSW | LCSW | II980608-2 | 6/24/98 9:20:00 PM | 1 | 0.976 | | 97.6 | 85 | 115 | |
| Aluminum | WG63232LFB | LFB | II980423-1 | 6/24/98 9:24:00 PM | 1 | 0.944 | | 94.4 | 85 | 115 | |
| Cadmium | WG63232LCSW | LCSW | II980608-2 | 6/24/98 9:20:00 PM | 1 | 0.978 | | 97.8 | 85 | 115 | |
| Cadmium | WG63232LFB | LFB | II980509-1 | 6/24/98 9:24:00 PM | 0.5 | 0.487 | | 97.4 | 85 | 115 | |
| Iron | WG63232LCSW | LCSW | II980608-2 | 6/24/98 9:20:00 PM | 1 | 0.951 | | 95.1 | 85 | 115 | |
| Iron | WG63232LFB | LFB | II980509-1 | 6/24/98 9:24:00 PM | 1 | 0.961 | | 96.1 | 85 | 115 | |
| Lead | WG63232LCSW | LCSW | II980608-2 | 6/24/98 9:20:00 PM | 1 | 0.963 | | 96.3 | 85 | 115 | |
| Lead | WG63232LFB | LFB | II980509-1 | 6/24/98 9:24:00 PM | 1 | 0.967 | | 96.7 | 85 | 115 | |
| Manganese | WG63232LCSW | LCSW | II980608-2 | 6/24/98 9:20:00 PM | 1 | 0.977 | | 97.7 | 85 | 115 | |
| Manganese | WG63232LFB | LFB | II980509-1 | 6/24/98 9:24:00 PM | 0.5 | 0.482 | | 96.3 | 85 | 115 | |
| Nickel | WG63232LCSW | LCSW | II980608-2 | 6/24/98 9:20:00 PM | 1 | 0.952 | | 95.2 | 85 | 115 | |
| Nickel | WG63232LFB | LFB | II980509-1 | 6/24/98 9:24:00 PM | 0.5 | 0.475 | | 95 | 85 | 115 | |
| Zinc | WG63232LCSW | LCSW | II980608-2 | 6/24/98 9:20:00 PM | 1 | 0.946 | | 94.6 | 85 | 115 | |
| Zinc | WG63232LFB | LFB | II980423-1 | 6/24/98 9:24:00 PM | 0.5 | 0.478 | | 95.6 | 85 | 115 | |
| Zinc | WG63330LCSW | LCSW | II980608-2 | 6/25/98 6:07:00 PM | 1 | 0.918 | | 91.8 | 85 | 115 | |
| Zinc | WG63330LFB | LFB | II980423-1 | 6/25/98 6:11:00 PM | 0.5 | 0.479 | | 95.8 | 85 | 115 | |

ACZ / Client ✓

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICPMS
**QC Report** ***Method Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | L18852 |
| QC Report ID | QC1764-C |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

## Dissolved Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | WG62656LFB | LFB | MS980526-6 | 6/17/98 3:18:00 AM | 0.1 | 0.100 | | 100 | 85 | 115 | |
| Chromium | WG62656LFB | LFB | MS980526-6 | 6/17/98 3:18:00 AM | 0.1 | 0.102 | | 102 | 85 | 115 | |
| Copper | WG62656LFB | LFB | MS980526-6 | 6/17/98 3:18:00 AM | 0.1 | 0.102 | | 102 | 85 | 115 | |
| Silver | WG62656LFB | LFB | MS980526-3 | 6/17/98 3:18:00 AM | 0.1 | 0.0994 | | 99.4 | 85 | 115 | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICPMS
**QC Report** ***Method Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | L18852 |
| QC Report ID | QC1764-C |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

## Total Recoverable Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | WG62478LFB | LFB | MS980526-6 | 6/15/98 9:24:00 PM | 0.2 | 0.199 | | 99.7 | 85 | 115 | |
| Antimony | WG62478LCSW | LCSW | II980610-1 | 6/15/98 9:41:00 PM | 0.1 | 0.101 | | 101 | 85 | 115 | |
| Chromium | WG62478LFB | LFB | MS980526-6 | 6/15/98 9:24:00 PM | 0.2 | 0.199 | | 99.3 | 85 | 115 | |
| Chromium | WG62478LCSW | LCSW | II980610-1 | 6/15/98 9:41:00 PM | 0.1 | 0.102 | | 102 | 85 | 115 | |
| Copper | WG62478LFB | LFB | MS980526-6 | 6/15/98 9:24:00 PM | 0.2 | 0.192 | | 96.1 | 85 | 115 | |
| Copper | WG62478LCSW | LCSW | II980610-1 | 6/15/98 9:41:00 PM | 0.1 | 0.0990 | | 99 | 85 | 115 | |
| Molybdenum | WG62478LFB | LFB | MS980526-6 | 6/15/98 9:24:00 PM | 0.2 | 0.195 | | 97.4 | 85 | 115 | |
| Molybdenum | WG62478LCSW | LCSW | II980610-1 | 6/15/98 9:41:00 PM | 0.1 | 0.0990 | | 99 | 85 | 115 | |
| Silver | WG62478LFB | LFB | MS980526-3 | 6/15/98 9:24:00 PM | 0.05 | 0.0494 | | 98.7 | 85 | 115 | |
| Silver | WG62478LCSW | LCSW | II980610-1 | 6/15/98 9:41:00 PM | 0.1 | 0.0970 | | 97 | 85 | 115 | |
| Uranium | WG62478LFB | LFB | MS980526-6 | 6/15/98 9:24:00 PM | 0.1 | 0.0975 | | 97.5 | 85 | 115 | |
| Uranium | WG62478LCSW | LCSW | II980610-1 | 6/15/98 9:41:00 PM | 0.05 | 0.0490 | | 98 | 85 | 115 | |
| Vanadium | WG62478LFB | LFB | MS980526-6 | 6/15/98 9:24:00 PM | 0.2 | 0.196 | | 98 | 85 | 115 | |
| Vanadium | WG62478LCSW | LCSW | II980610-1 | 6/15/98 9:41:00 PM | 0.1 | 0.0990 | | 99 | 85 | 115 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Metals - ICPMS
**QC Report** ***Method Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M6020 ICPMS

| Element | ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | WG62478LFB | LFB | MS980526-6 | 6/15/98 9:24:00 PM | 0.1 | 0.0943 | | 94.3 | 85 | 115 | |
| Arsenic | WG62478LCSW | LCSW | II980610-1 | 6/15/98 9:41:00 PM | 0.1 | 0.0950 | | 95 | 85 | 115 | |

| ACZ | Client |
|---|---|
| ✓ | |

# ACZ

## Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Wet Chemistry
**QC Report** ***Method Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | L18852 |
| QC Report ID | QC1764-C |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

## Alkalinity as CaCO3

Method M2320B

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62964LCSW3 | LCSW | WC980617-2 | 6/19/98 11:05:00 PM | 213.79 | 229 | | 107.1 | 90 | 110 | |
| WG62964LCSW6 | LCSW | WC980617-2 | 6/20/98 5:35:00 AM | 213.79 | 225 | | 105.4 | 90 | 110 | |

## Conductivity @25C

Method M120.1 - Meter

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (umhos/cm) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62810LCSW1 | LCSW | WC980617-2 | 6/18/98 4:29:00 PM | 1759.8 | 1720 | | 97.6 | 90 | 110 | |
| WG62810LCSW4 | LCSW | WC980617-2 | 6/18/98 9:18:00 PM | 1759.8 | 1710 | | 97.3 | 90 | 110 | |
| WG62810LCSW7 | LCSW | WC980617-2 | 6/19/98 3:26:00 AM | 1759.8 | 1720 | | 97.7 | 90 | 110 | |

## Nitrate as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62436LFB | LFB | PCN7072 | 6/15/98 | 2.25 | 2.34 | | 104 | 90 | 110 | |
| WG62653LFB | LFB | PCN8034 | 6/16/98 | 2.25 | 2.18 | | 96.9 | 90 | 110 | |

## Nitrite as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62436LFB | LFB | PCN8033 | 6/15/98 | 3.04 | 3.10 | | 102 | 90 | 110 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Wet Chemistry
**QC Report** ***Method Verification-Control Samples***

| | |
|---|---|
| ACZ Project # | L18852 |
| QC Report ID | QC1764-C |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

## pH (lab)

Method M150.1 - Electrometric

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (units) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62810LCSW2 | LCSW | WC980617-2 | 6/18/98 4:31:00 PM | 9.22 | 9.22 | | 100 | 90 | 110 | |
| WG62810LCSW5 | LCSW | WC980617-2 | 6/18/98 9:21:00 PM | 9.22 | 9.22 | | 100 | 90 | 110 | |
| WG62810LCSW8 | LCSW | WC980617-2 | 6/19/98 3:41:00 AM | 9.22 | 9.26 | | 100.4 | 90 | 110 | |

## Residue, Filterable (TDS) @180C

Method M160.1 - Gravimetric

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62404LCSW | LCSW | WC980608-3 | 6/11/98 | 264.78 | 272 | | 102.7 | 80 | 120 | |
| WG62511LCSW | LCSW | WC980608-3 | 6/15/98 | 264.78 | 270 | | 102 | 80 | 120 | |

## Residue, Non-Filterable (TSS) @103-5C

Method M160.2 - Gravimetric

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62326LCSW | LCSW | WC980608-3 | 6/10/98 | 57.3 | 58.0 | | 101.2 | 80 | 120 | |
| WG62584LCSW | LCSW | WC980608-3 | 6/15/98 | 57.3 | 48.0 | | 83.8 | 80 | 120 | |

## Sulfate

Method M375.3 - Gravimetric

| ACZ ID | QC Type | PCN / SCN# | Analysis Date | Concentration (mg/L) True | Found | Q | Rec (%) | Control Limits,% Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62937LCSW | LCSW | WC980206-4 | 6/19/98 | 100 | 109 | | 109.5 | 80 | 120 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

***Method Verification - Blanks***

***Cover Page***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

| | Page |
|---|---|
| **Metal Analysis** | 61 |
| Metals - Hydride | |
| Total Recoverable Metals | |
| Metals - ICP | |
| Dissolved Metals | |
| Total Recoverable Metals | |
| Metals - ICPMS | |
| Dissolved Metals | |
| Total Recoverable Metals | |
| **Wet Chemistry** | 67 |
| Alphabetical by Parameter | |

Additional analytical runs may have been required as a result of matrix effects and/or instrumental problems.
Re-analysis data immediately follows initial QC data as outlined in above sequence.

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - Hydride*
**QC Report** | ***Method Verification-Blanks***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Selenium, total recoverable

Method SM 3500-Se C, AA-Hydride

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) | | | Control Limits | | Q |
|---|---|---|---|---|---|---|---|---|
| | | | MDL | Found | Q | Lower | Upper | |
| WG63103PBW | PBW | 6/25/98 2:10:00 PM | 0.001 | 0.0001000 | | -0.002 | 0.002 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICP*
**QC Report** | ***Method Verification-Blank***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | Analysis Date | Concentration (mg/L) | | | Control Limits | | Q |
|---|---|---|---|---|---|---|---|---|---|
| | | | | MDL | Found | Q | Lower | Upper | |
| Manganese | WG62859LRB | LRB | 6/18/98 5:13:00 PM | 0.005 | 0.00058 | | -0.011 | 0.011 | |
| Zinc | WG62859LRB | LRB | 6/18/98 5:13:00 PM | 0.01 | 0.00110 | | -0.022 | 0.022 | |

ACZ | Client

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

| | |
|---|---|
| **Matrix** | *Aqueous* |
| **Analysis Group** | *Metals - ICP* |
| **QC Report** | ***Method Verification-Blank*** |

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M200.7 ICP

| Element | ACZ ID | QC Type | Analysis Date | Concentration (mg/L) | | | Control Limits | | Q |
|---|---|---|---|---|---|---|---|---|---|
| | | | | MDL | Found | Q | Lower | Upper | |
| Aluminum | WG63232LRB | LRB | 6/24/98 9:16:00 PM | 0.03 | -0.00083 | | -0.066 | 0.066 | |
| Cadmium | WG63232LRB | LRB | 6/24/98 9:16:00 PM | 0.003 | -0.00143 | | -0.0066 | 0.0066 | |
| Iron | WG63232LRB | LRB | 6/24/98 9:16:00 PM | 0.01 | 0.00154 | | -0.022 | 0.022 | |
| Lead | WG63232LRB | LRB | 6/24/98 9:16:00 PM | 0.04 | -0.01270 | | -0.088 | 0.088 | |
| Manganese | WG63232LRB | LRB | 6/24/98 9:16:00 PM | 0.005 | -0.00024 | | -0.011 | 0.011 | |
| Nickel | WG63232LRB | LRB | 6/24/98 9:16:00 PM | 0.01 | -0.00107 | | -0.022 | 0.022 | |
| Zinc | WG63232LRB | LRB | 6/24/98 9:16:00 PM | 0.01 | -0.00117 | | -0.022 | 0.022 | |
| Zinc | WG63330LRB | LRB | 6/25/98 6:02:00 PM | 0.01 | 0.00483 | | -0.022 | 0.022 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICPMS*
**QC Report** | ***Method Verification-Blank***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Dissolved Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | Analysis Date | Concentration (mg/L) | | | Control Limits | | Q |
|---|---|---|---|---|---|---|---|---|---|
| | | | | MDL | Found | Q | Lower | Upper | |
| Arsenic | WG62656LRB | LRB | 6/17/98 3:10:00 AM | 0.001 | 0.00001 | | -0.0022 | 0.0022 | |
| Chromium | WG62656LRB | LRB | 6/17/98 3:10:00 AM | 0.0002 | -0.00016 | | -0.00044 | 0.00044 | |
| Copper | WG62656LRB | LRB | 6/17/98 3:10:00 AM | 0.001 | 0.00028 | | -0.0022 | 0.0022 | |
| Silver | WG62656LRB | LRB | 6/17/98 3:10:00 AM | 0.0001 | 0.00011 | | -0.00022 | 0.00022 | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICPMS*
**QC Report** | ***Method Verification-Blank***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M200.8 ICP-MS

| Element | ACZ ID | QC Type | Analysis Date | Concentration (mg/L) MDL | Found | Q | Control Limits Lower | Upper | Q |
|---|---|---|---|---|---|---|---|---|---|
| Antimony | WG62478LRB | LRB | 6/15/98 9:16:00 PM | 0.0002 | 0.00002 | | -0.00044 | 0.00044 | |
| Antimony | WG62478PBW | PBW | 6/15/98 9:33:00 PM | 0.0004 | 0.0000808 | | -0.00088 | 0.00088 | |
| Chromium | WG62478LRB | LRB | 6/15/98 9:16:00 PM | 0.0002 | -0.00004 | | -0.00044 | 0.00044 | |
| Chromium | WG62478PBW | PBW | 6/15/98 9:33:00 PM | 0.0004 | -0.0001388 | | -0.00088 | 0.00088 | |
| Copper | WG62478LRB | LRB | 6/15/98 9:16:00 PM | 0.001 | 0.00008 | | -0.0022 | 0.0022 | |
| Copper | WG62478PBW | PBW | 6/15/98 9:33:00 PM | 0.002 | 0.0001783 | | -0.0044 | 0.0044 | |
| Molybdenum | WG62478LRB | LRB | 6/15/98 9:16:00 PM | 0.0002 | 0.00001 | | -0.00044 | 0.00044 | |
| Molybdenum | WG62478PBW | PBW | 6/15/98 9:33:00 PM | 0.0004 | 0.0000176 | | -0.00088 | 0.00088 | |
| Silver | WG62478LRB | LRB | 6/15/98 9:16:00 PM | 0.0001 | 0.00001 | | -0.00022 | 0.00022 | |
| Silver | WG62478PBW | PBW | 6/15/98 9:33:00 PM | 0.0002 | 0.0000136 | | -0.00044 | 0.00044 | |
| Uranium | WG62478LRB | LRB | 6/15/98 9:16:00 PM | 0.0001 | 0.00001 | | -0.00022 | 0.00022 | |
| Uranium | WG62478PBW | PBW | 6/15/98 9:33:00 PM | 0.0002 | 0.0000071 | | -0.00044 | 0.00044 | |
| Vanadium | WG62478LRB | LRB | 6/15/98 9:16:00 PM | 0.0002 | 0.00003 | | -0.00044 | 0.00044 | |
| Vanadium | WG62478PBW | PBW | 6/15/98 9:33:00 PM | 0.0004 | 0.0002721 | | -0.00088 | 0.00088 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Metals - ICPMS*
**QC Report** | ***Method Verification-Blank***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Total Recoverable Metals

Method M6020 ICPMS

| Element | ACZ ID | QC Type | Analysis Date | Concentration (mg/L) | | | Control Limits | | Q |
|---|---|---|---|---|---|---|---|---|---|
| | | | | MDL | Found | Q | Lower | Upper | |
| Arsenic | WG62478LRB | LRB | 6/15/98 9:16:00 PM | 0.001 | 0.00000 | | -0.0022 | 0.0022 | |
| Arsenic | WG62478PBW | PBW | 6/15/98 9:33:00 PM | 0.002 | -0.0001471 | | -0.0044 | 0.0044 | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** | *Aqueous*
**Analysis Group** | *Wet Chemistry*
**QC Report** | ***Method Verification-Blanks***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

## Nitrate as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) | | | Control Limits | | Q |
|---|---|---|---|---|---|---|---|---|
| | | | MDL | Found | Q | Lower | Upper | |
| WG62436LRB | LRB | 6/15/98 | 0.01 | 0.0000 | | -0.01 | 0.01 | |
| WG62653LRB | LRB | 6/16/98 | 0.01 | 0.0000 | | -0.01 | 0.01 | |

## Nitrite as N

Method M300.0 - Ion Chromatography

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) | | | Control Limits | | Q |
|---|---|---|---|---|---|---|---|---|
| | | | MDL | Found | Q | Lower | Upper | |
| WG62436LRB | LRB | 6/15/98 | 0.01 | 0.0000 | | -0.01 | 0.01 | |

## Residue, Filterable (TDS) @180C

Method M160.1 - Gravimetric

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) | | | Control Limits | | Q |
|---|---|---|---|---|---|---|---|---|
| | | | MDL | Found | Q | Lower | Upper | |
| WG62404PBW | PBW | 6/11/98 | 10 | 8.0000000 | | -20 | 20 | |
| WG62511PBW | PBW | 6/15/98 | 10 | -4.0000000 | | -20 | 20 | |

## Residue, Non-Filterable (TSS) @103-5C

Method M160.2 - Gravimetric

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) | | | Control Limits | | Q |
|---|---|---|---|---|---|---|---|---|
| | | | MDL | Found | Q | Lower | Upper | |
| WG62326PBW | PBW | 6/10/98 | 5 | 2.0000000 | | -10 | 10 | |
| WG62584PBW | PBW | 6/15/98 | 5 | -4.0000000 | | -10 | 10 | |

| ACZ | Client |
|---|---|
| | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**Matrix** Aqueous
**Analysis Group** Wet Chemistry
**QC Report** ***Method Verification-Blanks***

| | |
|---|---|
| ACZ Project # | L18852 |
| QC Report ID | QC1764-C |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

## Sulfate

Method M375.3 - Gravimetric

| ACZ ID | QC Type | Analysis Date | Concentration (mg/L) | | | Control Limits | | Q |
|---|---|---|---|---|---|---|---|---|
| | | | MDL | Found | Q | Lower | Upper | |
| WG62937PBW | PBW | 6/19/98 | 10 | 0.8232000 | | -10 | 10 | |

ACZ ✓ Client

ACZ FORM VIII - IN



REPQC001.07.97.03

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

***Analysis Run Log***

***Cover Page***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |


| | | Page |
|---|---|---|
| **Metal Analysis** | | 71 |
| Selenium (Total Recoverable) by Hydride | WG63103 | |
| Metals (Dissolved) by ICP | WG62487<br>WG62859 | |
| Metals (Total Recoverable) by ICP | WG63232<br>WG63330 | |
| Metals (Dissolved) by ICP-MS | WG62656 | |
| Metals (Total) by ICP-MS | WG62478 | |
| **Wet Chemistry** | | 81 |
| Alkalinity as CaCO3 | WG62810<br>WG62964 | |
| Ammonia by RFA | WG62972<br>WG63044 | |
| Carbon, total organic (TOC) | WG62533<br>WG63371 | |
| Chloride by RFA | WG63015 | |
| Electrical Conductivity @ 25C | WG62810 | |
| Ion Chromatography | WG62436<br>WG62653 | |
| pH (lab) | WG62810 | |
| Residue, Filterable (TDS) @180C | WG62404<br>WG62511 | |
| Sulfate (Gravimetric) | WG62937 | |
| Sulfide as S | WG62597 | |
| Sulfite | WG62258 | |
| TSS and TVS (Gravimetric) | WG62326 | |




REPQC001.07.97.03

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

***Analysis Run Log***

***Cover Page***

| | |
|---|---|
| ACZ Project # | *L18852* |
| QC Report ID | *QC1764-C* |
| Client | *American Geological Services, Inc.* |
| Client Project ID | *French Gulch* |
| Date Received | *6/10/98* |
| Date Reported | *7/6/98* |

**Page**

TSS and TVS (Gravimetric) WG62584



REPQC001.07.97.03

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** | *Analysis Run Log*

**Analysis** | *Selenium (Total Recoverable) by Hydride*

ACZ Project # L18852
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/10/98
Date Reported 7/6/98

Workgroup: WG63103

| ACZ ID | Measure Date | Dilution | Se |
|---|---|---|---|
| WG63103ICV | 6/25/98 | 1 | X |
| WG63103ICB | 6/25/98 | 1 | X |
| WG63103PBW | 6/25/98 | 1 | X |
| WG63103LCSW | 6/25/98 | 1 | X |
| WG63103LFB | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| L18795-10AS | 6/25/98 | 1 | X |
| L18795-10ASD | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| WG63103CCV1 | 6/25/98 | 1 | X |
| WG63103CCB1 | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| L18852-01 | 6/25/98 | 1 | X |
| L18852-02 | 6/25/98 | 1 | X |
| L18852-03 | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| L18861-01AS | 6/25/98 | 1 | X |
| L18861-01ASD | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| WG63103CCV2 | 6/25/98 | 1 | X |
| WG63103CCB2 | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| WG63103CCV3 | 6/25/98 | 1 | X |
| WG63103CCB3 | 6/25/98 | 1 | X |

ACZ | Client
✓

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Metals (Dissolved) by ICP*

ACZ Project # L18852
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/10/98
Date Reported 7/6/98

