

GEOTHERMAL BRANCH

INTER-OFFICE MEMORANDUM

SUBJECT: Hydrogeochemistry of Esmeralda County, Nevada

DATE: March 16, 1981

cc: A. E. Shenker

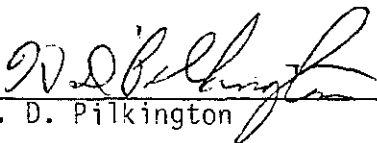
TO: J. E. Deymonaz

FROM: H. H. Pilkington

In order to provide the necessary hydrogeochemical background data for the new Alum District property in Esmeralda County, Nevada, the following analyses have been taken from the AMAX data file (Table I). The geothermometers were all recalculated based upon the equations given by Fournier (1980).

Table II represents data taken from the U.S. Geological Survey Open-File Report 80-672. The water chemistry was done as a part of a lithium resource study on water pumped from test holes drilled in 1979.

Table III represents data taken from a paper by Davis and Vine in the 1979 Basin and Range Symposium (RMAG and UGS).



H. D. Pilkington

HDP/c

attachments

Table I

| | W11048 Rabbit Spring NENE10T3DR42E Esmeralda | W11049 Tognoni Spring SWNE28T2SR43E Nye | W11050 Alkali Spring SENE26T1SR41E Esmeralda | W11051 Willow Spring NWNW1T3SR43E Nye | W11105 Columbus Well 18 T3N R36E Esmeralda | W11108 Crow Springs SENE33T5NR39E Esmeralda |
|---------------------------------|---|--|---|--|---|--|
| Temp (°C) | 17. | 26. | 50. | 22. | 17. | 23. |
| Flow (gpm) | -- | 2. | 25. | 2. | -- | 5. |
| pH | 8.12 | 7.5 | 7.12 | 7.52 | 7.99 | 8.0 |
| Cl | 54.0 | 33.0 | 50.0 | 24.0 | 320.0 | 39.0 |
| F | 0.5 | 0.7 | 7.6 | 0.5 | 1.1 | 2.1 |
| SO ₄ | 52.0 | 560.0 | 450.0 | 39.0 | 800.0 | 120.0 |
| HCO ₃ | 112.0 | 85.6 | 272.2 | 132.0 | 223.6 | 214.6 |
| CO ₃ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| SiO ₂ | 41.0 | 46.0 | 52.0 | 61.0 | -- | 55.0 |
| Na | 47.0 | 67.0 | 310.0 | 48.0 | 400.0 | 170.0 |
| K | 4.6 | 4.8 | 22.0 | 7.5 | 37.0 | 8.8 |
| Ca | 45.0 | 210.0 | 65.0 | 39.0 | 170.0 | 9.0 |
| Mg | 13.0 | 45.0 | 3.2 | 5.9 | 95.0 | 4.3 |
| Li | -- | -- | 1.9 | -- | 0.1 | 0.2 |
| B | 0.3 | 0.4 | 0.9 | 0.4 | 3.4 | 1.6 |
| MO | -- | -- | 5.0 | 4.0 | 40.0 | 10.0 |
| NH ₃ | -- | -- | -- | -- | 0.12 | -- |
| TDS | 369.4 | 1052.5 | 1234.8 | 357.3 | 2050.3 | 624.6 |
| T _q SiO ₂ | 94.7 | 99.2 | 104.1 | 110.7 | -- | 106.4 |
| T _c SiO ₂ | 62.2 | 67.8 | 73.9 | 82.1 | -- | 76.7 |
| TNa-K | 215.2 | 190.0 | 189.3 | 258.5 | 210.4 | 166.4 |
| TNa-K-Ca | 50.4 | 102.5 | 119.7 | 144.0 | --- | 116.2 |

