TECHNICAL REPORT

GREED III PROJ. DE – FC36-04GO14344

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PHASE 2 REESE RIVER GEOTEHRMAL PROJECT
SLIM WELL 56-4 DRILLING AND TESTING

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# TABLE OF CONTENTS

## EXECUTIVE SUMMARY ................................................................. 1

  BACKGROUND ......................................................................... 1
  SUMMARY .............................................................................. 1
  CONCLUSION ........................................................................... 2

## INTRODUCTION ............................................................................ 3

  BACKGROUND ......................................................................... 3
  DRILLING HISTORY ................................................................ 3

## 56-4 BOREHOLE LITHOLOGY ...................................................... 4

## TEMPERATURE LOGING ............................................................. 5

  TEMPERATURE VS PRESSURE ................................................ 5

## GEOCHEMISTRY ......................................................................... 5

  CHEMICAL OVERVIEW .......................................................... 6
  STABLE ISOTOPES .................................................................. 7

## INJECTIVITY TESTING ............................................................... 7

## GEOLOGIC INTERPRETATION .................................................... 7

  GEOLOGIC OVERVIEW ......................................................... 8
  STRATIGRAPHY AND STRUCTURE ........................................... 8
  TERTIARY SEDIMENTS ............................................................ 9
    RR 56-4 .............................................................................. 9
    RR 13-4 .............................................................................. 9
      Structural Significance ...................................................... 9
      Geothermal Significance ................................................. 10
  TERTIARY VOLCANICS .......................................................... 11
    RR 56-4 ............................................................................. 11
    RR 13-4 ............................................................................. 11
      Structural Significance .................................................... 11
      Geothermal Significance ................................................. 11
    RR 56-4 ............................................................................. 11
    RR 13-4 ............................................................................. 11
      Structural Significance .................................................... 12
      Geothermal Significance ................................................. 12
    RR 56-4 ............................................................................. 12
    RR 13-4 ............................................................................. 12
      Structural Significance .................................................... 13
      Geothermal Significance ................................................. 13

## CONCLUSION .............................................................................. 13

## REFERENCES .............................................................................. 14

## APPENDIX A: WELL SUMMARY REPORT

## APPENDIX B: MUD LOG

## APPENDIX C: TEMPERATURE AND PRESSURE LOGS

## APPENDIX D: WATER CHEMISTRY

## APPENDIX E: INJECTIVITY TESTING

## APPENDIX F: GEOLOGY

EXECUTIVE SUMMARY

Background
In FY 2005, Western Geothermal Partners, LLC (WGP) was awarded GRED III Cooperative Funding Agreement # DE-FC36-04GO14344, from USDOE to evaluate the Reese River geothermal prospect. Cooperative funding for the project was 80% DOE – 20% WGP. In FY 2006, WGP’s interest in the four federal geothermal leases which make up the prospect was acquired by Sierra Geothermal Power, Inc. (SGP) of Olympia, WA. Concurrent with the acquisition of the Reese River prospect, SGP took over WGP’s position as operator of the GRED III agreement.

In FY 2006, prior to the SGP acquisition, WGP completed and submitted a Phase 1 Final Technical Report to DOE. The report discussed the Phase 1 activities conducted under the cooperative funding agreement.

On Feb. 09, 2007, the GRED III funded Reese River 56-4 test well was spudded in Sec. 4, T 23N R 43E. The well reached TD of 1,198 m. on March 17, 2007 and was completed as a temperature observation well on Jan. 07, 2008.

This report is the Phase 2 Final Technical Report for the GRED III project. Since the well did not find commercial temperatures or permeability, the well will not be tested further and there will be no Phase 3 report. In addition to data from well 56-4, stratigraphic data from well RR 13-4, a non GRED III funded well is also used in this report in order to get a better understanding on the geology of the prospect.

Summary
The following highlights from the full report are synopsized here for the reader’s benefit:

- **Drilling History** – Stuck tools at 450 m, resulted in extended fishing operations and an eventual side track around the stuck tools.
- **56-4 Hole Lithology** – 0 to 18 m – Colluvium, 18 to 261 m – Tertiary Lake Beds, 261 to 344 m – Valmy Fm., 344 to 1198 m – Ordovician Carbonates
- **Temperature Logging** – 0 to 230 m – 300ºC/km, 230 to 370 m – 90ºC/km, 370 to 1198m – 50ºC/km. A bottom hole temperature of 124ºC was recorded.
- **Geochemistry** – Chemical geothermometers predict 110ºC to 155ºC for the reservoir temperature. Temperatures of 150ºC were found in RR 13-4.
- **Injectivity Testing** – Values of the injectivity index are in range of 10 l/s/MPa.
- **Geologic Interpretation**

  **Tertiary Sediments**
1. Section has been shortened by normal faulting at 56-4.
2. SE Heat Cell Boundary Fault is probably the main range front fault at the prospect.
3. SE Heat Cell Boundary Fault dips 45 – 50 degrees to the west at interval between 1,700 and 1,400 m of elevation.
4. Main Road and SE Antithetic Faults are antithetic faults, down to west and dip to west.

**Paleozoic Sediments**
1. Roberts Mtn. Thrust is located at Valmy / Carbonate contact.
2. Roberts Mtn. Thrust appears to dip to east at 56-4.

**Intrusive Granodiorite**
1. Granodiorite encountered in well 13-4 at 1,498 to 1580 m (TD).
2. If granodiorite is a sill, then SE Heat Cell Boundary Fault is below TD of 13-4 and the fault would not sole out until depths in the 2,000 to 2,500 m range.