Workgroup: WG62487

| ACZ ID | Measure Date | Dilution | Al | Ca | Cd | Fe | K | Mg | Na | Ni | Pb | Zn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WG62487ICV | 6/12/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| WG62487ICB | 6/12/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| WG62487LFB | 6/12/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| ZZZ | 6/12/98 | 1 | | | | | | | | X | | |
| L18783-05AS | 6/12/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| ZZZ | 6/12/98 | 1 | | | | | | | | X | | |
| L18783-06AS | 6/12/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| ZZZ | 6/12/98 | 1 | | | | | | | | X | | |
| L18783-07AS | 6/12/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| ZZZ | 6/12/98 | 1 | | | | | | | | X | | |
| L18783-08AS | 6/12/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| ZZZ | 6/12/98 | 1 | X | X | X | X | X | | X | X | X | |
| WG62487CCV1 | 6/12/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| WG62487CCB1 | 6/12/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| L18846-03AS | 6/12/98 | 1 | X | X | X | X | X | | X | X | X | |
| L18846-03ASD | 6/12/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| ZZZ | 6/12/98 | 1 | X | X | X | X | X | | X | X | X | |
| ZZZ | 6/12/98 | 1 | X | X | X | X | X | | X | X | X | |
| ZZZ | 6/12/98 | 1 | | X | | | X | | X | | | |
| ZZZ | 6/12/98 | 1 | | X | | | X | | X | | | |
| ZZZ | 6/12/98 | 1 | | X | | X | X | | X | | | X |
| ZZZ | 6/12/98 | 1 | | X | | X | X | X | X | | | X |
| L18848-02AS | 6/12/98 | 1 | X | X | | | X | | X | X | X | |
| L18848-02ASD | 6/12/98 | 1 | X | X | | | X | | X | X | X | |
| WG62487CCV2 | 6/12/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| WG62487CCB2 | 6/12/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| ZZZ | 6/12/98 | 1 | | X | | X | X | X | X | | | X |
| L18852-01 | 6/12/98 | 1 | X | X | X | X | X | X | X | X | X | |
| L18852-02 | 6/12/98 | 1 | X | X | X | X | X | X | X | X | X | |
| L18852-03 | 6/12/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| ZZZ | 6/12/98 | 1 | | | X | | | | | X | X | |
| ZZZ | 6/12/98 | 1 | | | | | | | | | | X |
| ZZZ | 6/12/98 | 1 | | X | | | | X | X | | | |
| WG62487CCV3 | 6/12/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| WG62487CCB3 | 6/12/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| ZZZ | 6/12/98 | 1 | X | X | X | X | X | X | X | X | X | X |

ACZ / Client

ACZ

# Inorganic QC Summary

*30400 Downhill Drive*
*Steamboat Springs, CO 80487*
*(800) 334-5493*
*Fax: (970) 879-2216*

**QC Report** | ***Analysis Run Log***

**Analysis** | ***Metals (Dissolved) by ICP***

ACZ Project # L18852
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/10/98
Date Reported 7/6/98

Workgroup: WG62487 **(Continued)**

| ACZ ID | Measure Date | Dilution | Al | Ca | Cd | Fe | K | Mg | Na | Ni | Pb | Zn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ZZZ | 6/12/98 | 1 | | X | | X | X | X | X | | | |
| WG62487CCV4 | 6/12/98 | 1 | X | X | X | X | X | X | X | X | X | X |
| WG62487CCB4 | 6/12/98 | 1 | X | X | X | X | X | X | X | X | X | X |

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# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Metals (Dissolved) by ICP*

| | |
|---|---|
| ACZ Project # | L18852 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

Workgroup: WG62859

| ACZ ID | Measure Date | Dilution | Mn | Zn |
|---|---|---|---|---|
| WG62859ICV | 6/18/98 | 1 | X | X |
| WG62859ICB | 6/18/98 | 1 | X | X |
| WG62859LRB | 6/18/98 | 1 | X | X |
| WG62859LFB | 6/18/98 | 1 | X | X |
| L18040-11AS | 6/18/98 | 1 | X | X |
| L18040-11ASD | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 5 | X | |
| ZZZ | 6/18/98 | 2 | X | |
| ZZZ | 6/18/98 | 1 | | X |
| ZZZ | 6/18/98 | 1 | X | |
| WG62859CCV1 | 6/18/98 | 1 | X | X |
| WG62859CCB1 | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | |
| ZZZ | 6/18/98 | 1 | | X |
| ZZZ | 6/18/98 | 5 | X | X |
| L18846-03AS | 6/18/98 | 5 | X | X |
| ZZZ | 6/18/98 | 5 | X | X |
| L18846-04AS | 6/18/98 | 5 | X | X |
| ZZZ | 6/18/98 | 5 | X | X |
| L18846-05AS | 6/18/98 | 5 | X | X |
| L18847-01AS | 6/18/98 | 1 | X | X |
| WG62859CCV2 | 6/18/98 | 1 | X | X |
| WG62859CCB2 | 6/18/98 | 1 | X | X |
| L18847-02AS | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | |
| L18848-01AS | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | |
| L18848-02AS | 6/18/98 | 1 | X | X |
| L18848-02ASD | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | |
| L18852-01 | 6/18/98 | 5 | X | X |
| L18852-02 | 6/18/98 | 5 | X | X |
| WG62859CCV3 | 6/18/98 | 1 | X | X |
| WG62859CCB3 | 6/18/98 | 1 | X | X |
| L18852-03 | 6/18/98 | 1 | X | |
| ZZZ | 6/18/98 | 2 | X | |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Metals (Dissolved) by ICP*

| | |
|---|---|
| ACZ Project # | L18852 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

Workgroup: WG62859 **(Continued)**

| ACZ ID | Measure Date | Dilution | Mn | Zn |
|---|---|---|---|---|
| WG62859CCV4 | 6/18/98 | 1 | X | X |
| WG62859CCB4 | 6/18/98 | 1 | X | X |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** | *Analysis Run Log*

**Analysis** | *Metals (Total Recoverable) by ICP*

ACZ Project # L18852
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/10/98
Date Reported 7/6/98

Workgroup: WG63232

| ACZ ID | Measure Date | Dilution | Al | Cd | Fe | Mn | Ni | Pb | Zn |
|---|---|---|---|---|---|---|---|---|---|
| WG63232ICV | 6/24/98 | 1 | X | X | X | X | X | X | X |
| WG63232ICB | 6/24/98 | 1 | X | X | X | X | X | X | X |
| WG63232LRB | 6/24/98 | 1 | X | X | X | X | X | X | X |
| WG63232LCSW | 6/24/98 | 1 | X | X | X | X | X | X | X |
| WG63232LFB | 6/24/98 | 1 | X | X | X | X | X | X | X |
| ZZZ | 6/24/98 | 25 | | | | X | | | |
| ZZZ | 6/24/98 | 2 | X | X | X | X | X | X | |
| ZZZ | 6/24/98 | 2 | X | X | X | X | X | X | |
| ZZZ | 6/24/98 | 2 | X | X | X | X | X | X | |
| ZZZ | 6/24/98 | 2 | X | X | X | X | X | X | |
| ZZZ | 6/24/98 | 2 | X | X | X | X | X | X | |
| L18852-01 | 6/24/98 | 2 | X | X | X | X | X | X | |
| WG63232CCV1 | 6/24/98 | 1 | X | X | X | X | X | X | X |
| WG63232CCB1 | 6/24/98 | 1 | X | X | X | X | X | X | X |
| L18852-02 | 6/24/98 | 2 | X | X | X | X | X | X | |
| L18852-03 | 6/24/98 | 1 | X | X | X | X | X | X | X |
| ZZZ | 6/24/98 | 2 | X | | | | X | | X |
| ZZZ | 6/24/98 | 1 | X | | | | X | | X |
| ZZZ | 6/24/98 | 1 | | | | | X | | X |
| L18861-03LFM | 6/24/98 | 1 | X | X | X | X | X | X | X |
| L18861-03LFMD | 6/24/98 | 1 | X | X | X | X | X | X | X |
| ZZZ | 6/24/98 | 1 | | | | | X | | X |
| WG63232CCV2 | 6/24/98 | 1 | X | X | X | X | X | X | X |
| WG63232CCB2 | 6/24/98 | 1 | X | X | X | X | X | X | X |
| ZZZ | 6/24/98 | 2 | | | | | X | | X |
| ZZZ | 6/24/98 | 1 | | | | | X | | X |
| ZZZ | 6/24/98 | 1 | | | | X | | | |
| ZZZ | 6/24/98 | 1 | | | | X | | | |
| ZZZ | 6/24/98 | 1 | | | | X | | | |
| ZZZ | 6/24/98 | 1 | | | | X | | | |
| ZZZ | 6/24/98 | 1 | | | | X | | | |
| ZZZ | 6/24/98 | 1 | | | X | X | | | |
| WG63232CCV3 | 6/24/98 | 1 | X | X | X | X | X | X | X |
| WG63232CCB3 | 6/24/98 | 1 | X | X | X | X | X | X | X |
| WG63232CCV4 | 6/24/98 | 1 | X | X | X | X | X | X | X |
| WG63232CCB4 | 6/24/98 | 1 | X | X | X | X | X | X | X |

ACZ ✓ | Client

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# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Metals (Total Recoverable) by ICP*

ACZ Project # L18852
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/10/98
Date Reported 7/6/98

Workgroup: WG63330

| ACZ ID | Measure Date | Dilution | Zn |
|---|---|---|---|
| WG63330ICV | 6/25/98 | 1 | X |
| WG63330ICB | 6/25/98 | 1 | X |
| WG63330LRB | 6/25/98 | 1 | X |
| WG63330LCSW | 6/25/98 | 1 | X |
| WG63330LFB | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 5 | X |
| ZZZ | 6/25/98 | 5 | X |
| ZZZ | 6/25/98 | 5 | X |
| ZZZ | 6/25/98 | 5 | X |
| ZZZ | 6/25/98 | 5 | X |
| L18852-01 | 6/25/98 | 5 | X |
| L18852-01LFM | 6/25/98 | 5 | X |
| WG63330CCV1 | 6/25/98 | 1 | X |
| WG63330CCB1 | 6/25/98 | 1 | X |
| L18852-01LFMD | 6/25/98 | 5 | X |
| L18852-02 | 6/25/98 | 5 | X |
| ZZZ | 6/25/98 | 1 | X |
| L18870-01LFM | 6/25/98 | 1 | X |
| L18870-01LFMD | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| WG63330CCV2 | 6/25/98 | 1 | X |
| WG63330CCB2 | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| L18896-02LFM | 6/25/98 | 1 | X |
| L18896-02LFMD | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |

| ACZ | Client |
|---|---|
| ✓ | |

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# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Metals (Total Recoverable) by ICP*

| | |
|---|---|
| ACZ Project # | L18852 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

Workgroup: WG63330 **(Continued)**

| ACZ ID | Measure Date | Dilution | Zn |
|---|---|---|---|
| WG63330CCV3 | 6/25/98 | 1 | X |
| WG63330CCB3 | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| ZZZ | 6/25/98 | 1 | X |
| WG63330CCV4 | 6/25/98 | 1 | X |
| WG63330CCB4 | 6/25/98 | 1 | X |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** | ***Analysis Run Log***

**Analysis** | ***Metals (Dissolved) by ICP-MS***

ACZ Project # L18852
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/10/98
Date Reported 7/6/98

Workgroup: WG62656

| ACZ ID | Measure Date | Dilution | Ag | As | Cr | Cu |
|---|---|---|---|---|---|---|
| WG62656ICS1 | 6/17/98 | 1 | X | X | X | X |
| WG62656ICB1 | 6/17/98 | 1 | X | X | X | X |
| WG62656QCS | 6/17/98 | 1 | X | X | X | X |
| WG62656LRB | 6/17/98 | 1 | X | X | X | X |
| WG62656LFB | 6/17/98 | 1 | X | X | X | X |
| L18852-01 | 6/17/98 | 2 | X | X | X | X |
| L18852-02 | 6/17/98 | 2 | X | X | X | X |
| L18852-03 | 6/17/98 | 2 | X | X | X | X |
| ZZZ | 6/17/98 | 2 | | X | X | |
| L18854-01DUP | 6/17/98 | 2 | X | X | X | X |
| WG62656ICS2 | 6/17/98 | 1 | X | X | X | X |
| WG62656ICB2 | 6/17/98 | 1 | X | X | X | X |
| L18854-02DUP | 6/17/98 | 2 | X | X | X | X |
| ZZZ | 6/17/98 | 2 | X | X | | X |
| L18856-01DUP | 6/17/98 | 2 | X | X | X | X |
| L18856-01LFM | 6/17/98 | 1 | X | X | X | X |
| L18856-01LFMD | 6/17/98 | 1 | X | X | X | X |
| WG62656ICS3 | 6/17/98 | 1 | X | X | X | X |
| WG62656ICB3 | 6/17/98 | 1 | X | X | X | X |

ACZ | Client

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Metals (Total) by ICP-MS*

ACZ Project # L18852
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/10/98
Date Reported 7/6/98

Workgroup: WG62478

| ACZ ID | Measure Date | Dilution | Ag | As | Cr | Cu | Mo | Sb | U | V |
|---|---|---|---|---|---|---|---|---|---|---|
| WG62478ICS1 | 6/15/98 | 1 | X | X | X | X | X | X | X | X |
| WG62478ICB1 | 6/15/98 | 1 | X | X | X | X | X | X | X | X |
| WG62478QCS | 6/15/98 | 1 | X | X | X | X | X | X | X | X |
| WG62478LRB | 6/15/98 | 1 | X | X | X | X | X | X | X | X |
| WG62478LFB | 6/15/98 | 2 | X | X | X | X | X | X | X | X |
| WG62478PBW | 6/15/98 | 2 | X | X | X | X | X | X | X | X |
| WG62478LCSW | 6/15/98 | 2 | X | X | X | X | X | X | X | X |
| ZZZ | 6/15/98 | 5 | X | X | X | X | | X | | |
| L18688-01LFM | 6/15/98 | 5 | X | X | X | X | X | X | X | X |
| L18688-01LFMD | 6/15/98 | 5 | X | X | X | X | X | X | X | X |
| WG62478ICS2 | 6/15/98 | 1 | X | X | X | X | X | X | X | X |
| WG62478ICB2 | 6/15/98 | 1 | X | X | X | X | X | X | X | X |
| ZZZ | 6/15/98 | 5 | X | X | | X | X | X | X | X |
| ZZZ | 6/15/98 | 5 | X | X | | X | X | X | X | X |
| ZZZ | 6/15/98 | 5 | X | X | | X | X | X | X | X |
| ZZZ | 6/15/98 | 5 | X | X | | X | X | X | X | X |
| L18846-04LFM | 6/16/98 | 5 | X | X | | X | X | X | X | X |
| L18846-04LFMD | 6/16/98 | 5 | X | X | | X | X | X | X | X |
| WG62478ICS3 | 6/16/98 | 1 | X | X | X | X | X | X | X | X |
| WG62478ICB3 | 6/16/98 | 1 | X | X | X | X | X | X | X | X |
| ZZZ | 6/16/98 | 5 | X | X | X | X | X | X | X | X |
| ZZZ | 6/16/98 | 5 | X | X | X | X | | X | | |
| L18852-01 | 6/16/98 | 5 | X | X | X | X | X | X | X | X |
| L18852-02 | 6/16/98 | 5 | X | X | X | X | X | X | X | X |
| L18852-03 | 6/16/98 | 2 | X | X | X | X | X | X | X | X |
| WG62478ICS4 | 6/16/98 | 1 | X | X | X | X | X | X | X | X |
| WG62478ICB4 | 6/16/98 | 1 | X | X | X | X | X | X | X | X |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Alkalinity as CaCO3*

ACZ Project # L18852
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/10/98
Date Reported 7/6/98

Workgroup: WG62810

| ACZ ID | Measure Date | Dilution | EC | PH |
|---|---|---|---|---|
| WG62810ICV | 6/18/98 | 1 | X | X |
| WG62810LCSW1 | 6/18/98 | 1 | X | X |
| WG62810LCSW2 | 6/18/98 | 1 | X | X |
| WG62810ICB | 6/18/98 | 1 | X | X |
| WG62810LCSW3 | 6/18/98 | 1 | X | X |
| WG62810ICB | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | |
| ZZZ | 6/18/98 | 1 | | X |
| ZZZ | 6/18/98 | 1 | | X |
| ZZZ | 6/18/98 | 1 | | X |
| ZZZ | 6/18/98 | 1 | | X |
| ZZZ | 6/18/98 | 1 | | X |
| ZZZ | 6/18/98 | 1 | | X |
| ZZZ | 6/18/98 | 1 | | X |
| ZZZ | 6/18/98 | 1 | | X |
| ZZZ | 6/18/98 | 1 | | X |
| ZZZ | 6/18/98 | 1 | | X |
| ZZZ | 6/18/98 | 1 | | X |
| ZZZ | 6/18/98 | 1 | | X |
| WG62810CCV1 | 6/18/98 | 1 | X | X |
| WG62810CCV2 | 6/18/98 | 1 | X | X |
| WG62810CCV3 | 6/18/98 | 1 | X | X |
| WG62810CCB1 | 6/18/98 | 1 | X | X |
| WG62810CCB2 | 6/18/98 | 1 | X | X |
| L18812-11DUP | 6/18/98 | 1 | X | X |
| L18812-11DUP | 6/18/98 | 1 | X | X |
| L18812-11DUP | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |

ACZ | Client

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** | ***Analysis Run Log***

**Analysis** | ***Alkalinity as CaCO3***

ACZ Project # L18852
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/10/98
Date Reported 7/6/98

Workgroup: WG62810 **(Continued)**

| ACZ ID | Measure Date | Dilution | EC | PH |
|---|---|---|---|---|
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| L18852-01 | 6/18/98 | 1 | X | X |
| WG62810CCV4 | 6/18/98 | 1 | X | X |
| WG62810CCV5 | 6/18/98 | 1 | X | X |
| WG62810CCV6 | 6/18/98 | 1 | X | X |
| WG62810CCB3 | 6/18/98 | 1 | X | X |
| WG62810CCB4 | 6/18/98 | 1 | X | X |
| L18852-02 | 6/18/98 | 1 | X | X |
| L18852-01DUP | 6/18/98 | 1 | X | X |
| L18852-01DUP | 6/18/98 | 1 | X | X |
| L18852-01DUP | 6/18/98 | 1 | X | X |
| WG62810LCSW4 | 6/18/98 | 1 | X | X |
| WG62810LCSW5 | 6/18/98 | 1 | X | X |
| WG62810LCSW6 | 6/18/98 | 1 | X | X |
| L18852-03 | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |

ACZ | Client

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Alkalinity as CaCO3*

ACZ Project # L18852
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/10/98
Date Reported 7/6/98

Workgroup: WG62810 **(Continued)**

| ACZ ID | Measure Date | Dilution | EC | PH |
|---|---|---|---|---|
| WG62810CCV7 | 6/18/98 | 1 | X | X |
| WG62810CCV8 | 6/18/98 | 1 | X | X |
| WG62810CCV9 | 6/18/98 | 1 | X | X |
| WG62810CCB5 | 6/18/98 | 1 | X | X |
| WG62810CCB6 | 6/18/98 | 1 | X | X |
| WG62810CCB7 | 6/18/98 | 1 | X | X |
| ZZZ | 6/18/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| L18870-03DUP | 6/19/98 | 1 | X | X |
| L18870-03DUP | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| L18870-03DUP | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| WG62810CCV10 | 6/19/98 | 1 | X | X |

ACZ / Client

ACZ

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

QC Report | *Analysis Run Log*

Analysis | *Alkalinity as CaCO3*

ACZ Project # L18852
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/10/98
Date Reported 7/6/98

Workgroup: WG62810 **(Continued)**

| ACZ ID | Measure Date | Dilution | EC | PH |
|---|---|---|---|---|
| WG62810CCV11 | 6/19/98 | 1 | X | X |
| WG62810CCV12 | 6/19/98 | 1 | X | X |
| WG62810CCB8 | 6/19/98 | 1 | X | X |
| WG62810CCB9 | 6/19/98 | 1 | X | X |
| WG62810CCB10 | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | | X |
| ZZZ | 6/19/98 | 1 | | X |
| ZZZ | 6/19/98 | 1 | | X |
| ZZZ | 6/19/98 | 1 | | X |
| ZZZ | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| L18916-01DUP | 6/19/98 | 1 | X | X |
| L18916-01DUP | 6/19/98 | 1 | X | X |
| WG62810LCSW7 | 6/19/98 | 1 | X | X |
| WG62810LCSW8 | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| WG62810LCSW9 | 6/19/98 | 1 | X | X |
| ZZZ | 6/19/98 | 1 | X | X |
| L18791-11DUP | 6/19/98 | 1 | X | |
| ZZZ | 6/19/98 | 1 | X | X |
| L18791-11DUP | 6/19/98 | 1 | X | |
| L18791-11DUP | 6/19/98 | 1 | X | |
| WG62810CCV13 | 6/19/98 | 1 | X | X |
| WG62810CCV14 | 6/19/98 | 1 | X | X |
| WG62810CCV15 | 6/19/98 | 1 | X | X |
| WG62810CCB11 | 6/19/98 | 1 | X | X |
| WG62810CCB12 | 6/19/98 | 1 | X | X |
| WG62810CCB13 | 6/19/98 | 1 | X | X |
| L18791-11DUP | 6/20/98 | 1 | X | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** | ***Analysis Run Log***

**Analysis** | ***Alkalinity as CaCO3***

ACZ Project # L18852
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/10/98
Date Reported 7/6/98

Workgroup: WG62964

| ACZ ID | Measure Date | Dilution | ALK |
|---|---|---|---|
| WG62964LCSW1 | 6/19/98 | 1 | X |
| WG62964LCSW2 | 6/19/98 | 1 | X |
| WG62964ICB | 6/19/98 | 1 | X |
| WG62964LCSW3 | 6/19/98 | 1 | X |
| WG62964ICB | 6/19/98 | 1 | X |
| WG62964ICB | 6/19/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| L18852-01 | 6/20/98 | 1 | X |
| L18852-02 | 6/20/98 | 1 | X |
| WG62964CCV1 | 6/20/98 | 1 | X |
| WG62964CCV2 | 6/20/98 | 1 | X |
| WG62964CCV3 | 6/20/98 | 1 | X |
| WG62964CCB1 | 6/20/98 | 1 | X |
| WG62964CCB2 | 6/20/98 | 1 | X |
| WG62964CCB3 | 6/20/98 | 1 | X |
| L18791-11DUP | 6/20/98 | 1 | X |
| L18791-11DUP | 6/20/98 | 1 | X |
| L18852-03 | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| WG62964CCV4 | 6/20/98 | 1 | X |
| WG62964CCV5 | 6/20/98 | 1 | X |
| WG62964CCV6 | 6/20/98 | 1 | X |
| WG62964CCB4 | 6/20/98 | 1 | X |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** | *Analysis Run Log*

**Analysis** | *Alkalinity as CaCO3*

ACZ Project # L18852
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/10/98
Date Reported 7/6/98

Workgroup: WG62964 **(Continued)**

| ACZ ID | Measure Date | Dilution | ALK |
|---|---|---|---|
| WG62964CCB5 | 6/20/98 | 1 | X |
| WG62964CCB6 | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| L18894-01DUP | 6/20/98 | 1 | X |
| L18894-01DUP | 6/20/98 | 1 | X |
| L18894-01DUP | 6/20/98 | 1 | X |
| WG62964LCSW4 | 6/20/98 | 1 | X |
| WG62964LCSW5 | 6/20/98 | 1 | X |
| WG62964LCSW6 | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| WG62964CCV7 | 6/20/98 | 1 | X |
| WG62964CCV8 | 6/20/98 | 1 | X |
| WG62964CCV9 | 6/20/98 | 1 | X |
| WG62964CCB7 | 6/20/98 | 1 | X |
| WG62964CCB8 | 6/20/98 | 1 | X |
| WG62964CCB9 | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| L18940-08DUP | 6/20/98 | 1 | X |
| L18940-08DUP | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |
| ZZZ | 6/20/98 | 1 | X |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Alkalinity as CaCO3*

ACZ Project # L18852
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/10/98
Date Reported 7/6/98