Table I

| | W11109 McLean Spring 22T2NR39E Esmeralda | W11110 Columbus Well NENE17T3NR36E Esmeralda | W11112 Coyote Spring NESW15T25R38E Esmeralda | W11113 Cave Spring NENW2T25R37E Esmeralda | W11114 Water Well NWNWS5T65R43E Esmeralda | W11115 Lida Spring SWSW36T5SR40E Esmeralda |
|---------------------------------|---|---|---|--|--|---|
| Temp (°C) | 28. | 21. | 24. | 17. | 19. | 16.5 |
| Flow (gpm) | 1. | -- | 4. | 10. | -- | 1. |
| pH | 7.8 | 7.9 | 7.62 | 8.4 | 7.89 | 8.75 |
| Cl | 170.0 | 1000.0 | 59.0 | 15.0 | 28.0 | 21.0 |
| F | 6.0 | 2.1 | 0.4 | 0.3 | 1.0 | 0.0 |
| SO ₄ | 200.0 | 120.0 | -- | 80.0 | 56.0 | 90.0 |
| HCO ₃ | 424.2 | 276.2 | 147.8 | 71.8 | 195.6 | 122.2 |
| CO ₃ | 0.0 | 0.0 | 0.0 | 2.4 | 0.0 | 20.0 |
| SiO ₂ | 46.0 | 59.0 | 21.0 | 31.0 | 62.0 | 46.0 |
| Na | 410.0 | 940.0 | 65.0 | 71.0 | 76.0 | 27.0 |
| K | 14.0 | 38.0 | 3.4 | 2.0 | 11.0 | 4.6 |
| Ca | 9.0 | 60.0 | 290.0 | 11.0 | 30.0 | 38.0 |
| Mg | 1.2 | 17.0 | 27.0 | 0.0 | 11.0 | 25.0 |
| Li | 0.1 | 1.4 | -- | 0.2 | 0.2 | 0.0 |
| B | 2.6 | 17.0 | 0.4 | 0.0 | 1.1 | 0.0 |
| MO | 100.0 | 30.0 | 2.0 | 0.0 | 10.0 | 0.0 |
| NH ₃ | 0.24 | 0.4 | 0.13 | 0.0 | 0.0 | 0.0 |
| TDS | 1283.3 | 2531.1 | 614.1 | 284.7 | 471.9 | 393.9 |
| T _q SiO ₂ | 99.2 | 109.3 | 70.6 | 84.2 | 111.14 | 99.2 |
| T _c SiO ₂ | 67.8 | 80.4 | 33.3 | 49.5 | 83.0 | 67.8 |
| TNa-K | 139.4 | 150.0 | 167.1 | 128.1 | 250.9 | 267.4 |
| TNa-K-Ca | 105.7 | 105.4 | 89.1 | 87.1 | 146.1 | 143.8 |

Table I

| | W11116 Cedar Spring SWSW36T5SR40E Esmeralda | W11119 Rhyolite Ridge Spr. NWSW1T2SR37E Esmeralda | W11122 North Spring SWSW29T1SR38E Esmeralda | W11123 Tailings Pond Well SENE17T2SR40E Esmeralda | W11139 Sand Spring NENE34T1NR34E Esmeralda | W11140 Rhyolite Ridge Test Well SW15T1SR36E Esmeralda |
|---------------------------------|--|--|--|--|---|--|
| Temp (°C) | 19. | 15. | 15. | 22. | 18. | 38 |
| Flow (gpm) | 1. | 11. | 2. | -- | 10. | 1600. |
| pH | 7.55 | 7.55 | 7.02 | 6.70 | 7.78 | 9.08 |
| Cl | 55.0 | 57.0 | 31.0 | 46,000.0 | 5.6 | 290.0 |
| F | 0.2 | 0.3 | 0.4 | 1.6 | 0.2 | 2.4 |
| SO ₄ | 74.0 | --- | 46.0 | 2100.0 | 24.0 | 60.0 |
| HCO ₃ | 198.0 | 169.8 | 76.0 | 587.6 | 39.6 | 193.4 |
| CO ₃ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 56.0 |
| SiO ₂ | 19.0 | 49.0 | 77.0 | 70.0 | 64.0 | 62.0 |
| Na | 28.0 | 75.0 | 76.0 | 290,000.0 | 29.0 | 320.0 |
| K | 1.8 | 6.1 | 1.6 | 280.0 | 2.0 | 30.0 |
| Ca | 85.0 | 48.0 | 1.0 | 60.0 | 1.0 | 5.0 |
| Mg | 32.0 | 10.0 | 1.0 | 290.0 | 0.0 | 0.9 |
| Li | 0.0 | 0.1 | 0.1 | 120.0 | 0.0 | 0.8 |
| B | 0.0 | 0.7 | 0.4 | 49.0 | 0.0 | 4.8 |
| MO | 0.0 | 8.0 | 0.0 | 0.0 | 0.0 | 10.0 |
| NH ₃ | 0.0 | 0.0 | 0.0 | 2.21 | 0.0 | 0.24 |
| TDS | 493.0 | 416.0 | 310.6 | 339,560.4 | 165.4 | 1025.5 |
| T _q SiO ₂ | 57. | 102. | 121. | 117. | 113. | 111. |
| T _c SiO ₂ | 29. | 71. | 95. | 90. | 85. | 83. |
| TNa-K | 182. | 200. | 112. | 3. | 187. | 212. |
| TNa-K-Ca | 99. | 118. | 91. | 23. | 131. | 151. |