Workgroup: WG62964 **(Continued)**

| ACZ ID | Measure Date | Dilution | ALK |
|---|---|---|---|
| WG62964CCV10 | 6/20/98 | 1 | X |
| WG62964CCV11 | 6/20/98 | 1 | X |
| WG62964CCV12 | 6/20/98 | 1 | X |
| WG62964CCB10 | 6/20/98 | 1 | X |
| WG62964CCB11 | 6/20/98 | 1 | X |
| WG62964CCB12 | 6/20/98 | 1 | X |
| L18940-18DUP | 6/20/98 | 1 | X |
| WG62964CCV13 | 6/20/98 | 1 | X |
| WG62964CCV14 | 6/20/98 | 1 | X |
| WG62964CCV15 | 6/20/98 | 1 | X |
| WG62964CCB13 | 6/20/98 | 1 | X |
| WG62964CCB14 | 6/20/98 | 1 | X |
| WG62964CCB15 | 6/20/98 | 1 | X |
| WG62964CCV16 | 6/20/98 | 1 | X |
| WG62964CCV17 | 6/20/98 | 1 | X |
| WG62964CCV18 | 6/20/98 | 1 | X |
| WG62964CCB16 | 6/20/98 | 1 | X |
| WG62964CCB17 | 6/20/98 | 1 | X |
| WG62964CCB18 | 6/20/98 | 1 | X |
| L18940-18DUP | 6/20/98 | 1 | X |
| L18940-18DUP | 6/20/98 | 1 | X |
| L18940-18DUP | 6/20/98 | 1 | X |
| WG62964CCV19 | 6/20/98 | 1 | X |
| WG62964CCV20 | 6/20/98 | 1 | X |
| WG62964CCV21 | 6/20/98 | 1 | X |
| WG62964CCB19 | 6/20/98 | 1 | X |
| WG62964CCB20 | 6/20/98 | 1 | X |
| WG62964CCB21 | 6/20/98 | 1 | X |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Ammonia by RFA*

ACZ Project # L18852
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/10/98
Date Reported 7/6/98

Workgroup: WG62972

| ACZ ID | Measure Date | Dilution | NH3 |
|---|---|---|---|
| WG62972ICV | 6/19/98 | 1 | X |
| WG62972ICB | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| WG62972CCV1 | 6/19/98 | 1 | X |
| WG62972CCB1 | 6/19/98 | 1 | X |
| L18802-14DUP | 6/19/98 | 1 | X |
| L18802-14AS | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| WG62972CCV2 | 6/19/98 | 1 | X |
| WG62972CCB2 | 6/19/98 | 1 | X |
| L18852-01 | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| L18872-03DUP | 6/19/98 | 1 | X |
| L18872-03AS | 6/19/98 | 1 | X |
| WG62972CCV3 | 6/19/98 | 1 | X |
| WG62972CCB3 | 6/19/98 | 1 | X |

| ACZ | Client |
|---|---|
| ✓ | |

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# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Ammonia by RFA*

| | |
|---|---|
| ACZ Project # | L18852 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

Workgroup: WG63044

| ACZ ID | Measure Date | Dilution | NH3 |
|---|---|---|---|
| WG63044ICV | 6/22/98 | 1 | X |
| WG63044ICB | 6/22/98 | 1 | X |
| L18852-02 | 6/22/98 | 1 | X |
| L18852-03 | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| WG63044CCV1 | 6/22/98 | 1 | X |
| WG63044CCB1 | 6/22/98 | 1 | X |
| L18865-02DUP | 6/22/98 | 1 | X |
| L18865-02AS | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| WG63044CCV2 | 6/22/98 | 1 | X |
| WG63044CCB2 | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| L18911-01DUP | 6/22/98 | 1 | X |
| L18911-01AS | 6/22/98 | 1 | X |
| L18852-03 | 6/22/98 | 10 | X |
| WG63044CCV3 | 6/22/98 | 1 | X |
| WG63044CCB3 | 6/22/98 | 1 | X |
| WG63044CCV4 | 6/22/98 | 1 | X |
| WG63044CCB4 | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 2 | X |

| ACZ | Client |
|---|---|
| ✓ | |

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** | *Analysis Run Log*

**Analysis** | *Ammonia by RFA*

| | |
|---|---|
| ACZ Project # | L18852 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

Workgroup: WG63044 **(Continued)**

| ACZ ID | Measure Date | Dilution | NH3 |
|---|---|---|---|
| L18911-01DUP | 6/22/98 | 2 | X |
| L18911-01AS | 6/22/98 | 5 | X |
| L18852-03 | 6/22/98 | 2 | X |
| WG63044CCV5 | 6/22/98 | 1 | X |
| WG63044CCB5 | 6/22/98 | 1 | X |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
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**QC Report** *Analysis Run Log*

**Analysis** *Carbon, total organic (TOC)*

| | |
|---|---|
| ACZ Project # | L18852 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

Workgroup: WG62533

| ACZ ID | Measure Date | Dilution | TOC |
|---|---|---|---|
| WG62533ICV | 6/15/98 | 1 | X |
| WG62533ICB | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| WG62533CCV1 | 6/15/98 | 1 | X |
| WG62533CCB1 | 6/15/98 | 1 | X |
| L18790-12DUP | 6/15/98 | 1 | X |
| L18790-13AS | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| WG62533CCV2 | 6/15/98 | 1 | X |
| WG62533CCB2 | 6/15/98 | 1 | X |
| L18852-01 | 6/15/98 | 1 | X |
| L18852-02 | 6/15/98 | 1 | X |
| L18852-01DUP | 6/15/98 | 1 | X |
| L18852-02AS | 6/15/98 | 1 | X |
| WG62533CCV3 | 6/15/98 | 1 | X |
| WG62533CCB3 | 6/15/98 | 1 | X |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

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Steamboat Springs, CO 80487
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**QC Report** | *Analysis Run Log*

**Analysis** | *Carbon, total organic (TOC)*

ACZ Project # L18852
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/10/98
Date Reported 7/6/98

Workgroup: WG63371

| ACZ ID | Measure Date | Dilution | TOC |
|---|---|---|---|
| WG63371ICV | 6/26/98 | 1 | X |
| WG63371ICB | 6/26/98 | 1 | X |
| L18852-03 | 6/26/98 | 1 | X |
| ZZZ | 6/26/98 | 1 | X |
| ZZZ | 6/26/98 | 1 | X |
| ZZZ | 6/26/98 | 1 | X |
| ZZZ | 6/26/98 | 1 | X |
| ZZZ | 6/26/98 | 1 | X |
| ZZZ | 6/26/98 | 1 | X |
| ZZZ | 6/26/98 | 1 | X |
| ZZZ | 6/26/98 | 1 | X |
| ZZZ | 6/26/98 | 1 | X |
| WG63371CCV1 | 6/26/98 | 1 | X |
| WG63371CCB1 | 6/26/98 | 1 | X |
| L18912-01DUP | 6/26/98 | 1 | X |
| L18912-02AS | 6/26/98 | 1 | X |
| ZZZ | 6/26/98 | 1 | X |
| ZZZ | 6/26/98 | 1 | X |
| ZZZ | 6/26/98 | 1 | X |
| ZZZ | 6/26/98 | 1 | X |
| ZZZ | 6/26/98 | 1 | X |
| ZZZ | 6/26/98 | 1 | X |
| WG63371CCV2 | 6/26/98 | 1 | X |
| WG63371CCB2 | 6/26/98 | 1 | X |
| ZZZ | 6/26/98 | 1 | X |
| ZZZ | 6/26/98 | 1 | X |
| L19084-03DUP | 6/26/98 | 1 | X |
| L19084-03AS | 6/26/98 | 1 | X |
| WG63371CCV3 | 6/26/98 | 1 | X |
| WG63371CCB3 | 6/26/98 | 1 | X |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** | *Analysis Run Log*

**Analysis** | *Chloride by RFA*

| | |
|---|---|
| ACZ Project # | L18852 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

Workgroup: WG63015

| ACZ ID | Measure Date | Dilution | CL |
|---|---|---|---|
| WG63015ICV | 6/22/98 | 1 | X |
| WG63015ICB | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| WG63015CCV1 | 6/22/98 | 1 | X |
| WG63015CCB1 | 6/22/98 | 1 | X |
| L18848-03DUP | 6/22/98 | 1 | X |
| L18848-03AS | 6/22/98 | 1 | X |
| L18852-01 | 6/22/98 | 1 | X |
| L18852-02 | 6/22/98 | 1 | X |
| L18852-03 | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| WG63015CCV2 | 6/22/98 | 1 | X |
| WG63015CCB2 | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 1 | X |
| L18856-02DUP | 6/22/98 | 1 | X |
| L18856-02AS | 6/22/98 | 1 | X |
| WG63015CCV3 | 6/22/98 | 1 | X |
| WG63015CCB3 | 6/22/98 | 1 | X |
| WG63015CCV4 | 6/22/98 | 1 | X |
| WG63015CCB4 | 6/22/98 | 1 | X |
| ZZZ | 6/22/98 | 2 | X |
| L18856-02DUP | 6/22/98 | 2 | X |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

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**QC Report** | *Analysis Run Log*

**Analysis** | *Chloride by RFA*

| | |
|---|---|
| ACZ Project # | L18852 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

Workgroup: WG63015 **(Continued)**

| ACZ ID | Measure Date | Dilution | CL |
|---|---|---|---|
| L18856-02AS | 6/22/98 | 5 | X |
| WG63015CCV5 | 6/22/98 | 1 | X |
| WG63015CCB5 | 6/22/98 | 1 | X |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** | ***Analysis Run Log***

**Analysis** | ***Electrical Conductivity @ 25C***

| | |
|---|---|
| ACZ Project # | L18852 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

Workgroup: WG62810

| ACZ ID | Measure Date | Dilution | EC | PH |
|---|---|---|---|---|
| L18852-01 | 6/18/98 | 1 | X | X |
| L18852-02 | 6/18/98 | 1 | X | X |
| L18852-03 | 6/18/98 | 1 | X | X |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** | *Analysis Run Log*

**Analysis** | *Ion Chromatography*

ACZ Project # L18852
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/10/98
Date Reported 7/6/98

Workgroup: WG62436

| ACZ ID | Measure Date | Dilution | NO2 | NO3 |
|---|---|---|---|---|
| WG62436ICV | 6/15/98 | 1 | X | X |
| WG62436ICB | 6/15/98 | 1 | X | X |
| WG62436LRB | 6/15/98 | 1 | X | X |
| WG62436LFB | 6/15/98 | 1 | X | X |
| ZZZ | 6/15/98 | 10 | X | X |
| ZZZ | 6/15/98 | 10 | X | X |
| L18041-10DUP | 6/15/98 | 10 | X | X |
| L18041-10AS | 6/15/98 | 10 | X | X |
| WG62436CCV1 | 6/15/98 | 1 | X | X |
| WG62436CCB1 | 6/15/98 | 1 | X | X |
| ZZZ | 6/15/98 | 10 | X | X |
| ZZZ | 6/15/98 | 1 | X | X |
| ZZZ | 6/15/98 | 1 | X | X |
| L18044-10DUP | 6/15/98 | 1 | X | X |
| WG62436CCV2 | 6/15/98 | 1 | X | X |
| WG62436CCB2 | 6/15/98 | 1 | X | X |
| L18044-10AS | 6/15/98 | 1 | X | X |
| L18044-10AS | 6/15/98 | 1 | X | X |
| ZZZ | 6/15/98 | 1 | X | X |
| ZZZ | 6/15/98 | 1 | X | X |
| ZZZ | 6/15/98 | 1 | X | X |
| ZZZ | 6/15/98 | 1 | X | X |
| ZZZ | 6/15/98 | 1 | X | X |
| L18852-01 | 6/15/98 | 1 | X | X |
| L18852-02 | 6/15/98 | 1 | X | X |
| L18852-02DUP | 6/15/98 | 1 | X | |
| L18852-02AS | 6/15/98 | 1 | X | |
| L18852-02AS | 6/15/98 | 1 | X | |
| WG62436CCV3 | 6/15/98 | 1 | X | X |
| WG62436CCB3 | 6/15/98 | 1 | X | X |
| L18852-03 | 6/15/98 | 1 | X | |
| ZZZ | 6/15/98 | 1 | X | |
| ZZZ | 6/15/98 | 1 | X | |
| ZZZ | 6/15/98 | 1 | X | |
| WG62436CCV4 | 6/15/98 | 1 | X | X |
| WG62436CCB4 | 6/15/98 | 1 | X | X |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
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**QC Report** *Analysis Run Log*

**Analysis** *Ion Chromatography*

ACZ Project # L18852
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/10/98
Date Reported 7/6/98

Workgroup: WG62653

| ACZ ID | Measure Date | Dilution | NO3 |
|---|---|---|---|
| WG62653ICV | 6/16/98 | 1 | X |
| WG62653ICB | 6/16/98 | 1 | X |
| WG62653LRB | 6/16/98 | 1 | X |
| WG62653LFB | 6/16/98 | 1 | X |
| L18852-03 | 6/16/98 | 1 | X |
| ZZZ | 6/16/98 | 1 | X |
| ZZZ | 6/16/98 | 10 | X |
| L18856-02DUP | 6/16/98 | 10 | X |
| L18856-02AS | 6/16/98 | 10 | X |
| WG62653CCV1 | 6/16/98 | 1 | X |
| WG62653CCB1 | 6/16/98 | 1 | X |
| ZZZ | 6/16/98 | 1 | X |
| WG62653CCV2 | 6/16/98 | 1 | X |
| WG62653CCB2 | 6/16/98 | 1 | X |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *pH (lab)*

| | |
|---|---|
| ACZ Project # | L18852 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

Workgroup: WG62810

| ACZ ID | Measure Date | Dilution | EC | PH |
|---|---|---|---|---|
| L18852-01 | 6/18/98 | 1 | X | X |
| L18852-02 | 6/18/98 | 1 | X | X |
| L18852-03 | 6/18/98 | 1 | X | X |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *Residue, Filterable (TDS) @180C*

| | |
|---|---|
| ACZ Project # | L18852 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

Workgroup: WG62404

| ACZ ID | Measure Date | Dilution | TDS |
|---|---|---|---|
| WG62404PBW | 6/11/98 | 1 | X |
| WG62404LCSW | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 2 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 2 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 2 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 2 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 2 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| L18812-05DUP | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| ZZZ | 6/11/98 | 1 | X |
| L18852-01 | 6/11/98 | 1 | X |
| L18852-01DUP | 6/11/98 | 1 | X |

| ACZ | Client |
|---|---|
| √ | |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
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**QC Report** *Analysis Run Log*

**Analysis** *Residue, Filterable (TDS) @180C*

| | |
|---|---|
| ACZ Project # | L18852 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

Workgroup: WG62511

| ACZ ID | Measure Date | Dilution | TDS |
|---|---|---|---|
| WG62511PBW | 6/15/98 | 1 | X |
| WG62511LCSW | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| L18852-02 | 6/15/98 | 1 | X |
| L18852-03 | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| L18861-05DUP | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| L18870-04DUP | 6/15/98 | 1 | X |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
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**QC Report** *Analysis Run Log*

**Analysis** *Sulfate (Gravimetric)*

| | |
|---|---|
| ACZ Project # | L18852 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

Workgroup: WG62937

| ACZ ID | Measure Date | Dilution | SO4 |
|---|---|---|---|
| WG62937PBW | 6/19/98 | 1 | X |
| WG62937LCSW | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| L18852-01 | 6/19/98 | 1 | X |
| L18852-02 | 6/19/98 | 1 | X |
| L18852-02 | 6/19/98 | 10 | X |
| L18852-03 | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| ZZZ | 6/19/98 | 1 | X |
| L18861-02DUP | 6/19/98 | 1 | X |
| L18870-01DUP | 6/19/98 | 1 | X |

| ACZ | Client |
|---|---|
| ✓ | |

ACZ

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Steamboat Springs, CO 80487
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**QC Report** *Analysis Run Log*

**Analysis** *Sulfide as S*

ACZ Project # L18852
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/10/98
Date Reported 7/6/98

Workgroup: WG62597

| ACZ ID | Measure Date | Dilution | H2S |
|---|---|---|---|
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| L18852-01 | 6/15/98 | 1 | X |
| L18852-02 | 6/15/98 | 1 | X |
| L18852-03 | 6/15/98 | 1 | X |
| WG62597CCV1 | 6/15/98 | 1 | X |
| WG62597CCB1 | 6/15/98 | 1 | X |
| L18852-03DUP | 6/15/98 | 1 | X |
| L18852-03AS | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| WG62597CCV2 | 6/15/98 | 1 | X |
| WG62597CCB2 | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| L18884-04DUP | 6/15/98 | 1 | X |
| L18884-04AS | 6/15/98 | 1 | X |
| WG62597CCV3 | 6/15/98 | 1 | X |
| WG62597CCB3 | 6/15/98 | 1 | X |

ACZ

# Inorganic QC Summary

*30400 Downhill Drive*
*Steamboat Springs, CO 80487*
*(800) 334-5493*
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**QC Report** | ***Analysis Run Log***

**Analysis** | ***Sulfite***

| | |
|---|---|
| ACZ Project # | L18852 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

Workgroup: WG62258

| ACZ ID | Measure Date | Dilution | SO3 |
|---|---|---|---|
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| L18852-01 | 6/10/98 | 1 | X |
| L18852-02 | 6/10/98 | 1 | X |
| L18852-03 | 6/10/98 | 1 | X |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *TSS and TVS (Gravimetric)*

ACZ Project # L18852
Client American Geological Services, Inc.
Client Project ID French Gulch
Date Received 6/10/98
Date Reported 7/6/98

Workgroup: WG62326

| ACZ ID | Measure Date | Dilution | TSS |
|---|---|---|---|
| WG62326PBW | 6/10/98 | 1 | X |
| WG62326LCSW | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| L18840-01DUP | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 2.5 | X |
| ZZZ | 6/10/98 | 1.6666667 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 1 | X |
| ZZZ | 6/10/98 | 5 | X |
| ZZZ | 6/10/98 | 1 | X |
| L18852-01 | 6/10/98 | 1 | X |
| L18852-02 | 6/10/98 | 1 | X |
| L18852-02DUP | 6/10/98 | 1 | X |

ACZ

# Inorganic QC Summary

30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493
Fax: (970) 879-2216

**QC Report** *Analysis Run Log*

**Analysis** *TSS and TVS (Gravimetric)*

| | |
|---|---|
| ACZ Project # | L18852 |
| Client | American Geological Services, Inc. |
| Client Project ID | French Gulch |
| Date Received | 6/10/98 |
| Date Reported | 7/6/98 |

Workgroup: WG62584

| ACZ ID | Measure Date | Dilution | TSS |
|---|---|---|---|
| WG62584PBW | 6/15/98 | 1 | X |
| WG62584LCSW | 6/15/98 | 1 | X |
| L18852-03 | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| L18856-02DUP | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| ZZZ | 6/15/98 | 1 | X |
| L18871-03DUP | 6/15/98 | 1 | X |

ICZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487



# SAMPLE RECEIPT FORM

CLIENT: Amer. Geology DATE 6/10/98

PROJECT #: L18852

| | | | |
|---|---|---|---|
| Does this project require special handling procedures such as CLP protocol? | NA | YES | NO |
| Are the custody seals on the cooler intact? | NA | YES | NO |
| Are the custody seals on the sample containers intact? | NA | YES | NO |
| Is there a Chain of Custody (COC), or other directive shipping papers present? | | YES | NO |
| Is the COC complete? | | YES | NO |
| Relinquished? Yes ____ No ____ Requested Analysis? Yes ____ No ____ | | | |
| Is the COC in agreement with the samples received? | | YES | NO |
| # of Samples: Yes ____ No ____ Sample ID: Yes ____ No ____ | | | |
| Matrix: Yes ____ No ____ # of Containers: Yes ____ No ____ | | | |
| Is there enough sample for all requested analysis? | | YES | NO |
| Are all samples within holding times for requested analysis? | | YES | NO |
| Were all sample containers received intact? | | YES | NO |
| 10) Are samples requiring no headspace, headspace free? | NA | YES | NO |
| 11) Do the samples require a Foriegn Soils Permit Label or quarantine? | | YES | NO |
| 12) Do samples require special disposal/hold considerations? | | | |
| Non-Hazardous: Yes ____ No ____ Hazardous: Yes ____ No ____ Hold: ____ months | | | |

Describe "NO" items (except #1, 11, & 12): _____

Was the client contacted? Yes ____ No ____

If yes: Date: _____ Name of person contacted: _____

Actions taken or client instructions: _____

Signature: _____

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487



# SAMPLE RECEIPT FORM

CLIENT: Amer. Geolog.
PROJECT #: L18852

DATE 6/10/98
ANALYST: [illegible]

## TEMPERATURE VERIFICATION SAMPLE CHECK (°C)

| CONTAINER ID | TEMP (°C) 2° to 6° | RAD µR/hr |
|---|---|---|
| 002 | 6.4 | 11 |
| | | |
| | | |
| | | |

If container radioactivity is > 25 µR/hr then each sample must be screened.

## PRESERVATION CHECK (pH) & RADIOACTIVITY SCREEN

| SAMPLE | R <2 | G <2 | Y <2 | YG <2 | B <2 | BG <2 | O <2 | T >12 | P >12 | RAD µR/hr |
|---|---|---|---|---|---|---|---|---|---|---|
| -01 | ✓ | ✓ | | ✓ | | | | * | | |
| -02 | ✓ | ✓ | | ✓ | | | | ** | | |
| -03 | ✓ | ✓ | | ✓ | | | | ✓ | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

INTERNAL COMMENTS: * pH is slightly basic
** pH is neutral

REPORT COMMENTS:

# CHAIN OF CUSTODY RECORD

Laboratory Sample Numbers (ACZ Use Only): L18852

COC # 14975

**ACZ Laboratories, Inc.**
30400 Downhill Drive
Steamboat Springs, CO 80487
(970) 879-6590 • (800) 334-5493

Name to Appear on Report and Invoice:
American Ecological Services Inc
12477 W. Cedar Dr. #206
Lakewood, CO 80228
Attn: A. Morrissey Tel: 303-988-1845

cc: (Report) - (Invoice) to: (circle one or both)
Attn: Tel:

Project or P.O. #
French Gulch / Mine Shafts

Shipped Via: FED X___ UPS___ Hand___ Other___

| SAMPLE IDENTIFICATION | DATE | TIME | Sample Matrix * | # of CONTAINERS | Dissolved Metals | Total Rec. Metals | Anions | Alkalinity | Nitrate/Nitrite | Ammonia | Sulfate/Sulfide | TSS/TDS | TOC | Ferrous Iron | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0006 ORO SHAFT | 6-9-98 | 1105 | GW | 9 | X | X | X | X | X | X | X | X | X | X | ORO-245 |
| 0007 ORO SHAFT | 6-9-98 | 1215 | GW | 9 | X | X | X | X | X | X | X | X | X | X | ORO-186 |
| 0008 | 6-9-98 | 1300 | GW | 6 | X | X | X | X | X | X | X | X | X | | |

* Matrix Options: SW (Surface water) • GW (Ground water) • WW (Wastewater) • DW (Drinking water) • SL (Sludge) • SOIL • OIL • Other (Specify)

**SAMPLE DISPOSAL OPTIONS** - *Please complete section A, or choose one option from sections B AND C. Proper charges will be assessed.*

***(A) Long-term storage***
Hold until _____(date)
for future analysis.

***(B) If Sample Is Non-Hazardous***
1) Local Disposal
2) RCRA - Permitted Facility
3) Return to Client

***(C) If Sample Is Hazardous***
1) RCRA-Permitted Facility
2) Return to Client

**COMMENTS**
Std. QA/QC Report
Filtered in-field

| RELINQUISHED BY: (SIGNATURE) | DATE | TIME | RECEIVED BY: ( SIGNATURE) | DATE | TIME | PAGE # |
|---|---|---|---|---|---|---|
| Arthur M. Morrissey | 6-10-98 | 0810 | | | | 1 OF 1 |
| | | | | 6/10/98 | 0810 | |

White - Return w/ sample Yellow - Return w/ sample Pink - Return w/ sample Gold - Keep for your records

*AquaVISION*
*Palisade, Colorado 81526*
*1.888.830.4004*

Bill Pedler
COLOG
17301 W. Colfax
Suite 265
Golden, CO 80401

Dear Bill:

This letter presents the results of the colloidal borescope investigation in French Gulch near Breckenridge, Colorado. The emphasis of this investigation was to demonstrate the capabilities of the borescope to quantify groundwater flow direction and velocity. Consequently, because of the limited time available to conduct the investigation, standard field procedures for obtaining accurate groundwater measurements were not strictly adhered to. Nevertheless, even with the limited time available, several flow measurements appear to be reliable indications of groundwater flow conditions in the area. The following section describes flow conditions encountered in a well, the proper procedure for obtaining reliable groundwater flow measurements, and conversion factors for determining groundwater velocity in the formation based on velocity measurements in the well bore. The remainder of the report describes the results of the field investigation.