Table I

| | W11141 Spring NWNW17T1SR34E Esmeralda | W11142 Well 21T2SR35E Esmeralda | W11143 Circle L Ranch Well SWNE33T2SR35E Esmeralda | W11144 Fish Warm Lake 26T2SR35E Esmeralda | W11145 Warm Spring SW24T25SR35E Esmeralda | W11146 Dyer Well 7T4SR36E Esmeralda |
|---------------------------------|--|--|---|--|--|--|
| Temp (°C) | 18. | 18. | 18. | 23. | 22. | 26 |
| Flow (gpm) | 1. | -- | -- | -- | 1. | -- |
| pH | 8.12 | 8.20 | 7.79 | 8.59 | 8.70 | 8.04 |
| Cl | 3.6 | 3.6 | 2.0 | 7.6 | 5.1 | 12.0 |
| F | 0.2 | 0.5 | 0.2 | 1.4 | 1.5 | 0.4 |
| SO ₄ | 12.0 | 29.0 | 21.0 | 37.0 | 44.0 | -- |
| HCO ₃ | 149.8 | 110.8 | 96.8 | 129.6 | 102.2 | 165.0 |
| CO ₃ | 0.0 | 0.0 | 0.0 | 8.4 | 5.2 | 0.0 |
| SiO ₂ | 38.0 | 24.0 | 24.0 | 60.0 | 43.0 | 53.0 |
| Na | 11.0 | 8.3 | 5.6 | 58.0 | 41.0 | 23.0 |
| K | 3.7 | 4.6 | 3.5 | 7.9 | 6.9 | 8.2 |
| Ca | 60.0 | 32.0 | 31.0 | 13.0 | 21.0 | 70.0 |
| Mg | 6.0 | 10.0 | 6.7 | 3.8 | 5.0 | 5.0 |
| Li | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |
| B | 0.0 | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 |
| MO | 0.0 | 0.0 | 20.0 | 40.0 | 4.0 | 4.0 |
| NH ₃ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TDS | 284.3 | 222.8 | 190.8 | 327.2 | 274.9 | 336.6 |
| T _q SiO ₂ | 92. | 75. | 75. | 110. | 97. | 105. |
| T _c SiO ₂ | 59. | 39. | 39. | 81. | 65. | 75. |
| TNa-K | 349. | 427. | 448. | 245. | 266. | 357. |
| TNa-K-Ca | 166. | 196. | 199. | 148. | 151. | 174. |

Table I

| | W11147 Water Well NE26T2SR35E Esmeralda | W11148 Fluch Well 9T2SR35E Esmeralda | W11149 Artesian Well NW20T1SR36E Esmeralda | W11150 Duval Well 28T1SR35E Esmeralda | W11159 Water Well 9T4SR36E Esmeralda | W11160 Water Well SWSW15T4SR36E Esmeralda |
|---------------------------------|--|---|---|--|---|--|
| Temp (°C) | 18. | 25. | 25. | 18. | 16. | 19. |
| Flow (gpm) | -- | -- | 500. | -- | -- | -- |
| pH | 7.62 | 7.76 | 6.85 | 6.92 | 7.95 | 7.98 |
| Cl | 8.7 | 8.2 | 64.0 | 2.0 | 5.1 | 95.0 |
| F | 2.6 | 0.6 | 4.5 | 0.3 | 0.5 | 0.6 |
| SO ₄ | 72.0 | 40.0 | 110.0 | 0.0 | 0.0 | 0.0 |
| HCO ₃ | 263.6 | 234.0 | 472.8 | 42.0 | 182.0 | 160.6 |
| CO ₃ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| SiO ₂ | 31.0 | 47.0 | 110.0 | 25.0 | 69.0 | 68.0 |
| Na | 56.0 | 11.0 | 250.0 | 5.3 | 15.0 | 25.0 |
| K | 5.8 | 4.6 | 20.0 | 1.2 | 5.5 | 4.9 |
| Ca | 75.0 | 85.0 | 59.0 | 10.0 | 40.0 | 34.0 |
| Mg | 18.0 | 19.0 | 6.9 | 1.0 | 12.0 | 7.2 |
| Li | 0.1 | 0.0 | 1.2 | 0.0 | 0.0 | 0.0 |
| B | 0.0 | 0.0 | 1.7 | 0.0 | 0.0 | 0.0 |
| MO | 20.0 | 10.0 | 30.0 | 6.0 | 8.0 | 20.0 |
| NH ₃ | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 |
| TDS | 532.8 | 449.4 | 1096.2 | 87.8 | 329.2 | 395.4 |
| T _q SiO ₂ | 84. | 100. | 137. | 78. | 116. | 115. |
| T _c SiO ₂ | 50. | 69. | 117. | 42. | 89. | 88. |
| TNa-K | 220. | 381. | 199. | 299. | 154. | 749. |
| TNa-K-Ca | 123. | 174. | 124. | 155. | 177. | 56. |

Table I

| | W11161 Water Well SENE15T4SR36E Esmeralda | W11162 Water Well 8T5SR37E Mono, CA | W11163 Water Well SWSW23T4SR36E Esmeralda | W11164 Water Well NENE22T4SR36E Esmeralda | W11168 Pigeon Spring NESE17T6SR39E Esmeralda | W11169 Kline Spring SWSE14T6SR39E Esmeralda |
|---------------------------------|--|--|--|--|---|--|
| Temp (°C) | 15. | 20. | 16. | 15. | 15. | 14. |
| Flow (gpm) | -- | -- | -- | -- | 3. | 5. |
| pH | 6.99 | 7.8 | 7.9 | 7.85 | 7.77 | 7.65 |
| Cl | 2.6 | 20.0 | 18.0 | 5.6 | 15.0 | 12.0 |
| F | 0.2 | 0.2 | 1.2 | 0.9 | 0.1 | 0.0 |
| SO ₄ | 320.0 | 0.0 | 44.0 | 17.0 | 32.0 | 22.0 |
| HCO ₃ | 663.6 | 235.2 | 173.6 | 176.0 | 179.0 | 209.6 |
| CO ₃ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| SiO ₂ | 71.0 | 43.0 | 64.0 | 66.0 | 26.0 | 26.0 |
| Na | 230.0 | 22.0 | 37.0 | 29.0 | 17.0 | 20.0 |
| K | 11.0 | 5.7 | 5.8 | 5.5 | 2.5 | 1.0 |
| Ca | 220.0 | 46.0 | 42.0 | 36.0 | 46.0 | 70.0 |
| Mg | 60.0 | 21.0 | 15.0 | 12.0 | 22.0 | 15.0 |
| Li | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 |
| B | 6.8 | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 |
| MO | 10.0 | 2.0 | 20.0 | 10.0 | 0.0 | 0.0 |
| NH ₃ | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TDS | 1585.3 | 393.1 | 401.1 | 348.1 | 339.6 | 375.6 |
| T _q SiO ₂ | 117. | 97. | 113. | 114. | 78. | 78. |
| T _c SiO ₂ | 90. | 65. | 85. | 86. | 42. | 42. |
| TNa-K | 161. | 315. | 259. | 279. | 252. | 164. |
| TNa-K-Ca | 95. | 161. | 150. | 150. | 132. | 89. |

Table I

| | W11170 Railroad Spr. T4SR41 1/2E Esmeralda | W11171 Indian Spring NENE13T6SR39E Esmeralda | W11637 Dyer School Spr. 3T3SR35E Esmeralda | W11638 Buster Creek Spr. 11T3SR35E Esmeralda | W11639 Water Well 17T3NR36E Esmeralda | W11640 Desert Well NESE31T3N39E Esmeralda |
|---------------------------------|---|---|---|---|--|--|
| Temp (°C) | 17. | 22. | 21. | 16. | 21. | 16. |
| Flow (gpm) | 1. | -- | 100. | -- | 1500. | -- |
| pH | 74. | 9.70 | 8.18 | 7.65 | 7.70 | 7.69 |
| Cl | 75.0 | 18.0 | 5.0 | 12.0 | 1000.0 | 24.0 |
| F | 0.2 | 0.1 | 1.1 | 1.3 | 4.2 | 1.6 |
| SO ₄ | 70.0 | 14.0 | 65.0 | 180.0 | 800.0 | 90.0 |
| HCO ₃ | 133.0 | 46.4 | 107.0 | 255.0 | 261.0 | 140.0 |
| CO ₃ | 0.0 | 40.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| SiO ₂ | 47.0 | 7.0 | 20.0 | 28.0 | 55.0 | 81.0 |
| Na | 45.0 | 34.0 | 38.0 | 42.0 | 1200.0 | 80.0 |
| K | 5.3 | 1.5 | 5.0 | 7.7 | 45.0 | 18.0 |
| Ca | 90.0 | 13.0 | 26.0 | 100.0 | 74.0 | 25.0 |
| Mg | 14.0 | 7.7 | 9.0 | 36.0 | 43.0 | 3.0 |
| Li | 0.0 | 0.0 | 0.0 | 0.1 | 1.2 | 0.2 |
| B | 0.2 | 0.0 | 0.0 | 0.0 | 16.0 | 0.7 |
| MO | 0.0 | 0.0 | 30.0 | 10.0 | 30.0 | 8.0 |
| NH ₃ | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 |
| TDS | 479.7 | 181.8 | 276.1 | 662.1 | 3499.4 | 463.6 |
| T _q SiO ₂ | 100. | 37. | 69. | 81. | 106. | 123. |
| T _c SiO ₂ | 69. | -- | 31. | 45. | 77. | 98. |
| TNa-K | 237. | 156. | 242. | 275. | 145. | 298. |
| TNa-K-Ca | 125. | 98. | 138. | 143. | 103. | 170. |