## INSTRUMENT DESCRIPTION AND OPERATION

The colloidal borescope consists of a CCD (charged-couple device) camera, a flux-gate compass, an optical magnification lens, an illumination source, and a stainless steel housing. The device is approximately 89 cm long and has a diameter of 44 mm, thus facilitating insertion into a 5-cm-diameter monitoring well. Upon insertion into a well, an electronic image magnified 140X is transmitted to the surface, where it is viewed and analyzed. The flux-gate compass is used to align the borescope in the well. As particles in the groundwater pass beneath the lens, the back lighting source illuminates the particles similar to a conventional microscope with a lighted stage. A video frame grabber digitizes individual video frames at intervals selected by the operator. A software package developed by Aquavision Inc. compares the two digitized video frames, matches particles from the two images, and assigns pixel addresses to the particles. Using this information, the software program computes and records the average particle size, number of particles, speed, and direction. A Pentium II PC computer with Windows 95 is capable of analyzing flow measurements every second resulting in a large data base after only a few minutes of observations. Since standard VHS video uses 30 frames per second, a particle that moves 1 mm across the field of view could be captured in subsequent frames 1/30 of a second apart. This would result in a upper measurement velocity range of 3 cm/s. For low flow conditions, the delay between frames can be set for large time periods resulting in a lower velocity range for stagnant flow conditions.

Flow velocities measured by the colloidal borescope were verified using a laminar flow chamber developed at the Desert Research Institute in Boulder City, Nevada. At a flow velocity in the

laminar flow chamber of 0.10 cm/s, and verified by a tracer test, the colloidal borescope measured a comparable velocity value of 0.11 cm/s (Kearl, 1997).

Only zones that display consistent horizontal laminar flow in a steady direction over a substantial time period (greater than 2 h) should be considered. Swirling flow zones may be the result of adjacent low-permeable sediments, positive skin effects, vertical flow gradients, or nearby preferential flow zones that dominate flow in the observed zone. Measurements in swirling flow zones should be disregarded. However, if steady directional flow is observed, typical of a preferential flow zone, then reliable measurements are possible.

For the colloidal borescope to be an effective tool in characterizing groundwater flow velocity, it is necessary to differentiate and quantify aquifer heterogeneity, filter packs, and well skins influence on flow in a well bore. This is a difficult task because the hydraulic conductivity of the filter pack and surrounding formation may be unknown and/or the skin effects not easily quantified. However, following some basic assumptions and general guidelines, it is possible to select reliable data and estimate a range of groundwater velocities.

At field sites, observed well bore flow velocities exceed predicted velocities, even values that are adjusted based on (conversion factor for predicting seepage velocity from well bore velocity) values. If theoretical work and laboratory results indicate that the borescope provides reliable flow measurements within a specified range, then this evidence would suggest that velocities in the well bore represent the maximum flow velocities in an aquifer. It would further suggest that the maximum velocity and not the average linear velocity over the entire screen length dominates flow in the well bore under ambient flow conditions. In no instances have velocity measurements using the colloidal borescope been less that values predicted by independent hydraulic information. Swirling, nondirectional flow zones may be representative of lower-permeable material within the permeable section of the aquifer or positive skin affects due to poor well construction practices, but the flow velocity has been magnified by the transfer of momentum from adjacent, higher-flow zones.

Based on the work presented in Kearl (1997), colloidal borescope measurements in the field should be reduced by a factor of 1 to 4 to calculate seepage velocity in the adjacent porous medium. For field comparison measurements presented in this paper, the borescope measurements represent the flow velocities in the preferential flow zones compared with average flow velocity measurement obtained by conventional methods. Consequently, the velocity values given in these figures should be reduced by a maximum factor of 4 to obtain the seepage velocity in the adjacent porous medium. It should be re-emphasized that the colloidal borescope is measuring the maximum velocity values in preferential flow zones in a heterogeneous aquifer.

The colloidal borescope has been used to develop the micropurge sampling methodology (Kearl et al., 1994) and to characterize flow in heterogeneous aquifer (Kearl and Roemer, 1998). In addition, the instrument has been used at numerous site across the United States to evaluate groundwater flow conditions and the effectiveness of remediation treatment systems.

## TEST RESULTS

Selected results of groundwater flow measurements conducted at the site are attached. Measurements were conducted on well MW-3 and the vertical mine shaft designated as the Oro mine shaft. Well MW-3 is completed in the alluvium of the stream channel. The alluvium was reworked by placer mining operations which filled the channel with boulders, cobbles and gravels that exhibit high hydraulic conductivity values. A reliable flow zone was detected at 23 ft. BTOSC as shown in Figure 1. The flow direction was in a westerly direction consistent with expected down valley flows. Groundwater velocity at this depth was the highest ever measured by the colloidal borescope and represents the upper range for flow measurement by the instrument. Because of the high velocities, only a few particles were capture by the software system. However, particle direction remained consistent during the test. Velocity values at this depth average 460 ft/d, corrected for the influence of the well bore. Considering the extremely coarse grain nature of the alluvial material and the high hydraulic gradient in the mountain valley, a high groundwater velocity is expected. Note that this velocity is in a preferential flow zone and does not represent the average linear velocity for the entire aquifer as determined by conventional methods such as pumping tests.

Tests were also conducted near the base of the lower well screen. According to the site geologist, the base of the lower screen is completed in the bedrock shale. Flow measurements at 51 and 52 ft. BTOSC showed a large number of particles consistent with a fine-grain shale formation (Figure 2 and 3). Flow in these zones was swirling with low velocities indicating that no significant groundwater flow was occurring in the shale.

Measurements were also performed in the vertical Oro mine shaft at depths adjacent to a horizontal mine drift suspected of conducting groundwater flow to surface discharge points near the valley stream. The reference point for the depth measurements was the top of the concrete pad covering the mine shaft. Three zones were measured in the vertical mine shaft. The first two zones at depths of 345 and 348 ft. showed swirling flow suggesting no hydraulic connection with the horizontal mine shaft (Figure 4 and 5). In the third zones tested at a depth of 340 ft., however, directional flow was observed (Figure 6). There was a significant amount of variability in the flow measurements at this depth. This is not surprising considering that flow is not controlled by conventional well bore conditions. The mine shaft represents open channel flow that can move in a general direction but show significant variations in flow. As illustrated in the attached figure, flow at a depth of 340 f t. showed a general westerly direction. Flow directions showed a variation that ranged between southwest to northwest but the flow direction averaged nearly due west. As noted in the previous section of this letter report, several hours of data are needed to verify the flow direction. With time, the variation in flow may decrease. However, the flow direction appears to be reliable even for the limited amount of time the measurements were conducted. Flow velocity without any correction factor is 150 ft/d.

## SUMMARY

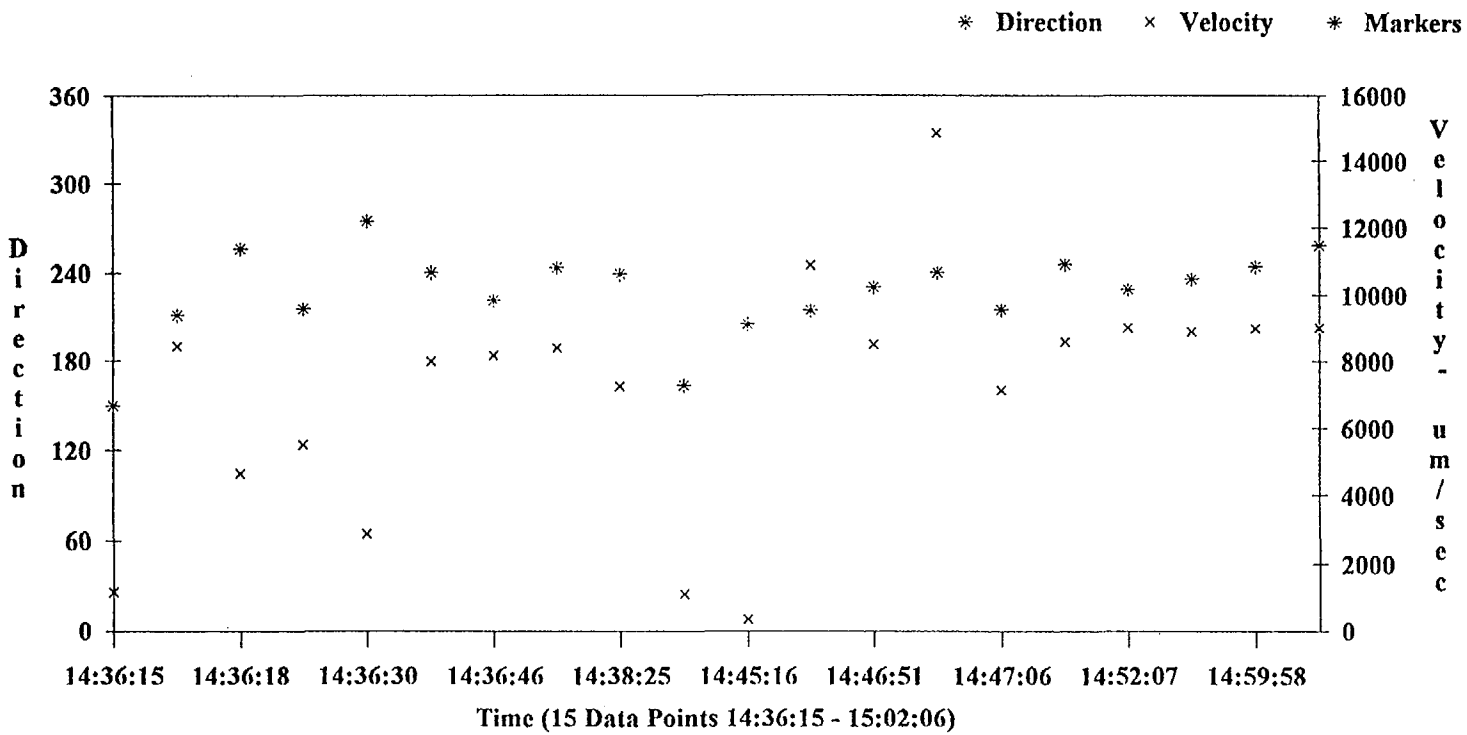
Although the purpose of this project was to demonstrate the colloidal borescope under limited time conditions, several zones tested appear to yield reliable flow measurements. We recommend that additional measurements be performed for the recommended time interval in order to confirm the flow measurements.

If you have any comments or questions regarding the results of the colloidal borescope demonstration, please feel free to contact me at (970) 248-6211. Thank you again for the opportunity to demonstrate the capabilities of the colloidal borescope.

Sincerely.

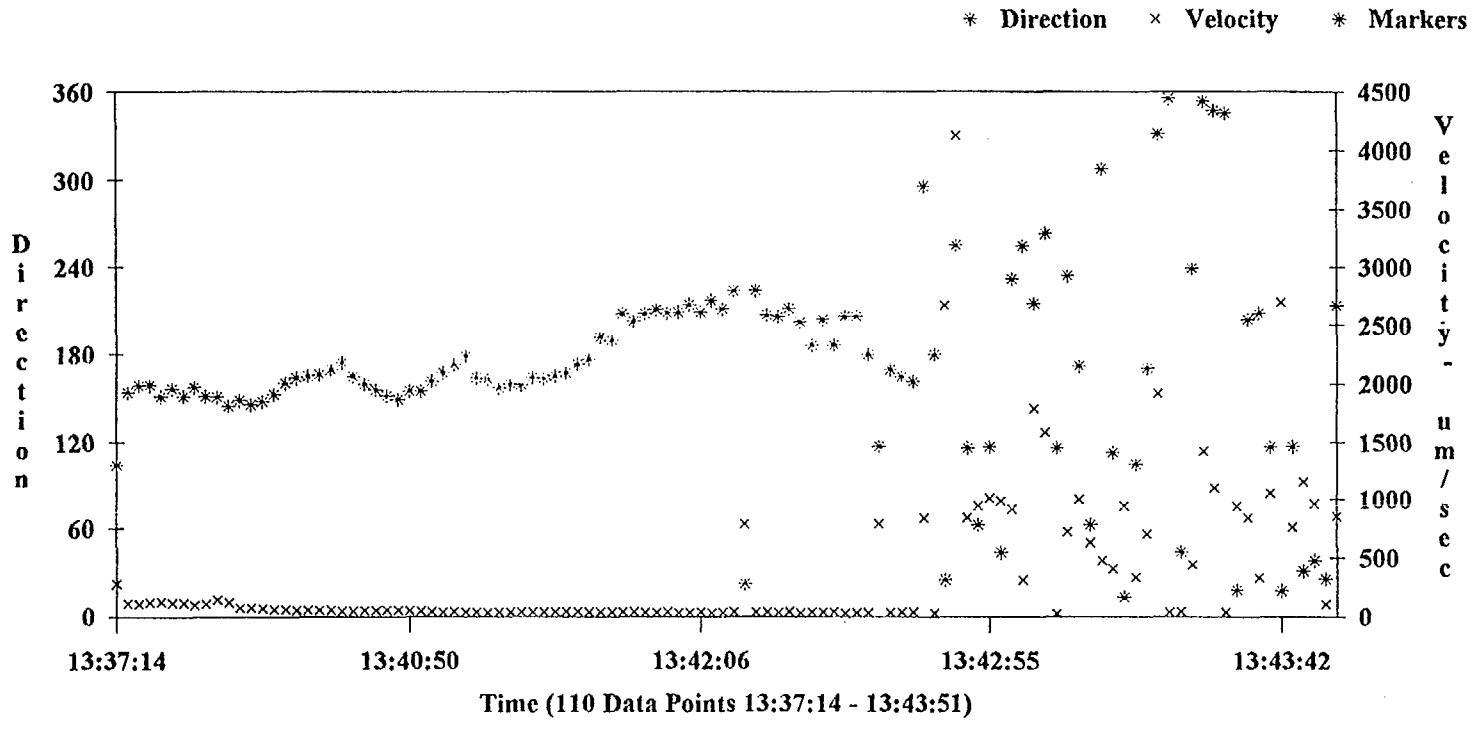
Peter M. Kearl

Peter M. Kearl
President--Aquavision, Inc.