Table I

| | W11644 Batra Spring SWSE32T2NR36E Esmeralda | W11645 Gap Well SESE32T2NR36E Esmeralda | W11646 Rhyolite Ridge Well NE30T1SR37E Esmeralda | W11648 Devils Gate Well SW28T3NR38E Esmeralda | W11649 Gilbert Spring SW15T4NR38E Esmeralda | W11650 Cholla Spring NW26T2NR40E Esmeralda |
|---------------------------------|--|--|---|--|--|---|
| Temp (°C) | 18. | 8. | 22. | 16. | 16. | 17. |
| Flow (gpm) | -- | -- | -- | 2. | 2. | 5. |
| pH | 7.02 | 8.50 | 8.02 | 7.51 | 7.48 | 7.10 |
| Cl | 800.0 | 2200.0 | 22.0 | 74.0 | 160.0 | 42.0 |
| F | 4.8 | 12.0 | 0.6 | 8.6 | 7.2 | 3.5 |
| SO ₄ | 1000.0 | 1200.0 | 90.0 | 48.0 | 130.0 | 42.0 |
| HCO ₃ | 641.0 | 612.0 | 139.0 | 363.0 | 271.0 | 190.0 |
| CO ₃ | 0.0 | 72.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| SiO ₂ | 20.0 | 43.0 | 45.0 | 42.0 | 45.0 | 45.0 |
| Na | 850.0 | 2700.0 | 88.0 | 140.0 | 210.0 | 39.0 |
| K | 69.0 | 160.0 | 5.1 | 0.6 | 4.1 | 2.2 |
| Ca | 120.0 | 48.0 | 25.0 | 69.0 | 80.0 | 80.0 |
| Mg | 44.0 | 72.0 | 5.0 | 20.0 | 19.0 | 19.0 |
| Li | 2.2 | 5.4 | 0.2 | 0.1 | 0.1 | 0.0 |
| B | 11.0 | 38.0 | 4.6 | 1.1 | 1.2 | 0.0 |
| MO | 30.0 | 20.0 | 7.0 | 2.0 | 10.0 | 0.8 |
| NH ₃ | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TDS | 3562.2 | 7162.4 | 424.5 | 765.4 | 927.6 | 463.5 |
| T _q SiO ₂ | 69. | 97. | 98. | 96. | 98. | 98. |
| T _c SiO ₂ | 31. | 65. | 67. | 63. | 67. | 67. |
| TNa-K | 200. | 176. | 174. | 43. | 108. | 172. |
| TNa-K-Ca | 128. | 129. | 110. | 28. | 31. | 96. |

Table I

| | W11651 Klondike Well SESE33T1NR42E Esmeralda | W11653 Water Well NENW1T5SR36E Mono, CA | W11654 Oasis Well SENW20T5SR37E Esmeralda | W11660 King Spring NE35T2NR42E Esmeralda |
|---------------------------------|---|--|--|---|
| Temp (°C) | 22. | 19. | 17. | 13. |
| Flow (gpm) | 0. | 0. | 0. | 0. |
| pH | 8.13 | 8.00 | 7.35 | 7.50 |
| Cl | 70.0 | 6.0 | 16.0 | 51.0 |
| F | 7.4 | 1.4 | 3.7 | 0.8 |
| SO ₄ | 90.0 | 18.0 | 0.0 | 35.0 |
| HCO ₃ | 116.0 | 158.0 | 246.0 | 286.0 |
| CO ₃ | 0.0 | 0.0 | 0.0 | 0.0 |
| SiO ₂ | 57.0 | 41.0 | 65.0 | 36.0 |
| Na | 82.0 | 38.0 | 20.0 | 100.0 |
| K | 18.0 | 4.3 | 5.0 | 1.7 |
| Ca | 34.0 | 34.0 | 67.0 | 75.0 |
| Mg | 7.0 | 4.0 | 10.0 | 4.0 |
| Li | 0.2 | 0.1 | 0.1 | 0.1 |
| B | 0.8 | 0.5 | 2.0 | 0.8 |
| MO | 5.0 | 0.0 | 0.0 | 0.0 |
| NH ₃ | 0.0 | 0.0 | 0.0 | 0.4 |
| TDS | 482.4 | 305.3 | 436.7 | 590.8 |
| T _q SiO ₂ | 108. | 95. | 113. | 90. |
| T _c SiO ₂ | 79. | 62. | 86. | 56. |
| TNa-K | 295. | 228. | 311. | 101. |
| TNa-K-Ca | 166. | 129. | 155. | 63. |

Table I

| | W11661 Zuma Well SE2T3SR41E Esmeralda | W11662 Warm Spring SWSE4T7SR40E Esmeralda | W11663 Blucher Spr. SE35T5SR40E Esmeralda | W11664 Blue Dick Spr. SE33T5SR40E Esmeralda |
|---------------------------------|--|--|--|--|
| Temp (°C) | 11. | 20. | 20. | 14. |
| Flow (gpm) | 0. | 2. | 0. | 2. |
| pH | 7.25 | 7.91 | 7.82 | 7.59 |
| Cl | 29.0 | 40.0 | 32.0 | 16.0 |
| F | 0.3 | 0.2 | 0.1 | 0.0 |
| SO ₄ | 160.0 | 95.0 | 60.0 | 39.0 |
| HCO ₃ | 252.0 | 226.0 | 210.0 | 250.0 |
| CO ₃ | 0.0 | 0.0 | 0.0 | --- |
| SiO ₂ | 28.0 | 38.0 | 28.0 | 23.0 |
| Na | 39.0 | 42.0 | 26.0 | 22.0 |
| K | 2.3 | 1.0 | 1.7 | 1.5 |
| Ca | 110.0 | 90.0 | 70.0 | 57.0 |
| Mg | 27.0 | 16.0 | 28.0 | 34.0 |
| Li | 0.0 | 0.0 | 0.0 | 0.0 |
| B | 0.0 | 0.0 | 0.0 | 0.0 |
| MO | 0.0 | 3.0 | 0.0 | 0.0 |
| NH ₃ | 0.2 | 0.0 | 0.0 | 0.0 |
| TDS | 647.8 | 548.2 | 455.8 | 442.6 |
| T _q SiO ₂ | 81. | 92. | 81. | 74. |
| T _c SiO ₂ | 45. | 59. | 45. | 37. |
| TNa-K | 176. | 119. | 183. | 191. |
| TNa-K-Ca | 96. | 77. | 100. | 104. |

Table II

| | X10000 Fish Lake DH11a(115') NWNW28T1SR36E Esmeralda | X10001 Fish Lake DH11a(155') NWNW28T1SR36E Esmeralda | X10002 Fish Lake DH11(155') NENW28T1SR36E Esmeralda | X10003 Fish Lake DH11a(435') NWNW28T1SR36E Esmeralda | X10004 Fish Lake DH11a(435') NWNW28T1SR36E Esmeralda | X10005 Fish Lake DH12a(115') NWNW11T1SR36E Esmeralda |
|---------------------------------|---|---|--|---|---|---|
| Temp (°C) | 17. | 18. | 16. | 19. | 19. | 18. |
| Flow (gpm) | | | | | | |
| pH | 7.80 | 7.70 | 8.10 | 7.9 | 8.3 | 7.7 |
| Cl | 1600.0 | 7900.0 | 130.0 | 420.0 | 52.0 | 2200.0 |
| F | 2.0 | 4.0 | 3.3 | 1.3 | 3.6 | 0.7 |
| SO ₄ | 130.0 | 400.0 | 130.0 | 70.0 | 51.0 | 170.0 |
| HCO ₃ | --- | --- | --- | --- | --- | --- |
| CO ₃ | --- | --- | --- | --- | --- | --- |
| SiO ₂ | 49.0 | 38.0 | 58.0 | 58.0 | 72.0 | 58.0 |
| Na | 900.0 | 4700.0 | 210.0 | 300.0 | 220.0 | 1200.0 |
| K | 85.0 | 240.0 | 14.0 | 30.0 | 14.0 | 100.0 |
| Ca | 130.0 | 290.0 | 12.0 | 61.0 | 12.0 | 230.0 |
| Mg | 34.0 | 100.0 | 1.8 | 12.0 | 6.7 | 50.0 |
| Li | 4.5 | 21.0 | 0.03 | 0.94 | 0.16 | 5.7 |
| B | 4.9 | 10.0 | 1.7 | 1.6 | 3.30 | 4.5 |
| MO | --- | --- | --- | --- | --- | --- |
| NH ₃ | --- | --- | --- | --- | --- | --- |
| TDS | 3050.0 | 13,900.0 | 719.0 | 1060.0 | 676.0 | 4110.0 |
| Ec(k) | 5601.0 | 21,000.0 | 1198.0 | 1782.0 | 963.0 | 7174.0 |
| T _q SiO ₂ | 102. | 92.0 | 109. | 109. | 118. | 109. |
| T _c SiO ₂ | 71. | 59. | 80. | 80. | 91. | 80. |
| TNa-K | 212. | 165. | 185. | 217. | 181. | 202. |
| TNa-K-Ca | 134. | 115. | 126. | 134. | 124. | 127. |

Table II

| | X10006 Fish Lake DH12a(135') NWNE11T1SR36E Esmeralda | X10007 Fish Lake DH12a(155') NWNE11T1SR36E Esmeralda | X10008 Fish Lake DH12a(275') NWNE11T1SR36E Esmeralda | X10009 Big Smokey DH14(135') SESW11T1NR38E Esmeralda | X10010 Big Smokey DH14(195') SESW11T1NR38E Esmeralda | X10011 Alkali Flat DH15 (435') NENW17T1SR41E Esmeralda |
|---------------------------------|---|---|---|---|---|---|
| Temp (°C) | 19. | 18. | 20. | 18. | 21. | 21. |
| Flow (gpm) | | | | | | |
| pH | 8.1 | 7.8 | 7.9 | 8.4 | 8.4 | 8.2 |
| Cl | 340.0 | 330.0 | 280.0 | 420.0 | 490.0 | 310.0 |
| F | 0.8 | 0.4 | 0.5 | 1.9 | 2.7 | 3.5 |
| SO ₄ | 76.0 | 98.0 | 130.0 | 200.0 | 220.0 | 260.0 |
| HCO ₃ | --- | --- | --- | --- | --- | --- |
| CO ₃ | --- | --- | --- | --- | --- | --- |
| SiO ₂ | 65.0 | 69.0 | 63.0 | 82.0 | 78.0 | 44.0 |
| Na | 180.0 | 120.0 | 140.0 | 600.0 | 650.0 | 500.0 |
| K | 31.0 | 21.0 | 25.0 | 58.0 | 58.0 | 16.0 |
| Ca | 79.0 | 65.0 | 100.0 | 13.0 | 12.0 | 2.4 |
| Mg | 15.0 | 11.0 | 23.0 | 6.7 | 7.3 | 1.7 |
| Li | 0.89 | 0.42 | 0.45 | 1.3 | 0.82 | 0.38 |
| B | 6.0 | 4.0 | 4.7 | 11.0 | 14.0 | 3.3 |
| MO | --- | --- | --- | --- | --- | --- |
| NH ₃ | --- | --- | --- | --- | --- | --- |
| TDS | 896.0 | 786.0 | 863.0 | 1750.0 | 1920.0 | 1380.0 |
| Ec(K) | 1528. | 1485. | 1415. | 2750. | 3107. | 2256. |
| T _q SiO ₂ | 113. | 116. | 112. | 124. | 121. | 98. |
| T _c SiO ₂ | 86. | 89. | 85. | 96. | 96. | 66. |
| TNa-K | 269. | 270. | 272. | 214. | 207. | 136. |
| TNa-K-Ca | 153. | 153. | 151. | 150. | 147. | 113. |