Avg. Dir: 199.39 - Avg.Vel: 6484.95
C:\AquaVISION\colog\fgulch8.aqv

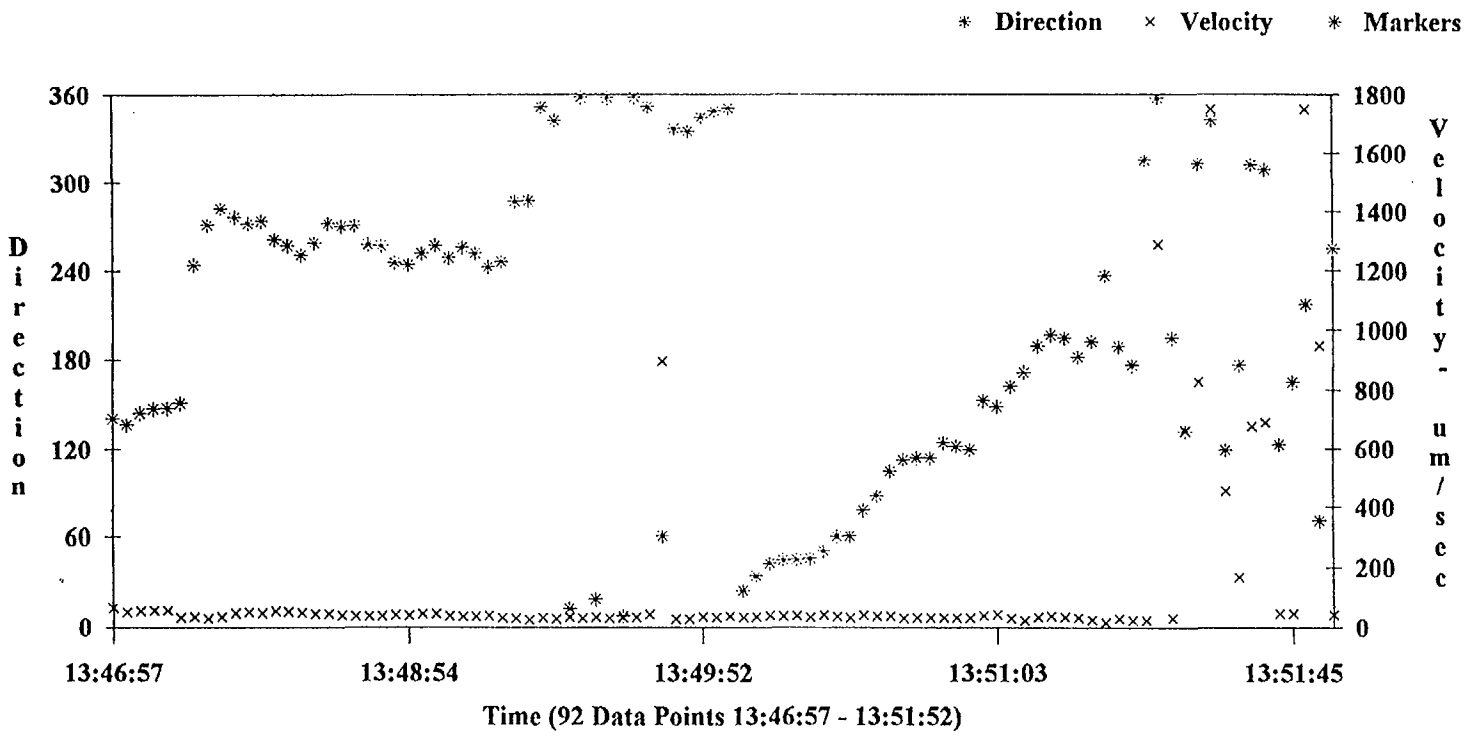
Figure 1




Avg. Dir: 170.37 - Avg.Vel: 377.63
C:\AquaVISION\colog\fgulch5.aqv

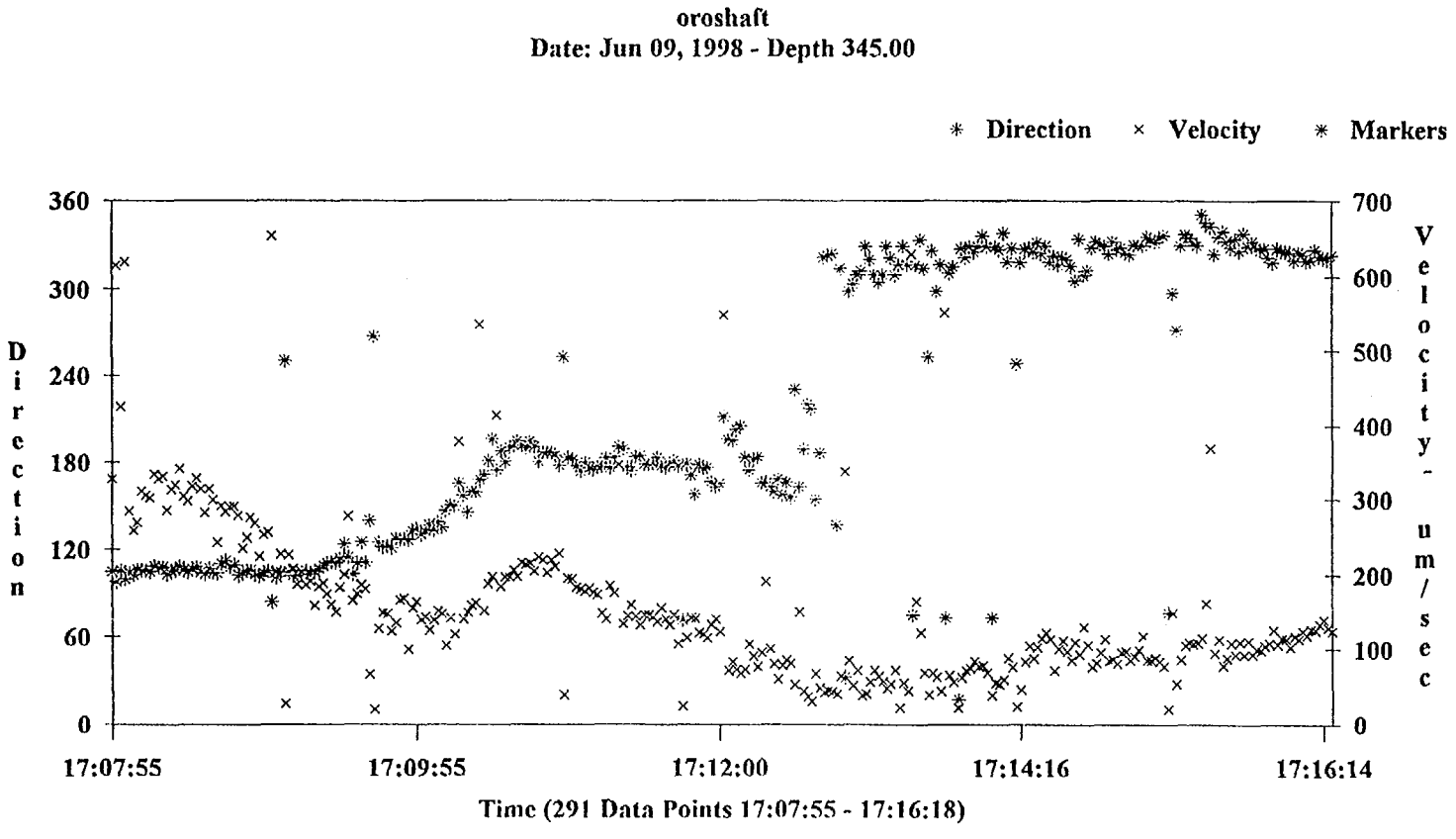
Figure 2

MW-3
Date: Jun 09, 1998 - Depth 52.00




Avg. Dir: 202.02 - Avg.Vel: 142.57
C:\AquaVISION\colog\fgulch6.aqv

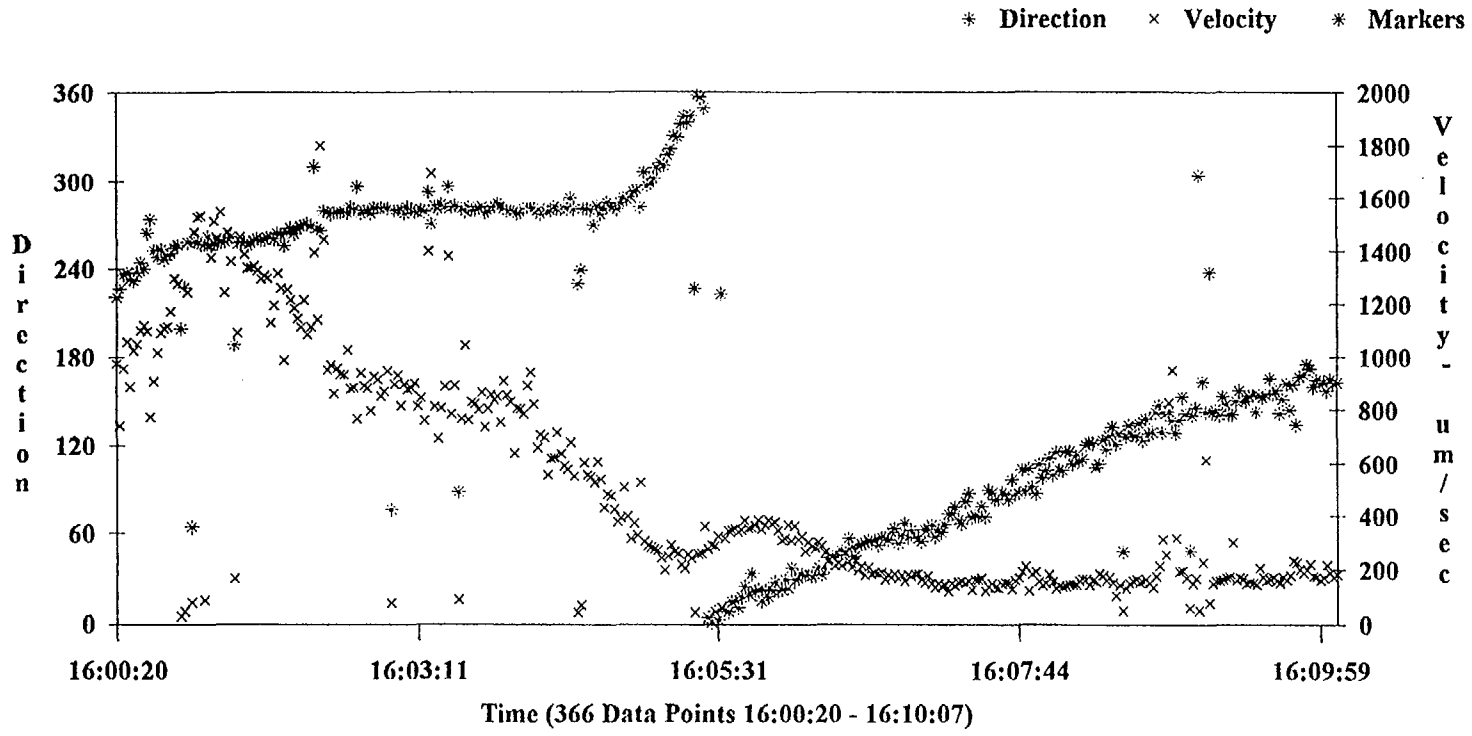
Figure 3




Avg. Dir: 215.72 - Avg.Vel: 154.56
C:\AquaVISION\colog\oroshaft4.aqv

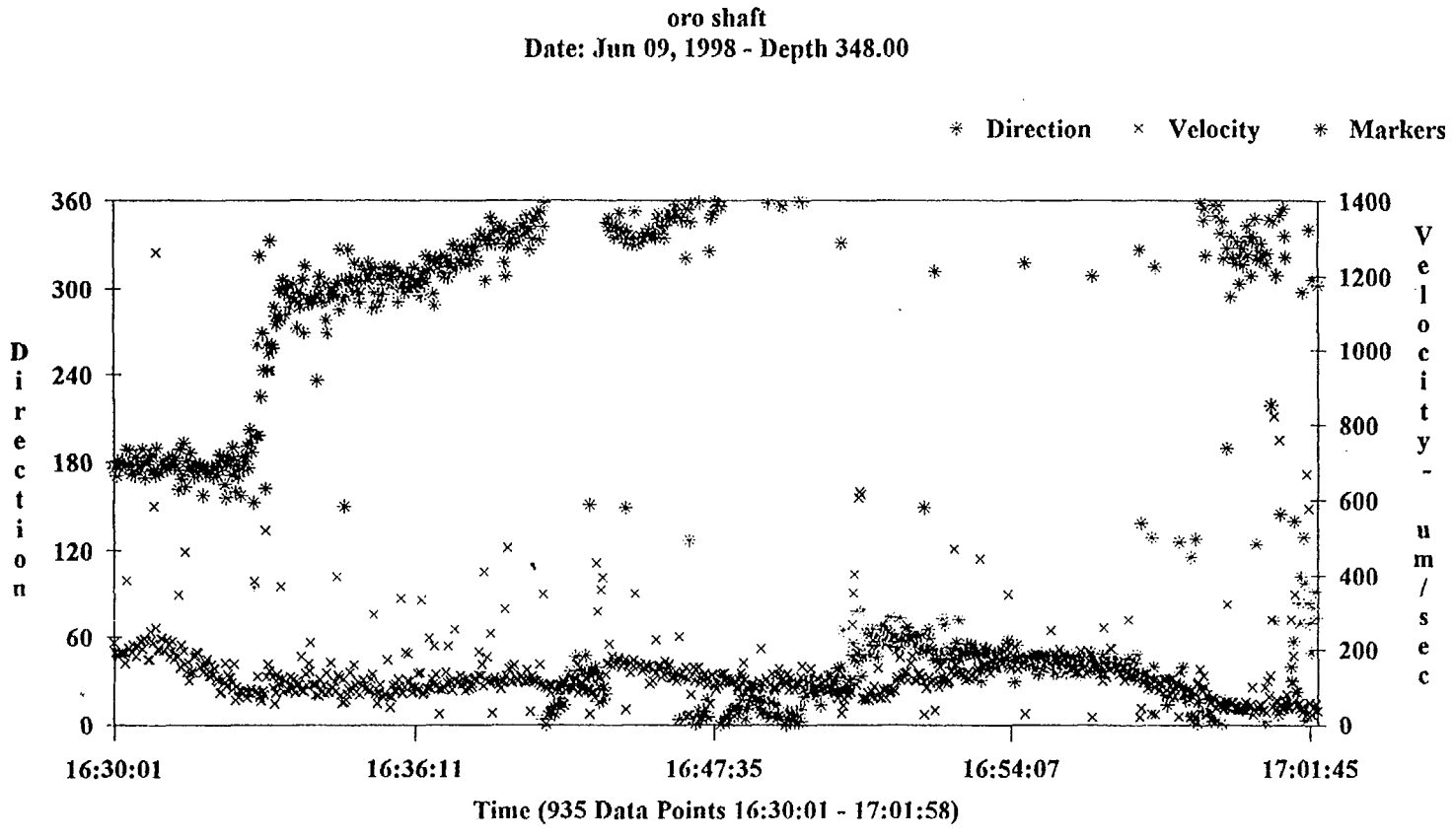
Figure 4

oro shaft
Date: Jun 09, 1998 - Depth 348.00



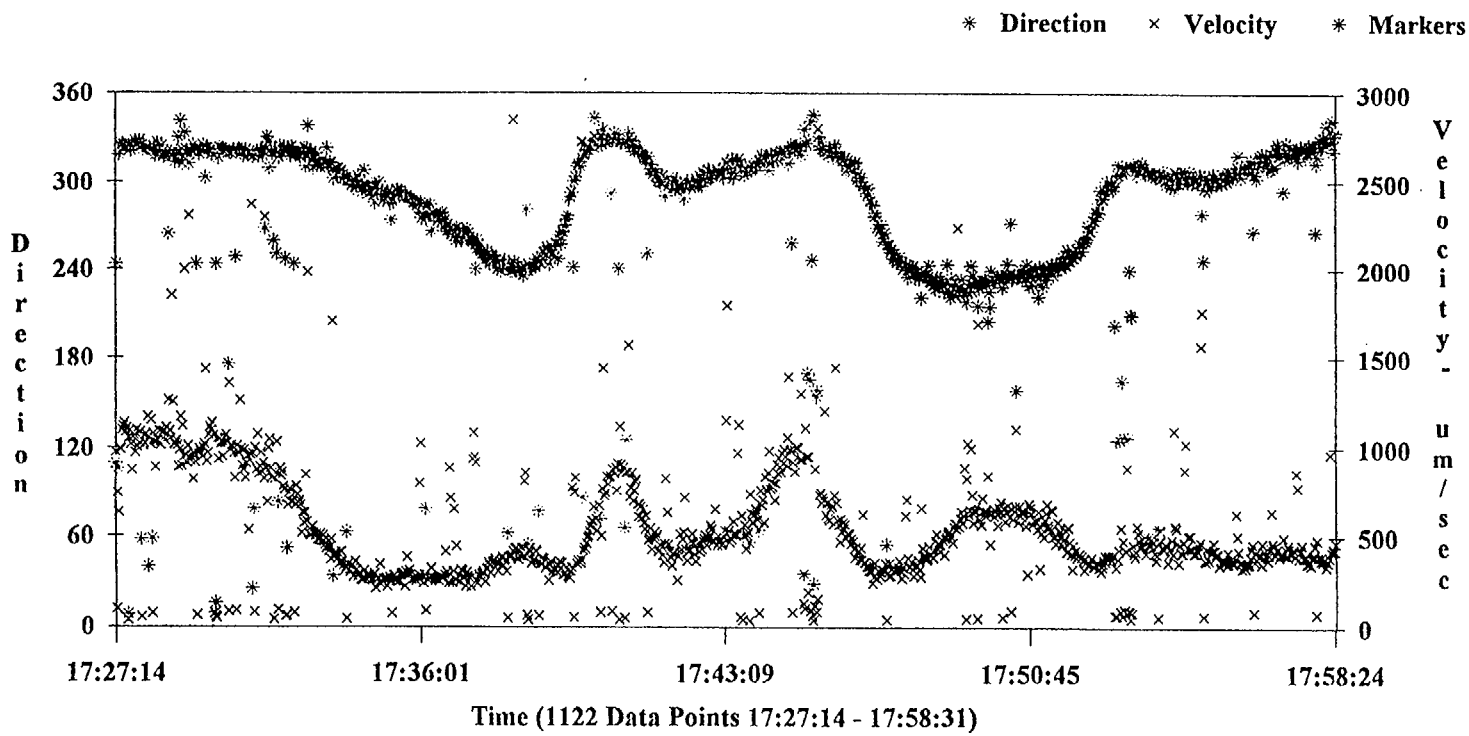

Avg. Dir: 180.30 - Avg.Vel: 508.98
C:\AquaVISION\colog\oroshft1.aqv

Figure 5




Avg. Dir: 161.71 - Avg.Vel: 135.05
C:\AquaVISION\colog\oroshaft3.aqv

Figure 5 continued




Avg. Dir: 282.47 - Avg.Vel: 551.51
C:\AquaVISION\colog\oroshaft5.aqv

Figure 6

BOREHOLE GEOPHYSICS
COLOG
INC.
GOLDEN, COLORADO

Mr. Arthur Morrisey, R.P.G,
American Geological Services
Lakewood, Colorado

September 1, 1998

**RE: Discussion of HydroPhysical Logging Results, Oro Shaft, French Gulch, Colorado**

*Via Facsimile 303.986.2898 2 pages*

Dear Mr. Morrissey,

On June 10 and 11, 1998, COLOG, Inc. performed HydroPhysical™ Logging (HpL™) in the Oro Shaft at the above referenced site. The objective of our study was to evaluate the ambient flow present in the shaft during high flow conditions. HpL™ was performed in conjunction with other flow measurements, which included the Heat Pulse flowmeter and a demonstration of the colloidal borescope. The data for the Heat Pulse survey and a brief report describing the results of the colloidal borescope were previously delivered under separate cover.

To characterize the ambient flow in the Oro shaft using the HpL™ technique, a slug of low conductivity water (low fluid electrical conductivity) was injected at a given depth. The volume of each slug was approximately 800 gallons. The low FEC water used was from the nearby stream which displayed a FEC of ~90 µS/cm. This presents a significant contrast to the native water in the shaft which was measured at 2500 to 4800 µS/cm. The approach used is similar to that described by Patten and Bennet, 1962[1]. Prior to performing the field work, the undersigned conducted "forward modeling" of the proposed scenario using code BORE (Tsang and Hale, 1990)[2] to evaluate the appropriateness of the test methodology. An equivalent well diameter of 5 feet was used and the result of the forward modeling indicated that the proposed methodology was appropriate..

The field methodology can be summarized as follows: 1) using a pump rig, a 2" diameter stand pipe was lowered to the depth at which the ambient flow was to be assessed; 2) approximately 800 gallons of stream water was injected at this depth from a truck mounted storage tank; 3) during injection, the HpL™ tool (measuring FEC and temperature) profiled the interval over which the injection was occurring; 4) at the completion of the injection, continuous FEC and temperature logging was conducted, and 5) at the completion of logging, the injection line was raised to the next depth and these steps performed again.

---

[1] United States Geological Survey Water-Supply Paper 1544-C.

[2] Tsang, C.F., F.V. Hale, and P. Hufschmied, "Validation of a Method for Analyzing Borehole Fluid Conductivity Logs to Determine Fracture Inflow Parameters," pp/95-98 in Earth Sciences Division Annual Report 1989, LBL 27900, UC-403, Lawrence Berkeley Laboratory, University of California, Berkeley, CA June 1990.

17301 W. Colfax, Suite 265 • Golden, CO 80401 • (303) 279-0171 • 1-800 753 0855 • FAX (303) 279-2730

A total of four depths were evaluated. The results of this test for the interval from 450 to 550 are presented in attached Figure 1. These data suggest that very little change in the FEC profile was affected by the injection of the stream water. In fact, a slight increase in FEC was observed when compared to the ambient FEC/T log taken prior to injection line installation. This is in stark contrast to general common sense, previous experience and the results predicted by the forward modeling. COLOG does not have a sufficient understanding of the geochemical relations which may be existing in the shaft to fully explain these observations. Possible causes for these observations may include, but are not limited to, the following:

1) Instantaneous dissolution of precipitants present. COLOG's expertise is not in this area of study and recommends a qualified geochemist consider this further.

2) Extremely high vertical flow rates. This is can not considered realistic after reviewing of the video log and heat pulse flowmeter results.

3) Other, as of yet unknown, geochemical reactions. Again, a qualified geochemist would be required to render such an opinion.

The undersigned has performed HpL™ in hundreds of wells and has never observed a similar occurrence. If I can be of any further assistance in explaining these observations, please contact me.

Regards,
COLOG, Inc.

William H. Pedler
Vice President - Hydrophysics

**PRELIMINARY FIGURE OROSHAFT:** SUMMARY OF HYDROPHYSICAL LOGS FOR AMBIENT FLOW CHARACTERIZATION, INJECTION AT 523 FEET; AGS, FRENCH GULCH, COLORADO, ORO SHAFT.

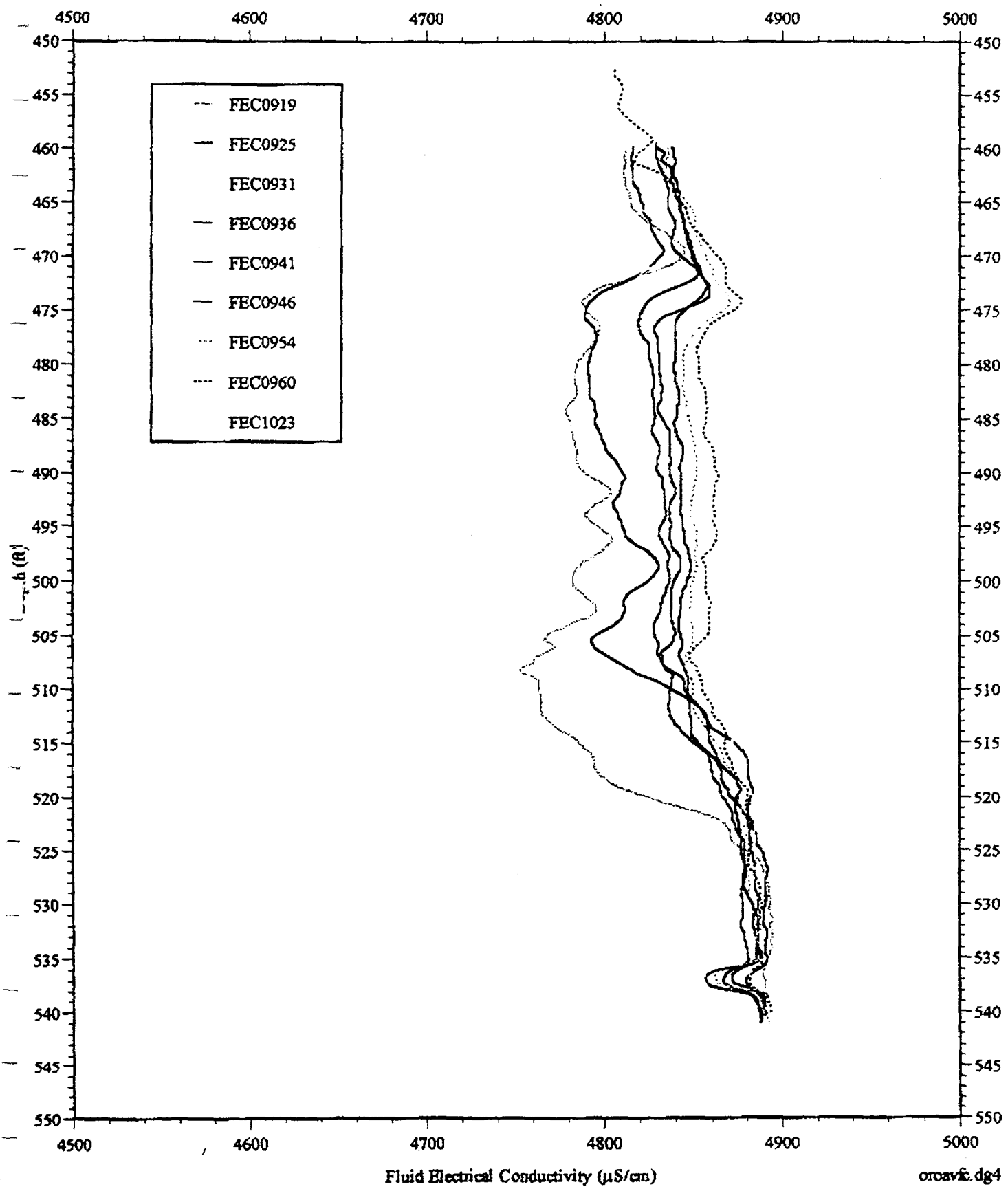



FIGURE 1

# Appendix 7-5
# Mine Pool Chemistry

| sample | | comments | color | turbidity | Temperature ($^0$C) | in-situ COLOG WQL Temperature ($^0$C) | Lab, Conductivity @25C (umhos/cm) |
|---|---|---|---|---|---|---|---|
| #3 Mine | 6/8/98 14:45 | | clear w/Fe ppt. | slight | 11.7 | nd | 2780 |
| #3 Mine duplicate | 6/8/98 14:45 | | clear w/Fe ppt. | slight | 11.7 | nd | 2760 |
| MSRW-3 | 6/10/96 15:35 | | | | 10.3 | nd | 2680 |
| MSRW-3 | 7/22/96 18:42 | | | | 9.2 | nd | |
| Oro Shaft 116' | 1/21/97 15:30 | min. air bubbles | | | 4.9 | 7.3 | nd |
| Oro Shaft 116' | 6/8/98 0:00 | | | | | 7.5 | |
| Oro Shaft top pool (90') | 1/21/97 0:00 | | | | | 6.0 | |
| Oro Shaft top pool (90') | 6/8/98 0:00 | | | | | 6.5 | |
| Oro Shaft top pool (EPA) | 6/11/96 17:30 | | | | 8.9 | nd | |
| Oro Shaft top pool (NAWQA) | 6/11/96 17:30 | | | | 8.9 | nd | 2083 |
| Oro Shaft 186' | 6/9/98 11:05 | min. air bubbles | clear w/Fe ppt. | slight | 15.7 | 8.9 | 2280 |
| Oro Shaft 186' | 1/21/97 15:00 | min. air bubbles | | | 6.2 | 8.9 | nd |
| Oro Shaft 245' | 6/9/98 11:05 | abund. air bubbles | clear w/Fe ppt. | slight | 11.8 | 9.0 | 2230 |
| Oro Shaft 245' | 1/21/97 14:15 | abund. air bubbles | | | 4.7 | 8.9 | nd |
| Oro Shaft 288' | 6/8/98 0:00 | | | | | 8.8 | |
| Oro Shaft 288' | 1/21/97 13:45 | abund. air bubbles | | | 4.1 | 8.8 | nd |
| Oro Shaft 348' | 6/8/98 14:45 | abund. air bubbles | clear w/Fe ppt. | slight | 8.9 | 8.7 | 2310 |
| Oro Shaft 444' | 6/8/98 14:45 | abund. air bubbles | clear w/Fe ppt. | slight | 13.8 | 9.1 | 2420 |
| Oro Shaft 570' | 6/8/98 14:45 | abund. air bubbles | clear w/Fe ppt. | slight | 15.4 | 9.6 | 2930 |
| DI Blank* | 6/9/98 11:05 | | clear | none | nd | nd | 32 |

nd - not determined

-(less than detection limit)

* DI Water purchased from Wild Oats Market in 5 gallon containers appears to be contaminated

# Appendix 7-5
# Mine Pool Chemistry

| sample | | Field, Conductivity (us/cm) | in-situ COLOG WQL Conductivity (us/cm) | pH (lab) | pH (field) | in-situ COLOG WQL pH | in-situ COLOG WQL Eh (volts) | Hardness as CaCO3 (mg/L) | Residue, Filterable (TDS) @180C (mg/L) | calculated TDS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|
| #3 Mine | 6/8/98 14:45 | 2300 | nd | 5.1 | 5.85 | nd | nd | 1415 | 3200 | 2889 |
| #3 Mine duplicate | 6/8/98 14:45 | 2300 | nd | 5 | 5.85 | nd | nd | 1416 | 3190 | 2865 |
| MSRW-3 | 6/10/96 15:35 | | nd | | 5.71 | nd | nd | 1540 | nd | 3355 |
| MSRW-3 | 7/22/96 18:42 | 2110 | nd | | 5.5 | nd | nd | 1475 | nd | 2919 |
| Oro Shaft 116' | 1/21/97 15:30 | 2420 | 2590 | nd | 5.71 | 6.0 | 0.16 | 1080 | nd | 2304 |
| Oro Shaft 116' | 6/8/98 0:00 | | 2440 | | | 6.2 | 0.14 | | | |
| Oro Shaft top pool (90') | 1/21/97 0:00 | | 1840 | | | 6.2 | 0.22 | | | |
| Oro Shaft top pool (90') | 6/8/98 0:00 | | 1900 | | | 6.0 | 0.19 | | | |
| Oro Shaft top pool (EPA) | 6/11/96 17:30 | 1907 | nd | | 5.51 | nd | nd | 1085 | nd | 2416 |
| Oro Shaft top pool (NAWQA) | 6/11/96 17:30 | 1907 | nd | 4.2 | 5.51 | nd | nd | 1120 | 2530 | 2184 |
| Oro Shaft 186' | 6/9/98 11:05 | 2190 | 2800 | 4.8 | 5.8 | 6.7 | 0.16 | 1209 | 2570 | 2276 |
| Oro Shaft 186' | 1/21/97 15:00 | 2700 | 3460 | nd | 6.26 | 6.9 | 0.07 | 1374 | nd | 2542 |
| Oro Shaft 245' | 6/9/98 11:05 | 2150 | 2830 | 4.7 | 5.69 | 6.7 | 0.08 | 1111 | 2530 | 2322 |
| Oro Shaft 245' | 1/21/97 14:15 | 2750 | 3700 | nd | 6.28 | 6.8 | 0.06 | 1382 | nd | 2589 |
| Oro Shaft 288' | 6/8/98 0:00 | | 2890 | | | 6.7 | 0.07 | | | |
| Oro Shaft 288' | 1/21/97 13:45 | 2860 | 3820 | nd | 6.28 | 6.9 | 0.06 | 1456 | nd | 2609 |
| Oro Shaft 348' | 6/8/98 14:45 | 1830 | 2950 | 5 | 5.87 | 6.7 | 0.07 | 1114 | 2760 | 2476 |
| Oro Shaft 444' | 6/8/98 14:45 | 2180 | 3040 | 5.3 | 5.65 | 6.7 | 0.03 | 1150 | 2710 | 2414 |
| Oro Shaft 570' | 6/8/98 14:45 | 2780 | 3130 | 5.8 | 5.9 | 6.7 | 0.05 | 1638 | 3440 | 3097 |
| DI Blank* | 6/9/98 11:05 | nd | nd | 4.5 | nd | | | -1 | 10 | 22 |

nd - not determined
-(less than detection limit)
* DI Water purchased from Wild Oats Market in 5