Table II

| | X10012 Alkali Flat DH15(675') NENW17T1SR41E Esmeralda | X10013 Alkali Flat DH16(100') NWSW30T1NR41E Esmeralda | X10014 Alkali Flat DH16(315') NWSW30T1NR41E Esmeralda | X10015 Alkali Flat DH16(515') NWSW30T1NR41E Esmeralda | X10016 Stonewall Flat DH1(455') SESW35T45R43E Nye | X10017 Big Smokey DH13(245') NWSW7T2NR39E Esmeralda |
|---------------------------------|--|--|--|--|--|--|
| Temp (°C) | 23. | 20. | 21. | 22. | 24. | 9. |
| Flow (gpm) | | | | | | |
| pH | 8.3 | 7.8 | 8.1 | 8.3 | 8.2 | 8.0 |
| Cl | 160.0 | 220.0 | 61.0 | 65.0 | 50.0 | 210.0 |
| F | 2.7 | 2.7 | 2.1 | 4.2 | 3.3 | 2.7 |
| SO ₄ | 390.0 | 290.0 | 170.0 | 230.0 | 160.0 | 74.0 |
| HCO ₃ | --- | --- | --- | --- | --- | --- |
| CO ₃ | --- | --- | --- | --- | --- | --- |
| SiO ₂ | 57.0 | 31.0 | 73.0 | 84.0 | 57.0 | 74.0 |
| Na | 390.0 | 280.0 | 180.0 | 220.0 | 140.0 | 240.0 |
| K | 15.0 | 32.0 | 19.0 | 20.0 | 15.0 | 15.0 |
| Ca | 4.0 | 49.0 | 14.0 | 12.0 | 60.0 | 10.0 |
| Mg | 1.9 | 5.2 | 1.90 | 2.7 | 0.79 | 0.88 |
| Li | 0.29 | 0.18 | 0.25 | 0.49 | 0.16 | 0.16 |
| B | 1.9 | 5.2 | 1.90 | 2.7 | 0.79 | 0.88 |
| MO | --- | --- | --- | --- | --- | --- |
| NH ₃ | --- | --- | --- | --- | --- | --- |
| TDS | 1200.0 | 1030.0 | 648.0 | 781.0 | 558.0 | 744.0 |
| Ec(K) | 1847. | 1627. | 947. | 1133. | 791. | 1217. |
| T _q SiO ₂ | 108. | 84. | 118. | 125. | 108. | 119. |
| T _c SiO ₂ | 79. | 50. | 92. | 100. | 79. | 93. |
| TNa-K | 147. | 229. | 222. | 209. | 223. | 180. |
| TNa-K-Ca | 115. | 142. | 144. | 140. | 132. | 126. |

Table II

| | X10018 Big Smokey DH13(395') NWSW7T2NR39E Esmeralda | X10019 Big Smokey DH13(495') NWSW7T2NR39E Esmeralda | X10020 Big Smokey DH13(620') NWSW7T2NR39E Esmeralda |
|---------------------------------|--|--|--|
| Temp (°C) | 21. | 22. | 24. |
| Flow (gpm) | | | |
| pH | 7.7 | 8.1 | 8.1 |
| Cl | 640.0 | 26.0 | 300.0 |
| F | 2.4 | 9.7 | 11.0 |
| SO ₄ | 77.0 | 58.0 | 97.0 |
| HCO ₃ | --- | --- | --- |
| CO ₃ | --- | --- | --- |
| SiO ₂ | 71.0 | 85.0 | 86.0 |
| Na | 450.0 | 190.0 | 350.0 |
| K | 39.0 | 7.2 | 10.0 |
| Ca | 26.0 | 7.6 | 3.0 |
| Mg | 6.3 | 1.0 | 0.1 |
| Li | 1.7 | 0.1 | 0.17 |
| B | 2.0 | 2.8 | 4.0 |
| MO | --- | --- | --- |
| NH ₃ | --- | --- | --- |
| TDS | 1430.0 | 586.0 | 1020.0 |
| Ec(K) | 2524. | 823. | 1680. |
| T _q SiO ₂ | 117. | 125. | 126. |
| T _c SiO ₂ | 90. | 101. | 101. |
| TNa-K | 205. | 146. | 129. |
| TNa-K-Ca | 137. | 106. | 105. |

Table III

| | X10021 Clayton Valley DH-1(315') NE12T2SR39E Esmeralda | X10022 Clayton Valley (155') NE6T2SR40E Esmeralda | X10023 Clayton Valley DH-2A(195') 21T1SR40E Esmeralda | X10024 Clayton Valley DH3(415') 23T1SR40E Esmeralda | X10025 Clayton Valley DH4 35T1SR40E Esmeralda |
|---------------------------------|---|--|--|--|--|
| Temp (°C) | 22. | 21. | 38. | 33. | 36. |
| Flow (gpm) | --- | --- | --- | --- | --- |
| pH | 7.8 | 8.0 | 8.0 | 8.0 | 7.8 |
| Cl | 12,000.0 | 11,000.0 | 15,000.0 | 16,000.0 | 21,000.0 |
| F | 1.5 | 2.7 | 4.9 | 2.9 | 1.7 |
| SO ₄ | 500.0 | 590.0 | 510.0 | 860.0 | 1200.0 |
| HCO ₃ | 710.0 | 1000.0 | 32.0 | 660.0 | 640.0 |
| CO ₃ | --- | --- | --- | --- | --- |
| SiO ₂ | 64.0 | 78.0 | 53.0 | 71.0 | 86.0 |
| Na | 7200.0 | 7200.0 | 8400.0 | 10,000.0 | 13,000.0 |
| K | 520.0 | 730.0 | 850.0 | 920.0 | 1300.0 |
| Ca | 450.0 | 150.0 | 240.0 | 320.0 | 270.0 |
| Mg | 180.0 | 92.0 | 30.0 | 87.0 | 78.0 |
| Li | 27.0 | 27.0 | 38.0 | 44.0 | 58.0 |
| B | --- | --- | --- | --- | --- |
| MO | --- | --- | --- | --- | --- |
| NH ₃ | --- | --- | --- | --- | --- |
| TDS | --- | --- | --- | --- | --- |
| Ec(K) | 31,000. | 29,100. | 37,500. | 42,500. | 51,000. |
| T _q SiO ₂ | 113. | 121. | 105. | 117. | 126. |
| T _c SiO ₂ | 85. | 96. | 75. | 90. | 101. |
| TNa-K | 191. | 218. | 218. | 210. | 217. |
| TNa-K-Ca | 129. | 152. | 150. | 144. | 152. |

Table III

| | X10026 Clayton Valley DH5(235') 35T1SR40E Esmeralda | X10027 Clayton Valley DH5A(715') NENW2T2SR40E Esmeralda | X10028 Foote Minerals DH7 NW20T2SR40E Esmeralda | X10029 Hot Spring 26T1SR40E Esmeralda |
|---------------------------------|--|--|--|--|
| Temp (°C) | 22, | 19.5 | 19.4 | 36.5 |
| Flow (gpm) | | | | |
| pH | 8.0 | 7.1 | 7.3 | 7.3 |
| Cl | 10,000.0 | 150,000.0 | 37,000.0 | 14,000.0 |
| F | 1.8 | 0.5 | 0.4 | 4.2 |
| SO ₄ | 550.0 | 6,600.0 | 160.0 | 590.0 |
| HCO ₃ | 580.0 | 650.0 | 151.0 | 609.0 |
| CO ₃ | --- | --- | --- | --- |
| SiO ₂ | 34.0 | 11.0 | 55.0 | 46.0 |
| Na | 6000.0 | 93,000.0 | 20,000.0 | 8,800.0 |
| K | 490.0 | 8000.0 | 2100.0 | 850.0 |
| Ca | 120.0 | 710.0 | 840.0 | 300.0 |
| Mg | 41.0 | 360.0 | 400.0 | 37.0 |
| Li | 26.0 | 320.0 | 89.0 | 34.0 |
| B | --- | --- | --- | --- |
| MO | --- | --- | --- | --- |
| NH ₃ | --- | --- | --- | --- |
| TDS | --- | --- | --- | --- |
| Ec(K) | 27,500. | 260,000. | 75,500. | 37,400. |
| T _q SiO ₂ | 88. | 50. | 106. | 99. |
| T _c SiO ₂ | 54. | 10. | 77. | 68. |
| TNa-K | 200. | 204. | 221. | 214. |
| TNa-K-Ca | 143. | 153. | 149. | 146. |