# Appendix 7-5
# Mine Pool Chemistry

| sample | | TDS (ratio measured/ calculated) | Residue, Non-Filterable (TSS) @103-5C | Bicarbonate as CaCO3 (mg/L) | Carbonate as CaCO3 (mg/L) | Hydroxide as CaCO3 (mg/L) | Lab, Total Alkalinity (mg/L) | Field, Total Alkalinity, methyl orange (mg/L) | Carbon, total organic (TOC) (mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| #3 Mine | 6/8/98 14:45 | 1.11 | 600 | 45 | -2 | -2 | 45 | 70 | 2 |
| #3 Mine duplicate | 6/8/98 14:45 | 1.11 | 400 | 78 | -2 | -2 | 78 | 70 | 2 |
| MSRW-3 | 6/10/96 15:35 | nd | 46 | nd | nd | nd | 8.65 | nd | 1.7 |
| MSRW-3 | 7/22/96 18:42 | nd | 61 | nd | nd | nd | 21.6 | nd | 1.6 |
| Oro Shaft 116' | 1/21/97 15:30 | nd | 14 | nd | nd | nd | 20 | nd | nd |
| Oro Shaft 116' | 6/8/98 0:00 | | | | | | | | |
| Oro Shaft top pool (90') | 1/21/97 0:00 | | | | | | | | |
| Oro Shaft top pool (90') | 6/8/98 0:00 | | | | | | | | |
| Oro Shaft top pool (EPA) | 6/11/96 17:30 | nd | 12 | nd | nd | nd | 15.6 | nd | 1.9 |
| Oro Shaft top pool (NAWQA) | 6/11/96 17:30 | 1.16 | nd | nd | nd | nd | nd | nd | 1.4 |
| Oro Shaft 186' | 6/9/98 11:05 | 1.13 | 46 | 3 | -2 | -2 | 3 | 45 | 2 |
| Oro Shaft 186' | 1/21/97 15:00 | nd | 124 | nd | nd | nd | 40 | nd | nd |
| Oro Shaft 245' | 6/9/98 11:05 | 1.09 | 48 | -2 | -2 | -2 | -2 | 55 | 2 |
| Oro Shaft 245' | 1/21/97 14:15 | nd | 132 | nd | nd | nd | 40 | nd | nd |
| Oro Shaft 288' | 6/8/98 0:00 | | | | | | | | |
| Oro Shaft 288' | 1/21/97 13:45 | nd | 155 | nd | nd | nd | 30 | nd | nd |
| Oro Shaft 348' | 6/8/98 14:45 | 1.11 | 46 | 74 | -2 | -2 | 74 | 85 | 2 |
| Oro Shaft 444' | 6/8/98 14:45 | 1.12 | 50 | 16 | -2 | -2 | 16 | 65 | 2 |
| Oro Shaft 570' | 6/8/98 14:45 | 1.11 | 32 | 78 | -2 | -2 | 78 | 145 | 2 |
| DI Blank* | 6/9/98 11:05 | 0.45 | -5 | -2 | -2 | -2 | -2 | nd | 13 |

nd - not determined
-(less than detection limit)
* DI Water purchased from Wild Oats Market in 5

# Appendix 7-5
# Mine Pool Chemistry

| sample | | Sum of Anions | Sum of Cations | Cation-Anion Balance % | Cl, Chloride (mg/L) | $SO_4$, Sulfate (mg/L) | $S^-$, Sulfide as S (mg/L) | Lab, $SO_3$, Sulfite (mg/L) | Field, $SO_3$, Sulfite (mg/L) | $NH_3$, Nitrogen, ammonia (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|
| #3 Mine | 6/8/98 14:45 | 42.31 | 41.91 | -0.5 | 1 | 1970 | 0.07 | 2 | -0.64 | 0.6 |
| #3 Mine duplicate | 6/8/98 14:45 | 42.33 | 41.4 | -1.1 | 1 | 1940 | 0.09 | -2 | -0.64 | 0.8 |
| MSRW-3 | 6/10/96 15:35 | 49.85 | 46.3 | -3.7 | 4.12 | 2360 | nd | nd | nd | 0.12 |
| MSRW-3 | 7/22/96 18:42 | 41.69 | 44.3 | 3 | 1.96 | 1960 | nd | nd | nd | 0.17 |
| Oro Shaft 116' | 1/21/97 15:30 | 33.35 | 33.59 | 0.3 | 6.95 | 1560 | nd | nd | nd | nd |
| Oro Shaft 116' | 6/8/98 0:00 | | | | | | | | | |
| Oro Shaft top pool (90') | 1/21/97 0:00 | | | | | | | | | |
| Oro Shaft top pool (90') | 6/8/98 0:00 | | | | | | | | | |
| Oro Shaft top pool (EPA) | 6/11/96 17:30 | 36.93 | 31.41 | -8.1 | 2.71 | 1740 | nd | nd | nd | 0.14 |
| Oro Shaft top pool (NAWQA) | 6/11/96 17:30 | 31.56 | 32.14 | 0.9 | 2.3 | 1500 | nd | nd | nd | nd |
| Oro Shaft 186' | 6/9/98 11:05 | 31.41 | 36.62 | 7.7 | 2 | 1490 | -0.02 | -2 | -0.64 | 0.53 |
| Oro Shaft 186' | 1/21/97 15:00 | 36.59 | 38.97 | 3.1 | 3.3 | 1700 | nd | nd | nd | nd |
| Oro Shaft 245' | 6/9/98 11:05 | 33.45 | 33.96 | 0.8 | 2 | 1590 | -0.02 | -2 | -0.64 | 0.41 |
| Oro Shaft 245' | 1/21/97 14:15 | 36.92 | 40.06 | 4.1 | -2 | 1720 | nd | nd | nd | nd |
| Oro Shaft 288' | 6/8/98 0:00 | | | | | | | | | |
| Oro Shaft 288' | 1/21/97 13:45 | 36.39 | 41.98 | 7.1 | 3.3 | 1700 | nd | nd | nd | nd |
| Oro Shaft 348' | 6/8/98 14:45 | 36.82 | 34.67 | -3 | 2 | 1680 | -0.02 | -2 | -0.64 | 0.47 |
| Oro Shaft 444' | 6/8/98 14:45 | 35.03 | 35.1 | 0.1 | 2 | 1650 | -0.02 | -2 | -0.64 | 0.44 |
| Oro Shaft 570' | 6/8/98 14:45 | 45.48 | 46.16 | 0.7 | 1 | 2090 | -0.02 | -2 | -0.64 | 0.54 |
| DI Blank* | 6/9/98 11:05 | 0.4 | 0.1 | | -1 | 20 | -0.02 | -2 | nd | 2.3 |

nd - not determined

-(less than detection limit)

* DI Water purchased from Wild Oats Market in 5

# Appendix 7-5
# Mine Pool Chemistry

| | | | | | | | Mine Pool Chemistry | | |
|---|---|---|---|---|---|---|---|---|---|
| sample | | $NO_3$, Nitrite as N, (mg/L) | $NO_2$, Nitrate as N (mg/L) | Ca, Calcium, dissolved (mg/L) | Mg, Magnesium, dissolved (mg/L) | Na, Sodium, dissolved (mg/L) | K, Potassium, dissolved (mg/L) | Ag, Silver, dissolved (mg/L) | Ag, Silver, total recoverable (mg/L) |
| #3 Mine | 6/8/98 14:45 | -0.01 | 0.13 | 367 | 121 | 13.8 | 3 | -0.0005 | 0.005 |
| #3 Mine duplicate | 6/8/98 14:45 | -0.01 | 0.06 | 369 | 120 | 13.6 | 3 | -0.0005 | 0.0049 |
| MSRW-3 | 6/10/96 15:35 | nd | nd | 393 | 135.6 | 13.07 | 5.7 | -0.0002 | -0.0002 |
| MSRW-3 | 7/22/96 18:42 | nd | nd | 376 | 130.1 | 12.81 | 2.4 | -0.0002 | -0.0002 |
| Oro Shaft 116' | 1/21/97 15:30 | nd | nd | 273 | 96.6 | 11.4 | 1.81 | nd | nd |
| Oro Shaft 116' | 6/8/98 0:00 | | | | | | | | |
| Oro Shaft top pool (90') | 1/21/97 0:00 | | | | | | | | |
| Oro Shaft top pool (90') | 6/8/98 0:00 | | | | | | | | |
| Oro Shaft top pool (EPA) | 6/11/96 17:30 | nd | nd | 280.5 | 93.37 | 9.67 | 4.7 | -0.0002 | 0.0006 |
| Oro Shaft top pool (NAWQA) | 6/11/96 17:30 | nd | nd | 300 | 90 | 10 | 3.7 | -0.001 | -0.001 |
| Oro Shaft 186' | 6/9/98 11:05 | -0.01 | 0.06 | 316 | 102 | 11.6 | 2.8 | -0.0002 | -0.0005 |
| Oro Shaft 186' | 1/21/97 15:00 | nd | nd | 354 | 119 | 15.1 | 3.36 | nd | nd |
| Oro Shaft 245' | 6/9/98 11:05 | -0.01 | 0.05 | 289 | 94.6 | 12.2 | 3.1 | -0.0002 | -0.0005 |
| Oro Shaft 245' | 1/21/97 14:15 | nd | nd | 357 | 119 | 19 | 2.15 | nd | nd |
| Oro Shaft 288' | 6/8/98 0:00 | | | | | | | | |
| Oro Shaft 288' | 1/21/97 13:45 | nd | nd | 382 | 125 | 14.2 | 3.07 | nd | nd |
| Oro Shaft 348' | 6/8/98 14:45 | -0.01 | 0.09 | 291 | 94 | 11.8 | 3 | -0.0005 | -0.0005 |
| Oro Shaft 444' | 6/8/98 14:45 | -0.01 | 0.16 | 299 | 99 | 11.1 | 2.8 | -0.0005 | -0.0005 |
| Oro Shaft 570' | 6/8/98 14:45 | -0.01 | 0.07 | 435 | 134 | 14.9 | 3.4 | -0.0005 | -0.0005 |
| DI Blank* | 6/9/98 11:05 | -0.01 | 0.07 | -0.2 | -0.2 | -0.3 | -0.3 | -0.0002 | -0.0002 |
| | | | | | | | | | |
| nd - not determined | | | | | | | | | |
| -(less than detection limit) | | | | | | | | | |
| * DI Water purchased from Wild Oats Market in 5 | | | | | | | | | |

# Appendix 7-5
# Mine Pool Chemistry

| sample | | AL, Aluminum, dissolved (mg/L) | Al, Aluminum, total recoverable (mg/L) | As, Arsenic, dissolved (mg/L) | As, Arsenic, total recoverable (mg/L) | Cd, Cadmium, dissolved (mg/L) | Cd, Cadmium, total recoverable (mg/L) | Co, Cobalt, dissolved (mg/L) | Co, Cobalt, total (mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| #3 Mine | 6/8/98 14:45 | 0.16 | 15.3 | -0.005 | 0.063 | 0.064 | 0.166 | nd | nd |
| #3 Mine duplicate | 6/8/98 14:45 | 0.17 | 15 | 0.006 | 0.067 | 0.062 | 0.153 | nd | nd |
| MSRW-3 | 6/10/96 15:35 | 1.351 | 2.5 | 0.013 | 0.0162 | 0.657 | 0.651 | nd | nd |
| MSRW-3 | 7/22/96 18:42 | 1.05 | 4.063 | 0.0047 | 0.0108 | 0.589 | 0.597 | nd | nd |
| Oro Shaft 116' | 1/21/97 15:30 | 0.884 | 1.81 | -0.005 | -0.005 | 0.387 | 0.384 | nd | nd |
| Oro Shaft 116' | 6/8/98 0:00 | | | | | | | | |
| Oro Shaft top pool (90') | 1/21/97 0:00 | | | | | | | | |
| Oro Shaft top pool (90') | 6/8/98 0:00 | | | | | | | | |
| Oro Shaft top pool (EPA) | 6/11/96 17:30 | 0.428 | 0.629 | 0.0063 | 0.0076 | 0.271 | 0.278 | nd | nd |
| Oro Shaft top pool (NAWQA) | 6/11/96 17:30 | 0.48 | 0.57 | 0.006 | 0.005 | 0.25 | nd | 0.08 | 0.14 |
| Oro Shaft 186' | 6/9/98 11:05 | 0.85 | 1.02 | 0.014 | 0.011 | 0.226 | 0.265 | nd | nd |
| Oro Shaft 186' | 1/21/97 15:00 | -0.1 | 0.447 | -0.005 | -0.005 | 0.185 | 0.176 | nd | nd |
| Oro Shaft 245' | 6/9/98 11:05 | 0.8 | 0.9 | 0.011 | 0.011 | 0.294 | 0.232 | nd | nd |
| Oro Shaft 245' | 1/21/97 14:15 | -0.1 | 1.08 | -0.005 | 0.011 | 0.178 | 0.183 | nd | nd |
| Oro Shaft 288' | 6/8/98 0:00 | | | | | | | | |
| Oro Shaft 288' | 1/21/97 13:45 | -0.1 | 6.02 | -0.005 | 0.0099 | 0.184 | 0.2 | nd | nd |
| Oro Shaft 348' | 6/8/98 14:45 | 0.83 | 0.97 | 0.008 | 0.01 | 0.268 | 0.249 | nd | nd |
| Oro Shaft 444' | 6/8/98 14:45 | 0.71 | 0.83 | 0.009 | 0.011 | 0.234 | 0.205 | nd | nd |
| Oro Shaft 570' | 6/8/98 14:45 | 0.1 | 0.1 | 0.012 | 0.014 | 0.009 | 0.016 | nd | nd |
| DI Blank* | 6/9/98 11:05 | -0.03 | -0.03 | -0.002 | -0.002 | -0.003 | -0.003 | | |
| | | | | | | | | | |
| nd - not determined | | | | | | | | | |
| -(less than detection limit) | | | | | | | | | |
| * DI Water purchased from Wild Oats Market in 5 | | | | | | | | | |

# Appendix 7-5
# Mine Pool Chemistry

| sample | | Cr, Chromium, dissolved (mg/L) | Cr, Chromium, total recoverable (mg/L) | Cu, Copper, dissolved (mg/L) | Cu, Copper, total recoverable (mg/L) | Lab, $Fe^{+2}$ Iron, Ferrous (mg/L) | Field, $Fe^{+2}$ Iron, Ferrous (mg/L) | $Fe^{+3}$, Iron, Ferric (mg/L) | Fe, Iron, dissolved (mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| #3 Mine | 6/8/98 14:45 | -0.002 | 0.003 | 0.037 | 0.474 | 145 | 165 | -2 | 131 |
| #3 Mine duplicate | 6/8/98 14:45 | -0.002 | 0.003 | 0.038 | 0.499 | nd | nd | nd | 132 |
| MSRW-3 | 6/10/96 15:35 | -0.004 | -0.004 | 0.219 | 0.2609 | nd | nd | nd | 172.567 |
| MSRW-3 | 7/22/96 18:42 | -0.004 | -0.004 | 0.1837 | 0.2071 | nd | nd | nd | 163.59 |
| Oro Shaft 116' | 1/21/97 15:30 | nd | nd | 0.0477 | 0.0651 | nd | nd | nd | 118 |
| Oro Shaft 116' | 6/8/98 0:00 | | | | | | | | |
| Oro Shaft top pool (90') | 1/21/97 0:00 | | | | | | | | |
| Oro Shaft top pool (90') | 6/8/98 0:00 | | | | | | | | |
| Oro Shaft top pool (EPA) | 6/11/96 17:30 | -0.004 | -0.004 | 0.0172 | 0.037 | nd | nd | nd | 84.3714 |
| Oro Shaft top pool (NAWQA) | 6/11/96 17:30 | 0.002 | nd | 0.041 | nd | nd | nd | nd | 85 |
| Oro Shaft 186' | 6/9/98 11:05 | -0.0004 | 0.001 | 0.1 | 0.13 | 125 | 130 | 9 | 134 |
| Oro Shaft 186' | 1/21/97 15:00 | nd | nd | -0.01 | -0.01 | nd | nd | nd | 110 |
| Oro Shaft 245' | 6/9/98 11:05 | -0.0004 | -0.001 | 0.133 | 0.108 | 123 | 140 | -0.8 | 118 |
| Oro Shaft 245' | 1/21/97 14:15 | nd | nd | -0.01 | -0.01 | nd | nd | nd | 117 |
| Oro Shaft 288' | 6/8/98 0:00 | | | | | | | | |
| Oro Shaft 288' | 1/21/97 13:45 | nd | nd | -0.01 | 0.0154 | nd | nd | nd | 119 |
| Oro Shaft 348' | 6/8/98 14:45 | -0.002 | -0.001 | 0.091 | 0.112 | 101 | 140 | 21 | 122 |
| Oro Shaft 444' | 6/8/98 14:45 | -0.002 | -0.001 | 0.084 | 0.088 | 116 | 130 | 7 | 123 |
| Oro Shaft 570' | 6/8/98 14:45 | -0.002 | 0.007 | 0.035 | 0.04 | 142 | 180 | -2 | 142 |
| DI Blank* | 6/9/98 11:05 | -0.0004 | 0.0006 | -0.002 | -0.002 | nd | | nd | 0.02 |

nd - not determined

-(less than detection limit)

* DI Water purchased from Wild Oats Market in 5

# Appendix 7-5
# Mine Pool Chemistry

| sample | | Fe, Iron, total recoverable (mg/L) | Mn, Manganese, dissolved (mg/L) | Mn, Manganese, total recoverable (mg/L) | Mo, Molybdenum, total recoverable (mg/L) | Ni, Nickel, dissolved (mg/L) | Ni, Nickel, total recoverable (mg/L) | Pb, Lead, dissolved (mg/L) |
|---|---|---|---|---|---|---|---|---|
| #3 Mine | 6/8/98 14:45 | 173 | 44.2 | 42.8 | 0.002 | 0.13 | 0.13 | 0.26 |
| #3 Mine duplicate | 6/8/98 14:45 | 170 | 44.2 | 43 | 0.002 | 0.12 | 0.13 | 0.24 |
| MSRW-3 | 6/10/96 15:35 | 175.133 | 50.7115 | 50.0295 | nd | 0.135 | 0.1412 | 0.3733 |
| MSRW-3 | 7/22/96 18:42 | 175.68 | 50.1924 | 49.1798 | nd | 0.1185 | 0.1129 | 0.32722 |
| Oro Shaft 116' | 1/21/97 15:30 | 125 | 36.5 | 36.7 | nd | 0.127 | 0.123 | 0.25 |
| Oro Shaft 116' | 6/8/98 0:00 | | | | | | | |
| Oro Shaft top pool (90') | 1/21/97 0:00 | | | | | | | |
| Oro Shaft top pool (90') | 6/8/98 0:00 | | | | | | | |
| Oro Shaft top pool (EPA) | 6/11/96 17:30 | 90.1876 | 34.2036 | 36.1111 | nd | 0.1072 | 0.1182 | 0.2623 |
| Oro Shaft top pool (NAWQA) | 6/11/96 17:30 | nd | 32 | 35 | nd | 0.11 | nd | 0.4 |
| Oro Shaft 186' | 6/9/98 11:05 | 110 | 37.7 | 33.4 | -0.001 | 0.11 | 0.11 | 0.2 |
| Oro Shaft 186' | 1/21/97 15:00 | 137 | 39.1 | 36.9 | nd | 0.121 | 0.115 | -0.006 |
| Oro Shaft 245' | 6/9/98 11:05 | 119 | 36.2 | 35.6 | -0.001 | 0.11 | 0.11 | 0.28 |
| Oro Shaft 245' | 1/21/97 14:15 | 142 | 41.4 | 40.5 | nd | 0.127 | 0.147 | -0.006 |
| Oro Shaft 288' | 6/8/98 0:00 | | | | | | | |
| Oro Shaft 288' | 1/21/97 13:45 | 153 | 44.4 | 43.2 | nd | 0.125 | 0.155 | -0.006 |
| Oro Shaft 348' | 6/8/98 14:45 | 114 | 36.5 | 34.5 | -0.001 | 0.11 | 0.11 | 0.26 |
| Oro Shaft 444' | 6/8/98 14:45 | 121 | 37.5 | 36.4 | -0.001 | 0.11 | 0.12 | 0.2 |
| Oro Shaft 570' | 6/8/98 14:45 | 143 | 43.3 | 40.8 | -0.001 | 0.15 | 0.15 | -0.04 |
| DI Blank* | 6/9/98 11:05 | 0.03 | -0.005 | 0.006 | -0.0004 | -0.01 | -0.01 | -0.04 |

nd - not determined

-(less than detection limit)

* DI Water purchased from Wild Oats Market in 5

# Appendix 7-5
# Mine Pool Chemistry

| sample | | Pb, Lead, total recoverable (mg/L) | Sb, Antimony, total recoverable (mg/L) | Se, Selenium, total recoverable (mg/L) | U, Uranium, total recoverable (mg/L) | V, Vanadium, total recoverable (mg/L) | Zn, Zinc, dissolved (mg/L) | Zn, Zinc, total recoverable (mg/L) | Tritium, Total (PCI/L) |
|---|---|---|---|---|---|---|---|---|---|
| #3 Mine | 6/8/98 14:45 | 4.6 | 0.004 | -0.001 | 0.0084 | 0.005 | 196 | 197 | 59 |
| #3 Mine duplicate | 6/8/98 14:45 | 4.7 | 0.004 | -0.001 | 0.0086 | 0.006 | 195 | 194 | nd |
| MSRW-3 | 6/10/96 15:35 | 0.5772 | nd | nd | nd | nd | 213.21 | 216.77 | nd |
| MSRW-3 | 7/22/96 18:42 | 0.72759 | nd | nd | nd | nd | 205.7 | 213.8 | nd |
| Oro Shaft 116' | 1/21/97 15:30 | 0.47 | nd | nd | nd | nd | 187 | 186 | nd |
| Oro Shaft 116' | 6/8/98 0:00 | | | | | | | | |
| Oro Shaft top pool (90') | 1/21/97 0:00 | | | | | | | | |
| Oro Shaft top pool (90') | 6/8/98 0:00 | | | | | | | | |
| Oro Shaft top pool (EPA) | 6/11/96 17:30 | 0.4533 | nd | nd | nd | nd | 156.71 | 166.91 | nd |
| Oro Shaft top pool (NAWQA) | 6/11/96 17:30 | nd | 0.002 | -0.001 | -0.001 | nd | 160 | 230 | 84 |
| Oro Shaft 186' | 6/9/98 11:05 | 0.34 | -0.001 | -0.001 | 0.0013 | -0.001 | 177 | 159 | 66 |
| Oro Shaft 186' | 1/21/97 15:00 | 0.18 | nd | nd | nd | nd | 174 | 170 | nd |
| Oro Shaft 245' | 6/9/98 11:05 | 0.28 | -0.001 | -0.001 | 0.0013 | -0.001 | 171 | 162 | nd |
| Oro Shaft 245' | 1/21/97 14:15 | 0.24 | nd | nd | nd | nd | 190 | 177 | nd |
| Oro Shaft 288' | 6/8/98 0:00 | | | | | | | | |
| Oro Shaft 288' | 1/21/97 13:45 | 0.21 | nd | nd | nd | nd | 203 | 191 | nd |
| Oro Shaft 348' | 6/8/98 14:45 | 0.3 | -0.001 | -0.001 | 0.0014 | -0.001 | 172 | 159 | nd |
| Oro Shaft 444' | 6/8/98 14:45 | 0.24 | -0.001 | -0.001 | 0.0013 | -0.001 | 172 | 160 | 73 |
| Oro Shaft 570' | 6/8/98 14:45 | -0.08 | -0.001 | -0.001 | 0.0016 | -0.001 | 148 | 137 | nd |
| DI Blank* | 6/9/98 11:05 | -0.04 | -0.0004 | -0.001 | -0.0002 | -0.0004 | 0.04 | 0.04 | nd |

nd - not determined
-(less than detection limit)
* DI Water purchased from Wild Oats Market in 5

# Appendix 7-5
# Mine Pool Chemistry

| | | | | |
|---|---|---|---|---|
| | | Stable Isotopes | | |
| sample | | Tritium, Total (TU) | Oxygen Del $^{18}O$ ($^{o}/_{oo}$) | Hydrogen Del D ($^{o}/_{oo}$) |
| #3 Mine | 6/8/98 14:45 | 18 | -18.6 | -140 |
| #3 Mine duplicate | 6/8/98 14:45 | nd | -18.8 | -141 |
| MSRW-3 | 6/10/96 15:35 | nd | -18.5 | -143 |
| MSRW-3 | 7/22/96 18:42 | nd | -18.7 | -135 |
| Oro Shaft 116' | 1/21/97 15:30 | nd | -19.0 | -143 |
| Oro Shaft 116' | 6/8/98 0:00 | | | |
| Oro Shaft top pool (90') | 1/21/97 0:00 | | | |
| Oro Shaft top pool (90') | 6/8/98 0:00 | | | |
| Oro Shaft top pool (EPA) | 6/11/96 17:30 | nd | nd | nd |
| Oro Shaft top pool (NAWQA) | 6/11/96 17:30 | 25 | nd | nd |
| Oro Shaft 186' | 6/9/98 11:05 | 20 | -18.6 | -138 |
| Oro Shaft 186' | 1/21/97 15:00 | nd | -19.2 | -146 |
| Oro Shaft 245' | 6/9/98 11:05 | nd | -18.4 | -141 |
| Oro Shaft 245' | 1/21/97 14:15 | nd | -19.4 | -146 |
| Oro Shaft 288' | 6/8/98 0:00 | | | |
| Oro Shaft 288' | 1/21/97 13:45 | nd | -19.2 | -146 |
| Oro Shaft 348' | 6/8/98 14:45 | nd | -18.6 | -143 |
| Oro Shaft 444' | 6/8/98 14:45 | 22 | -18.6 | -139 |
| Oro Shaft 570' | 6/8/98 14:45 | nd | -18.7 | -145 |
| DI Blank* | 6/9/98 11:05 | nd | nd | nd |
| | | | | |
| nd - not determined | | | | |
| -(less than detection limit) | | | | |
| * DI Water purchased from Wild Oats Market in 5 | | | | |

# Snowpack Accumulation and Snowmelt at the Wellington-Oro Mine, French Creek Drainage, Breckenridge Colorado, 1998

**Prepared For:**

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## Summary

The purpose of this project was to quantify the amount and timing of water released from the seasonal snowpack during spring melt in a 50 ha sub-catchment of the French Creek watershed near Breckenridge, Colorado. It has been suggested that this sub-catchment is the primary source of water entering the Wellington-Oro mine during snowmelt. This report presents the results from two snow surveys at the site, weekly precipitation monitoring on site, daily precipitation and melt data from two local SNOTEL sites spanning the elevation range of the catchment, soil water storage, and daily stream discharge from January through May, 1998 at the French Creek gage (USGS gage # 09046530).

Snow depth and density were measured on 22-23 March and 21 April along 10 transects which varied in both slope and aspect and were representative of the major snowpack regimes at the site. Snow water equivalence (SWE) within these snowpack regimes in late March ranged from 3 to 25.8 cm (1.2 to 10.2 inches) of water, with lower amounts in wind-scoured areas and higher amounts in protected areas. Precipitation from 1 April through May 31 at the site was 6.4 cm (2.5 inches) yielding a total water input (SWE plus precipitation) of 9.4 to 32.2 cm (3.7 to 12.7 inches). After correcting for the area of each snowpack regime, the average water input to the site was 25.9 cm (10.2 inches). The total volume of water at the site was 128,203 $m^{-3}$. Long-term winter precipitation records from the Copper Mountain and Summit Ranch SNOTEL sites indicates the seasonal snowpack in this area was within 10% of average.

Snowmelt melt began at the most exposed locations (S and SW aspects) on approximately 23 March, while melt at the highest and most protected parts of the site did not begin until the last week in April, 1998. Between 23 March and 21 April SWE decreased at all but the most protected areas of the site. The total water loss during this period was 24,500 $m^{-3}$. Throughout the melt period discharge in French Creek responded to melt events generally within a day.

## Background on Snowmelt Hydrology in High Elevation Catchments

The annual hydrologic cycle in high elevation catchments is dominated by spring snowmelt when 60% to 80% of annual precipitation is released from the snowpack (Heuer et al. in review, Baron and Campbell 1997). In contrast to overland flow as the major route of melt water to the stream recent research in high elevation catchments in Colorado indicates that the majority of this snowmelt enters the soil resulting in an increase in the water table which subsequently increases stream discharge (Boyer et al. 1997, Brooks et al. 1995, Williams et al. 1996). Chemical characterization of surface water during the snowmelt period indicates that this infiltration and flushing of soil water pools is characteristic of a wide range of seasonally snow-covered systems (Creed et al. 1996), and that groundwater and soil water from the entire basin is flushed during the melt period (Hornberger et al. 1994, Boyer et al. 1997).

Snowmelt at 9500 - 10,000 ft in central Colorado typically begins in early- to mid-April and gradually proceeds to higher elevations with melt beginning at 11,500 - 12,000 ft in early May (Cline 1995, Williams et al. 1996, Baron and Campbell 1997). While average air temperature is the best, basin-wide predictor of melt, exposed south and southwest slopes often experience episodic melt events as early as March due to increased solar radiation (Elder 1991, Cline 1995). These melt events are reflected in the hydrographs from French Creek (USGS gauging station 09046530) in both 1996 and 1997 when discharge doubled approximately one month before basin-wide melt began (Figure 1). Once melt begins, the mixture of snow and water within the waning snowpack buffers the temperature at 0° C, and any incoming energy speeds melt. A significant fraction of annual snowfall occurs during the March through May period, and the increased albedo of the new snow reduces the incoming solar radiation absorbed by the snowpack and interrupts melt events for days to weeks (Cline 1995). The cyclic nature of these melt events can be seen in the hydrograph from French Creek in 1998 (Figure 2). Typically, when basin-wide average air temperatures are above freezing snowmelt begins regardless of exposure to incoming solar radiation.

## Sampling Design and Methodology

Snow water equivalence was calculated for the site from snow surveys on two dates; the first on 23 March and the second on 21 April, 1998. The date for the first survey was

chosen to coincide with the initiation of the episodic spring melt events as possible. The second date was chosen to coincide with the initiation of melt throughout the sub-catchment. Precipitation input to the site was measured from shortly after the last snow survey through 31 May 1998. Additionally, the potential for water storage in soil was calculated during the first snow survey.

Four primary transects, separated by approximately 75 m in elevation, were established roughly parallel to elevation contours. These transects were designated A through D, with A the highest elevation and D the lowest. When a transect changed aspect it was given a new designation by appending the original letter designation with an apostrophe. For example transect A began along a SW facing slope, when the aspect changed to SE across the drainage the designation for measurement was changed to A' (Figure 3). This sampling design resulted in data from 10 areas of the basin with potentially different snowpack regimes.

Along each transect, depth measurements were made manually at approximately 20 m intervals, and integrated snow density samples were collected every 50 - 60 meters using a federal sampler. Additional depth measurements were made 10 m to either side of the density samples. Large unconsolidated snow crystals ("depth hoar" or "sugar snow") dominated the snowpack and intact federal samples could not be collected at many sites. In these areas additional samples were collected from the snowpack and density was calculated as described for snowpits below.

High resolution snow density measurements were made at two locations, one in coniferous forest and one at the boundary of coniferous forest and aspen. Snow pits were dug to the soil surface at each location and snow density was measured in 10 cm intervals between the surface of the snowpack and the soil-snow interface. Intact snow samples were collected using a 1L stainless steel snow cutter and weighed to the nearest gram. The volume of water within each sample was calculated by dividing the weight of the sample by the weight of 1L of water. Snow density for the intact snowpack was calculated as the mean of the individual measurements from the snowpit. Three integrated snow samples immediately adjacent to these pits were collected with the federal sampler for calibration of the federal sampler to the snowpit data.

To determine how close the snowpack was to melt, snow temperature was measured concurrent with density measurements using a dial stem thermometer calibrated to 0° C in a

snow/water mixture. Additional temperature measurements were made at approximately 5 locations along each transect below the melt-freeze zone at a depth of 20 cm. All physical measurements of the snowpack were performed using standard peer reviewed methods (Elder et al. 1991, Brooks et al. 1995, Williams et al. 1996)

During the first snow survey seven soil cores were collected from locations throughout the site to determine the potential for water storage in the soil. Soils were collected using a 3.8 cm diameter soil corer and transferred immediately to new polyethylene bags. Upon return to the lab, soils were weighed, dried at 60° C to determine soil moisture content, and analyzed for water holding capacity. All soil measurements were performed using standard, peer-reviewed methods (Fisk and Schmidt 1997, Brooks et al. 1995, 1996, 1997, 1998).

Precipitation inputs were measured at approximately weekly intervals in a 20 cm (8 inch) diameter snow gage. This gage was located at 10,200 ft elevation on private property adjacent to the site to protect it from vandalism.

## RESULTS

### Snow Depth, Water Content, and Distribution

A total of 123 depth measurements and 21 density measurements were performed during the first snow survey (22-23 March), and 117 depth and 31 density measurements were performed during the second snow survey (21 April) (Table 1). During the first survey mean snow depth ranged from high of 80 cm along the high elevation, SW facing, forested transect A, to 8 cm at the low elevation, relatively unvegetated, wind scoured transect D''. Mean snow depth along the remaining transects was fairly consistent, ranging from a high of 69.5 cm to a low of 59.2 cm. During the second snow survey snow depth ranged from 64 cm at both the highest elevation sites (transect A, Figure 3) and protected, relatively flat (transect D' Figure 2) sites to 0 cm at the most exposed, south facing sites (transect D", Figure 2). Snow depth over the remainder of the site averaged 46 cm. In general, the depth of snow at any location was controlled by two factors; 1) vegetation, aspect, and micro-topography that enhanced the capture of wind blown snow, and 2) the degree of protection from incoming solar radiation afforded by vegetation and aspect.

During the first survey there was no significant difference in snow density measurements along the A and B transects. The mean density for all measurements along

these transects was 285 (+/- 60) g/L. Along transects C and D mean snow density was 320 (+/- 81) g/L at shaded sites and 374 (+/-45) g/L at sunny, exposed sites. Higher densities at exposed locations along transects C and D reflect compaction, and the generally warmer temperatures (see below) associated with the initiation of melt. Snow densities measured throughout the site (including exposed areas in C and D) were relatively low, consistent with the formation of depth hoar due to over-winter energy flux from relatively warm ground to cold air and the absence of significant melt. During the second survey snow densities throughout the site had increased markedly, with densities at the lowest elevations and on south and southwest facing slopes above 400 g/L, consistent with the initiation of melt at these sites. Snow density at sites along transects A' and B' ranged from 295 to 375 g/L consistent with compaction and localized melt at more exposed locations.

In late March snow temperatures along transects A, B, and C, ranged from 0° C at the surface to -1.5° C at depth indicating a diurnal melt cycle in the surficial snow which re-froze in deeper layers of the snowpack, but no melt resulting in loss of water from the snowpack. This is consistent with soil samples from these sites which were unsaturated. The snowpack at exposed locations along transects D, D', and D" was isothermal at 0° C and soils were saturated. By late April the snowpack at all except the highest elevation, most protected sites was isothermal at 0° C, consistent with density measurements that indicated melt was beginning. The highest elevation, SE facing sites had accumulated a small amount of water while all other sites had a small decrease in SWE (Table 1). Snow water equivalence (SWE) for the entire site decreased slightly from 97,312 $m^3$ on 23 March to 91,079 $m^3$ on 21 April (Table 2). The decrease in SWE was greatest at the most exposed, lightly vegetated S and SW facing slopes, while higher elevation SE facing slopes increased water content.

Soil moisture in the well developed upper soils (5 to 18 cm, depending on site) before melt ranged from 69% to 82% water holding capacity. It is estimated that the soils at the site could retain a maximum of 2 cm of water before becoming saturated and are not a significant storage reservoir for incoming snowmelt.

Total precipitation input from 1 April through May 31 was 6.4 cm (Figure 3). The majority of this precipitation came in early April, with a few, smaller precipitation events during the remainder of the time period. Only 1.5 cm of precipitation fell between the second snow survey and 31 May. In windy conditions characteristic of this area snow gauges are

thought to over-sample precipitation by as much as 20%. In the absence of wind speed data for this site, and because these values are similar to precipitation at the SNOTEL sites, the measured values are used in this report.

Neither SNOTEL sites recorded precipitation during the last week in March suggesting that the total seasonal water input for the site is equal to the volume of water in the snowpack on the first snow survey plus precipitation inputs through 31 May. This yields a total water input for the site ranging from 9.4 to 30.6 cm, with an area weighted average of 25.9 cm (Table 2). Summing the area SWE measurements with precipitation through 31 May yields an estimated total volume of water input to the site of 128,203 $m^{-3}$ (Table 3).

**Snow Melt and Stream Discharge**

Both the isothermal snowpack in exposed locations identified during the first snow survey and the hydrograph at the French Gulch gauging station identify a melt event during the third week in March (Figure 4). The duration and extent of this melt event can be evaluated using data from the SNOTEL stations at Summit Ranch (elevation 9,300') and Copper Mountain (elevation 10,200') (Figure 5). These locations are close to the site and provide high resolution snowmelt data at sites similar to the lower elevations of the French Gulch catchment and the Wellington-Oro mine site. Both sites indicate the melt event during the third week in March was halted by fresh snow in early April and the seasonal snowpack continued to develop until 21 April at the lower elevation site (Summit Ranch) and until 27 April at the higher site (Copper Mountain) (Figure 5). The snow survey, both SNOTEL sites, and stream discharge all indicate the initiation of snowmelt at the elevation of the Wellington-Oro mine regardless of slope and aspect during this last week of April.

The melt event beginning the third week of March is clearly reflected in the hydrograph of the French Gulch. This melt event was limited primarily to S and SW facing, exposed slopes below 10,200'. Increasing discharge between day 81 and day 91 reflect snowmelt beginning at slightly higher elevation, exposed slopes. The gradual decrease in discharge between day 91 and day 112 (Figure 4) is a result of the combination of fresh snowfall (Figures 3 & 5) increasing the albedo and clouds reducing incoming solar radiation to exposed locations. Snow survey data supports earlier initiation and faster melt at exposed locations. For example, the flat transects D and D' showed no significant decrease (~1 cm) in SWE

during the period even though the SW facing transects A, B, and C at higher elevation lost 2 to 6 cm of water.

During the 31 day period after melt began at exposed locations the increase in discharge over baseflow at the French Gulch gage was 58,284 $m^{-3}$. The loss of water from the snowpack at the site during this period was 6232 $m^{-3}$, and the total water lost from the site (decrease in SWE plus precipitation) was 24,500 $m^{-3}$ (Table 3). In the absence of chemical tracer data the fate of the melt-water from the site during this time is unknown.

Hydrochemical data from the 1996 snowmelt season suggests the flushing of concentrated source water early during the snowmelt period (Figure 6 a & b). During the early portion of melt both zinc and sulfate concentrations were 2 - 2.5 time higher than baseflow concentrations.

Table 1. Snow depth and Snow Water Equivalence (SWE) in the Wellington-Oro snowpack, 1998

| | March 23, 1998 | | | April 21, 1998 | | |
|---|---|---|---|---|---|---|
| Transect | # samples | Snow Depth (cm) | SWE (cm) | # samples | Snow Depth (cm) | SWE (cm) |
| A | 12 | 80.5 (10.9) | 24.2 | 11 | 63.5 (20.3) | 22.2 |
| A' | 13 | 65.3 (10.3) | 18.6 | 14 | 56.5 (18.1) | 19.9 |
| B | 12 | 69.5 (16.4) | 19.8 | 11 | 46.0 (24.0) | 16.2 |
| B' | 12 | 61.3 (11.0) | 18.6 | 14 | 46.1 (14.3) | 19.2 |
| C | 11 | 62.8 (15.6) | 20.1 | 11 | 40.8 (16.3) | 14.4 |
| C' | 13 | 69.3 ( 8.9) | 22.2 | 14 | 51.5 (24.9) | 21.5 |
| C'' | 14 | 59.2 (16.9) | 20.4 | 13 | 51.0 (17.1) | 20.0 |
| D | 14 | 61.1 (13.2) | 20.9 | 11 | 51.7 (10.9) | 19.8 |
| D' | 9 | 69.0 ( 7.3) | 25.8 | 8 | 64.1 (9.6) | 24.6 |
| D'' | 12 | 7.9 ( 9.2) | 3.0 | 10 | 0 | 0 |

Table 3. Snowpack water storage on the two snow survey dates and total precipitation inputs for the snowmelt season.

| Transect | Area (ha)* | March 23 SWE ($m^3$) | April 21 SWE ($m^3$) | Change in SWE ($m^3$) | 4/1 - 4/21 PPT ($m^3$) | 3/23 - 4/21 Water loss ($m^3$) | 4/21 - 5/31 PPT ($m^3$) | Total Water Input ($m^3$) |
|---|---|---|---|---|---|---|---|---|
| A | 4.03 | 9762 | 8956 | - 806 | 1977 | 2783 | 605 | 12345 |
| A' | 5.93 | 11028 | 11798 | +770 | 2905 | 2135 | 889 | 14052 |
| B | 2.69 | 5325 | 4357 | - 968 | 1317 | 2285 | 403 | 7046 |
| B' | 4.83 | 8933 | 9271 | +338 | 2366 | 2028 | 724 | 11686 |
| C | 3.48 | 7003 | 5017 | -1986 | 1707 | 3693 | 522 | 9233 |
| C' | 4.95 | 10991 | 10644 | - 347 | 2426 | 2773 | 742 | 11686 |
| C" | 5.62 | 11528 | 11246 | - 282 | 2755 | 3037 | 844 | 15127 |
| D | 6.23 | 12906 | 12344 | - 562 | 3055 | 3617 | 935 | 16896 |
| D' | 7.09 | 18293 | 17442 | - 851 | 3474 | 4325 | 1064 | 22831 |
| D" | 5.13 | 1540 | 0 | -1540 | 2515 | 4056 | 770 | 4826 |
| SUM | 50 | 97312 | 91079 | - 6232 | 24500 | 30732 | 7500 | 128203 |

* Area of the sub-catchment occupied by these 10 snowpack classes.

Table 2. Total snowmelt season precipitation inputs to the Wellington-Oro mine site, 1998.

| Transect | SWE 23 March | | PPT through 5/31 | | Total | |
|---|---|---|---|---|---|---|
| | (cm) | (inches) | (cm) | (inches) | (cm) | (inches) |
| A | 24.2 | 9.5 | 6.4 | 2.5 | 30.6 | 12 |
| A' | 18.6 | 7.3 | 6.4 | 2.5 | 25.0 | 9.8 |
| B | 19.8 | 7.8 | 6.4 | 2.5 | 26.2 | 10.3 |
| B' | 18.6 | 7.3 | 6.4 | 2.5 | 25.0 | 9.8 |
| C | 20.1 | 7.9 | 6.4 | 2.5 | 26.5 | 10.4 |
| C' | 22.2 | 8.7 | 6.4 | 2.5 | 28.6 | 11.2 |
| C'' | 20.4 | 8.0 | 6.4 | 2.5 | 26.8 | 10.5 |
| D | 20.9 | 8.2 | 6.4 | 2.5 | 27.3 | 10.7 |
| D' | 25.8 | 10.2 | 6.4 | 2.5 | 32.2 | 12.7 |
| D'' | 3.0 | 1.2 | 6.4 | 2.5 | 9.4 | 3.6 |
| Average | | | | | 25.7 | 10.1 |
| Average (corrected for area of snowpack regime)* | | | | | 25.9 | 10.2 |

* The correction was based on the relative area of each snowpack regime found in Table 1.

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**Figure Legends.**

Figure 1. Discharge recorded at French Gulch during the 1996 and 1997 water years. Note approximate doubling of discharge on 10 April 1996 and 29 March 1997 due to low elevation melt. (data from USGS gauging station #09046530 located above the confluence of French Gulch with the Blue River)

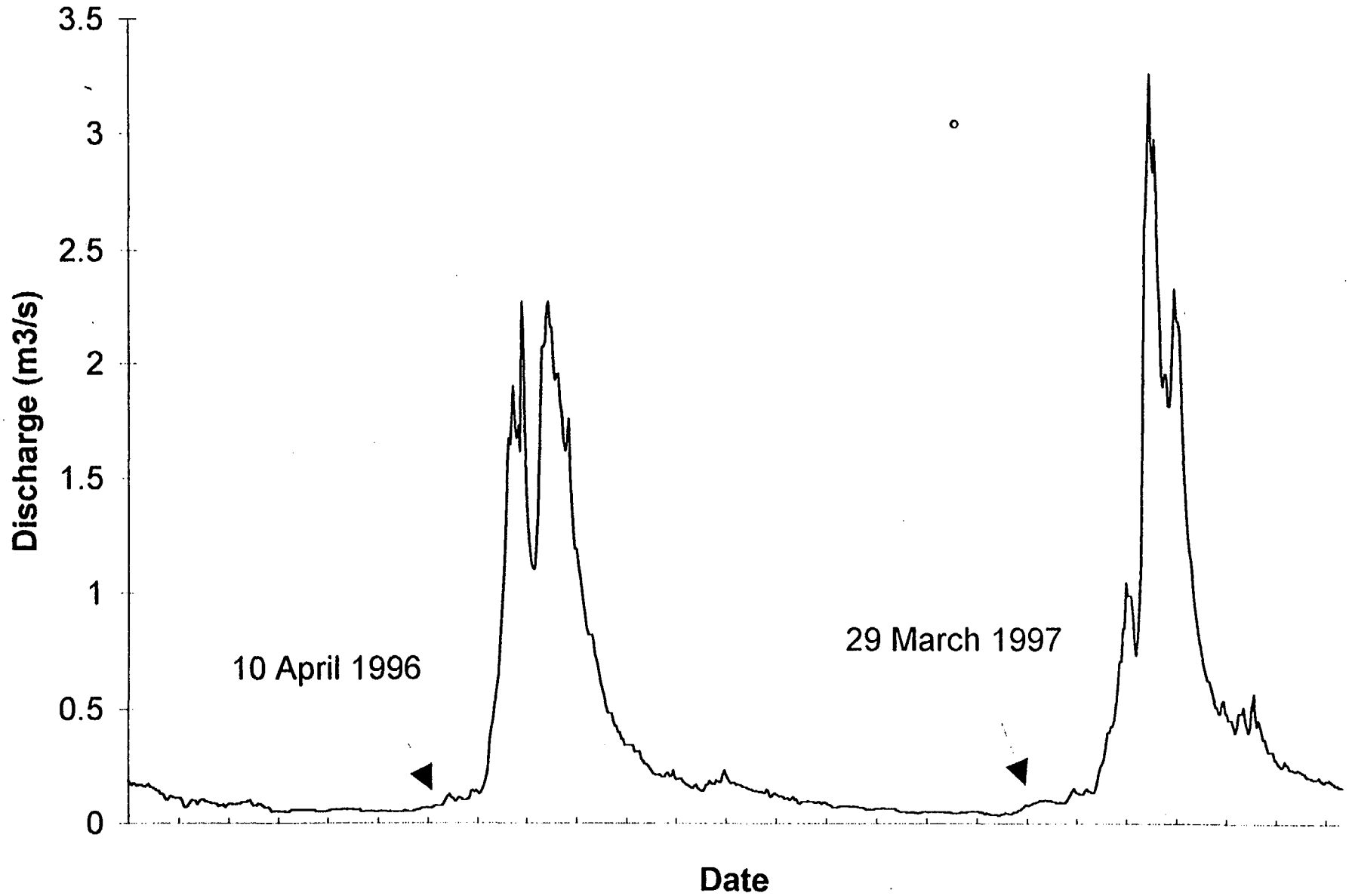
Figure 2. Discharge at the French Gulch gauging station (USGS 09046530) from 1 January through 31 May, 1998. Dates of the snow surveys are noted.

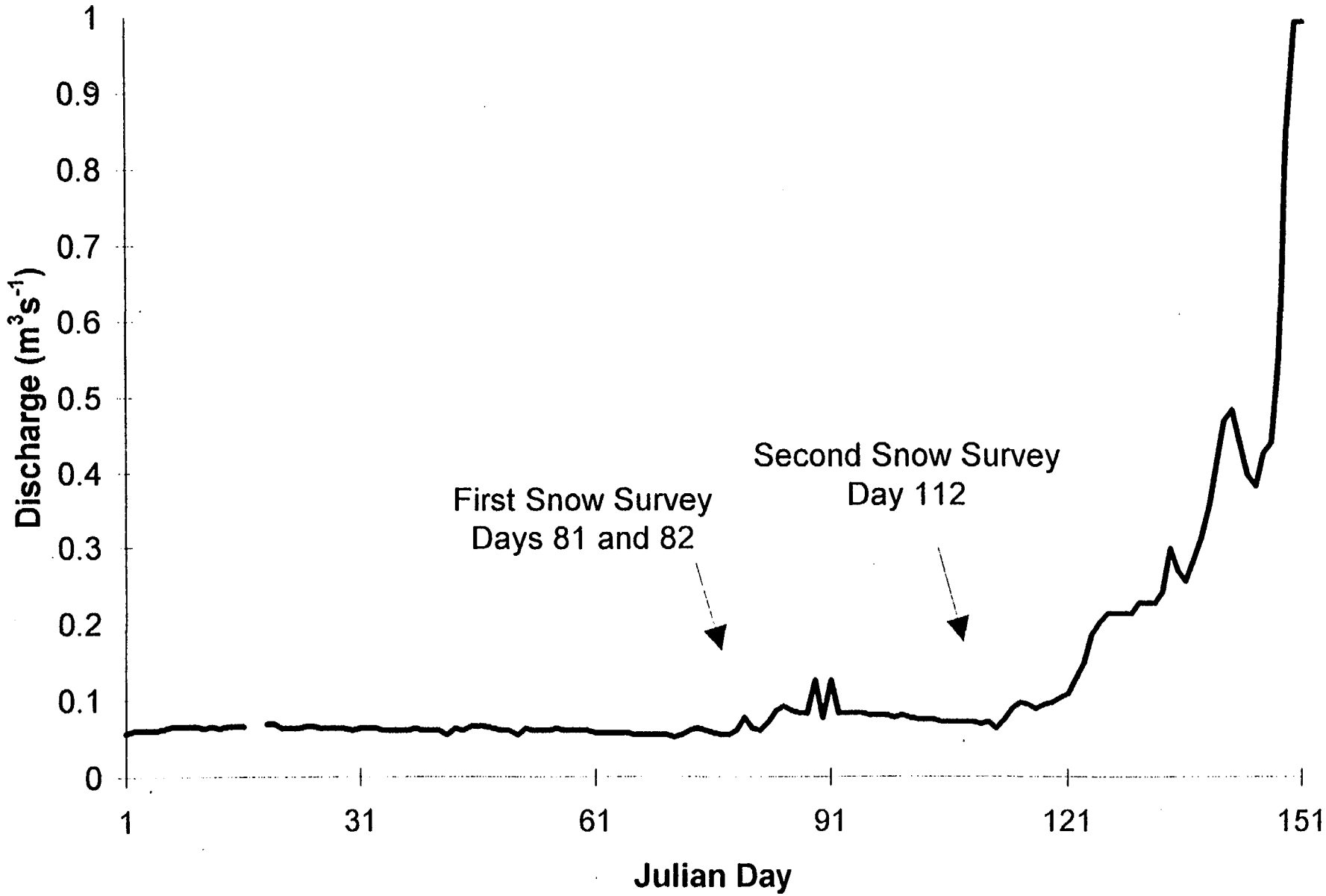
Figure 3. Outline of the Wellington-Oro snow survey site. Transects are represented by dashed lines. Approximate location of snow pits are represented by black boxes. Scale = 72m:1cm

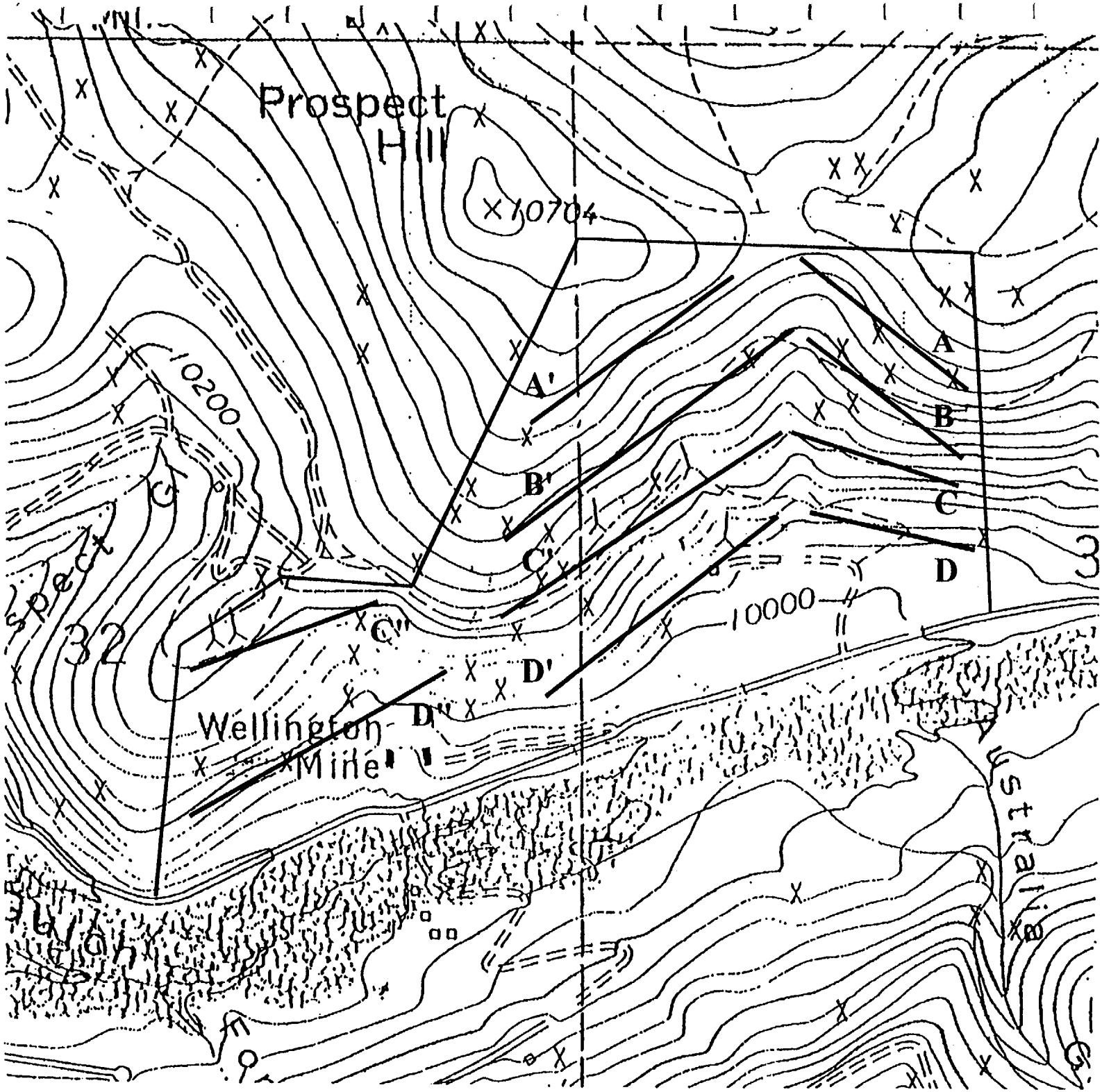
Figure 4. Precipitation inputs at the French Gulch site between 1 April and 31 May, 1998. The bars indicate precipitation between measurement dates (x axis), and line indicates total accumulated precipitation for the period.

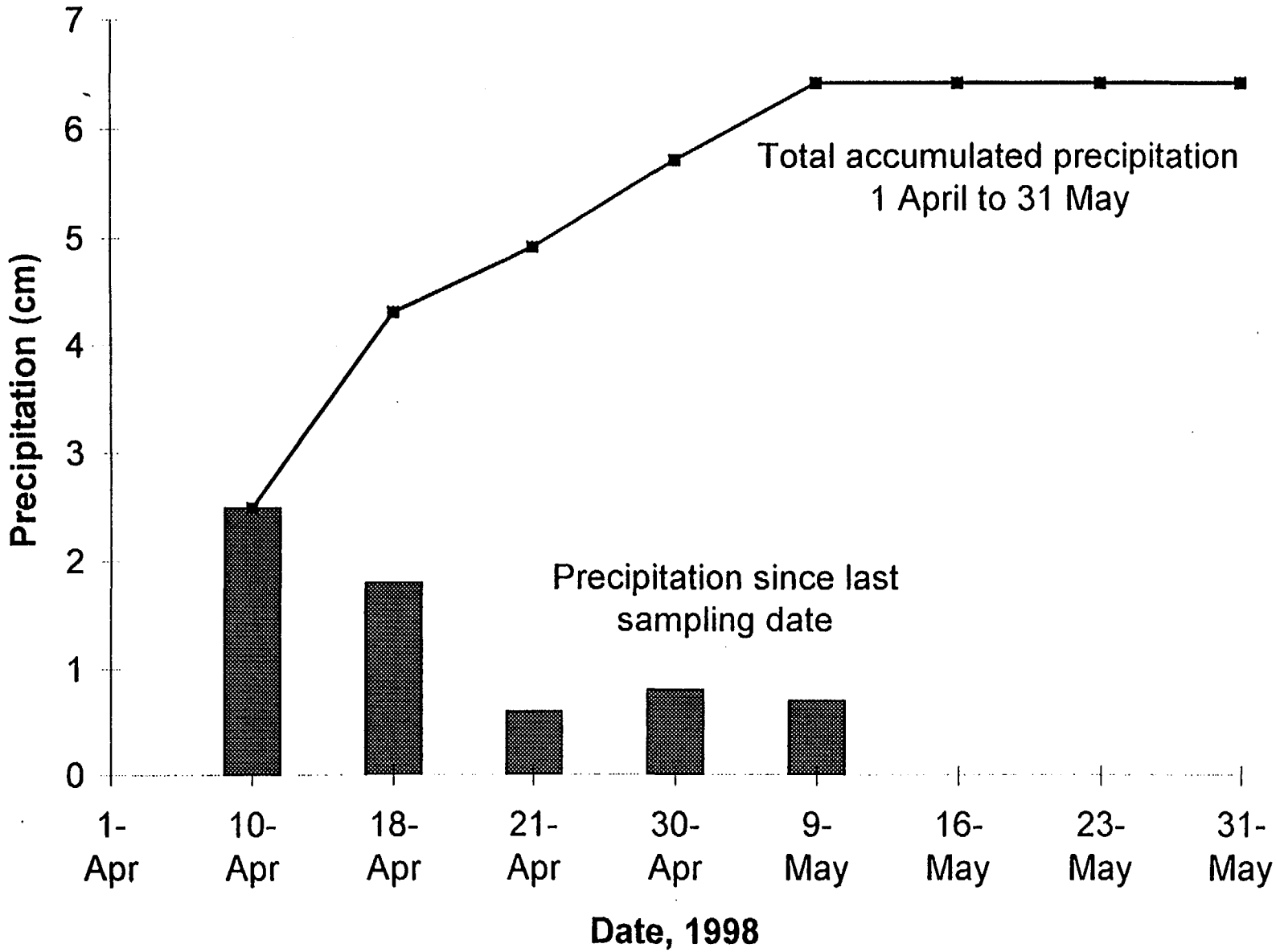
Figure 5. Snow water equivalence at the Summit Ranch and Copper Mountain SNOTEL sites during the spring of 1998. Discharge at the French Gulch gauging station is provided for reference.

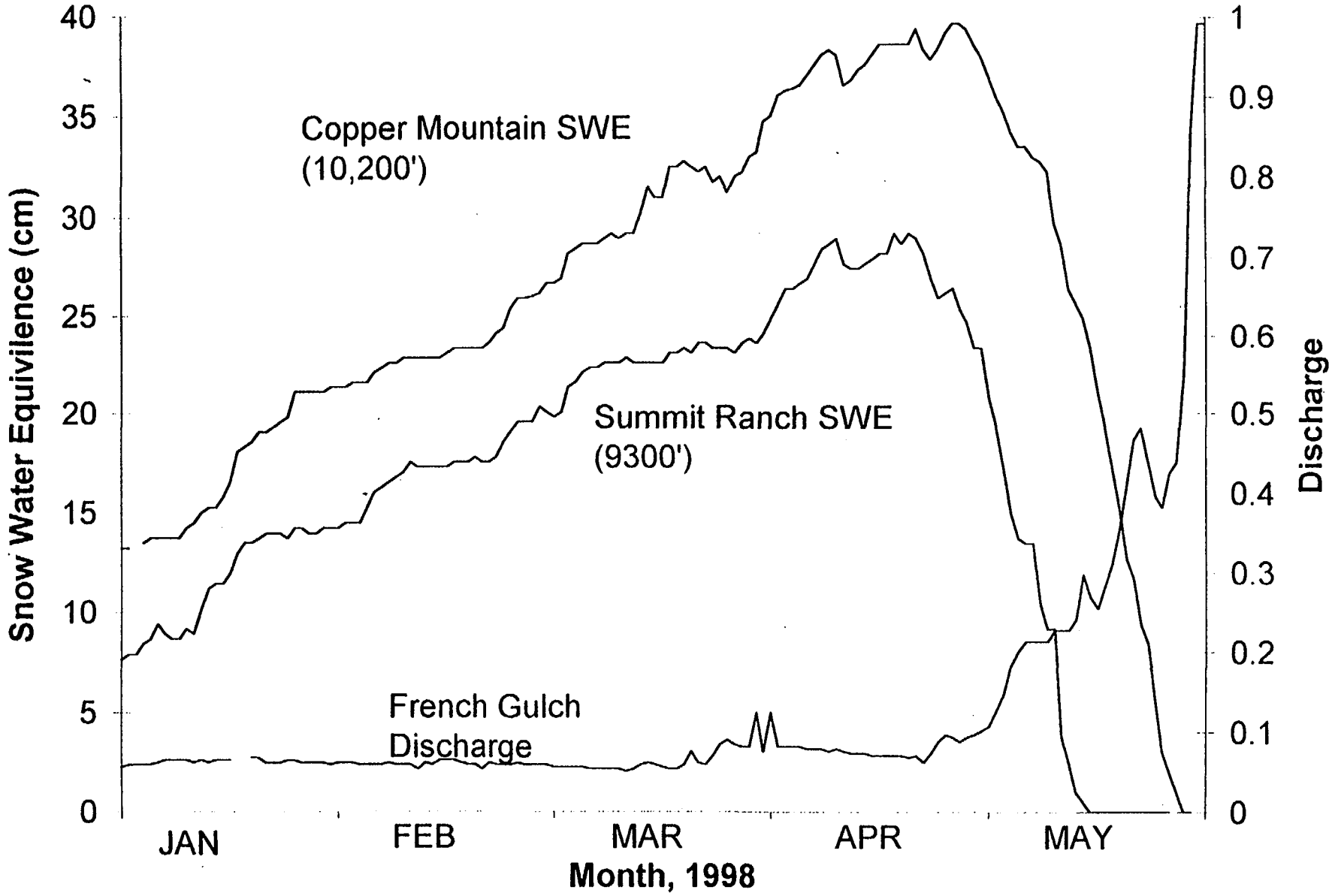
Figure 6. Zinc (a) and sulfate (b) concentrations superimposed on the seasonal hydrograph from French Gulch in 1996.

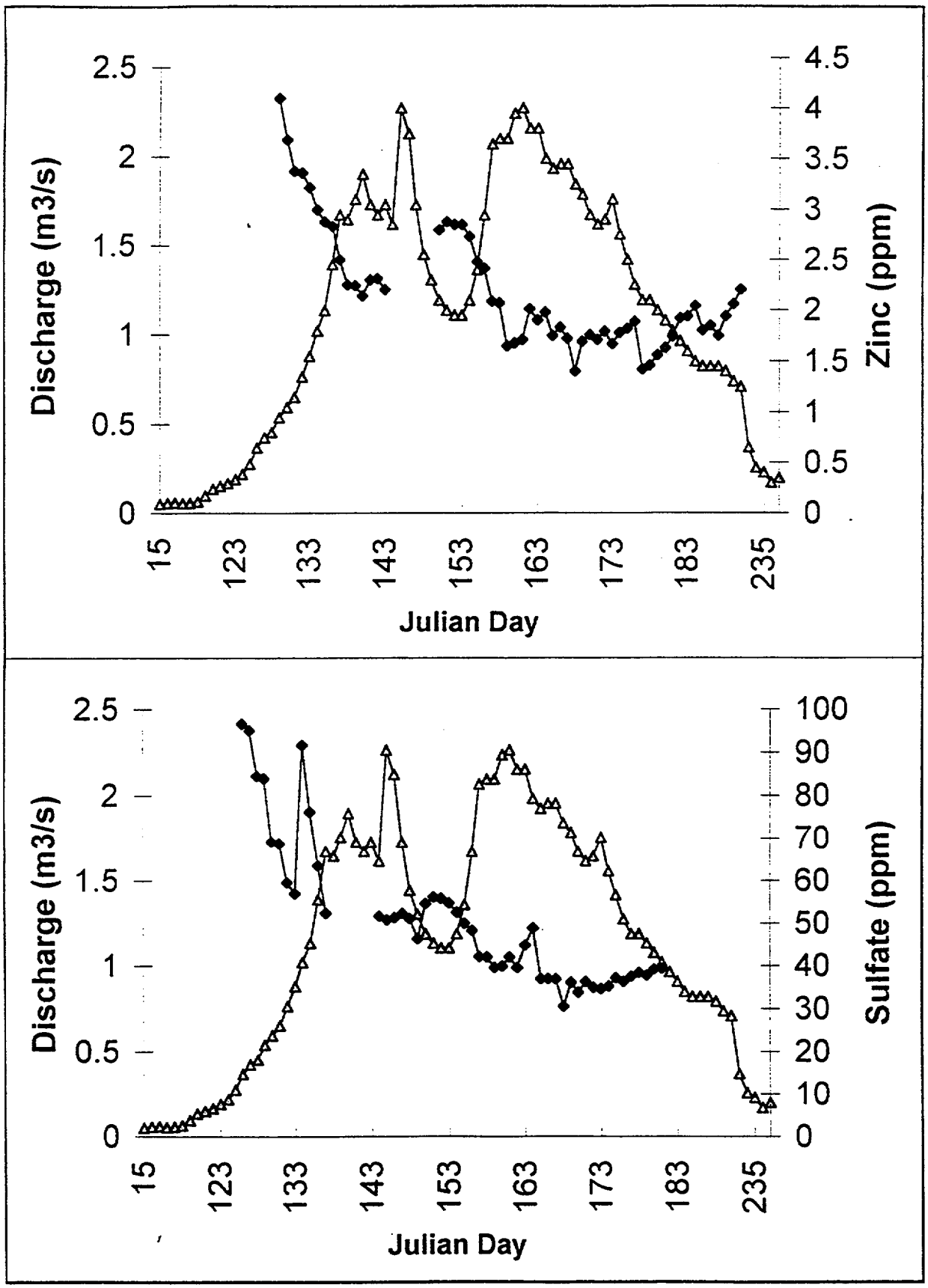

3.5
3
2.5
2
1.5
1
0.5
0
Discharge (m3/s)
10 April 1996
29 March 1997
Date


Discharge ($m^3s^{-1}$)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
First Snow Survey
Days 81 and 82
Second Snow Survey
Day 112
1
31
61
91
121
151
Julian Day


Prospect Hill
10704
10200
10000
A
A'
B
B'
C
C'
C''
D
D'
D''
Wellington Mine
32
3


Precipitation (cm)
7
6
5
4
3
2
1
0
Total accumulated precipitation
1 April to 31 May
Precipitation since last
sampling date
1-
Apr
10-
Apr
18-
Apr
21-
Apr
30-
Apr
9-
May
16-
May
23-
May
31-
May
Date, 1998


Snow Water Equivilence (cm)
40
35
30
25
20
15
10
5
0
Copper Mountain SWE
(10,200')
Summit Ranch SWE
(9300')
French Gulch
Discharge
JAN
FEB
MAR
APR
MAY
Month, 1998
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Discharge


Discharge (m3/s)
2.5
2
1.5
1
0.5
0
Zinc (ppm)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
15
123
133
143
153
163
173
183
235
Julian Day
Discharge (m3/s)
2.5
2
1.5
1
0.5
0
Sulfate (ppm)
100
90
80
70
60
50
40
30
20
10
0
15
123
133
143
153
163
173
183
235
Julian Day