**Geothermal Significance**
1. The abrupt change in geothermal gradient below the Tertiary sediments indicates an outflow aquifer.
2. The source of outflow is east of 56-4, along SE Heat Cell Boundary Fault
3. Major lost circulation zone in 56-4 is located 20 m below Roberts Mountain Thrust and is related to it.
4. Very hot temperatures might be found along SE Heat Cell Boundary Fault at depths below 1,800 m.

**Conclusion**

Well RR 56-4, was not successful in intersecting an exploitable geothermal resource. However, the lack of temperature reversal in the well and the geochemistry information obtained from fluid sampling point towards a large resource of moderate temperature. The encouraging results from 56-4 have lead to continued exploration on the project. The geologic and hydrologic information collected from 56-4 has proved an invaluable aid when combined with data from well 13-4, in interpreting the geothermal development potential of the Reese River Prospect.
INTRODUCTION

Background

In FY 2005, Western Geothermal Partners, LLC (WGP) was awarded GRED III Cooperative Funding Agreement # DE-FC36-04GO14344, from USDOE to evaluate the Reese River geothermal prospect. Cooperative funding for the project was 80% DOE – 20% WGP. In FY 2006, WGP’s interest in the four federal geothermal leases which make up the prospect was acquired by Sierra Geothermal Power, Inc. (SGP) of Olympia, WA. Concurrent with the acquisition of the Reese River prospect, SGP took over WGP’s position as operator of the GRED III agreement.

In FY 2006, prior to the SGP acquisition, WGP completed and submitted a Phase 1 Final Technical Report to DOE. The report discussed the Phase 1 activities conducted under the cooperative funding agreement. These activities included; detailed geologic mapping, geophysical surveys, mercury soil vapor geochemical and vegetation biogeochemical surveys of the prospect. The purpose of the Phase 1 activities, was to site a 1000 m slim hole test well to evaluate the geothermal potential of the prospect.

On Feb. 09, 2007, the GRED III funded Reese River 56-4 test well was spudded in Sec. 4, T 23N R 43E. The well reached TD of 1,198 m on March 17, 2007 and was completed as a temperature observation well on Jan. 07, 2008. The well did not find a resource; consequently, SGP has decided to explore other areas of the lease hold. Further exploration at Reese River has taken place without DOE assistance. However, the geological mapping, geochemical and geophysical studies which were funded under Phase 1 of the GRED III agreement are continually used as a baseline for the entire prospect, when planning and executing additional exploration activities.

This report is the Phase 2 Final Technical Report for the GRED III project. Since the well did not find commercial temperatures or permeability, the well will not be tested further and there will be no Phase 3 report. In addition to data from well 56-4, stratigraphic data from well RR 13-4, a non GRED III funded well is also used in this report in order to get a better understanding on the geology of the prospect.

DRILLING HISTORY

Complete details of well 56-4’s drilling history are presented in Appendix – A. For the most part, the drilling history of well 56-4 can be described as routine. However, the tools got stuck in the hole at a depth of 450 m on Feb. 21, 2007. The period from February 21 through March 1 was spent trying to fish the stuck pipe out of the hole.

On March 1, whip stock equipment arrived on the site from Baker Tools of Bakersfield, CA. A whip stock track was drilled around the fish and on March 3, the hole was ready to resume normal drilling operations. The remaining 767 m of hole (431 to 1,198 m) was finished by March 17.
On January 03, 2008, a 5” slotted liner from 404 to 1,198 m was pulled from the hole by a work over rig and the casing head was re-installed. This operation ended active drilling operations at well 56-4. The following table shows the casing data for the well:

<table>
<thead>
<tr>
<th>Casing</th>
<th>Depth</th>
<th>Hole Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 in conductor – Sch 30</td>
<td>0 – 15 m</td>
<td>17.5 in</td>
</tr>
<tr>
<td>9.625 in - 36 lb/ft</td>
<td>0 – 106 m</td>
<td>12.25 in</td>
</tr>
<tr>
<td>7 in – 23 lb/ft</td>
<td>0 – 448 m</td>
<td>8.5 in</td>
</tr>
<tr>
<td>Open Hole</td>
<td>448 – 1,198 m</td>
<td>6.25 in</td>
</tr>
</tbody>
</table>

**56-4 BOREHOLE LITHOLOGY**

Details of the drill hole lithology can be are attached in Appendix B. In summary, the drill hole encountered the following major lithologies:

<table>
<thead>
<tr>
<th>Lithology</th>
<th>Depth</th>
<th>Formation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loose sand/silt</td>
<td>0 – 18 m</td>
<td>Colluvium – Quaternary</td>
</tr>
<tr>
<td>Siltstone / Shale</td>
<td>18 – 124 m</td>
<td>Lake Beds – Tertiary</td>
</tr>
<tr>
<td>Sandstone, fine</td>
<td>124 – 260 m</td>
<td>Lake Beds – Tertiary</td>
</tr>
<tr>
<td>Grey – Black Shale</td>
<td>260 – 344 m</td>
<td>Valmy Fm. – Ordovician – Upper Plate</td>
</tr>
<tr>
<td>Limestone/Dolomite</td>
<td>344 – 649 m</td>
<td>Carbonates – Ordovician – Lower Plate</td>
</tr>
<tr>
<td>Mixed Carbonates – Qtz/Chert</td>
<td>649 – 687 m</td>
<td>Carbonates – Ordovician – Lower Plate</td>
</tr>
<tr>
<td>Carbonates – Sub Qtz/Chert</td>
<td>687 – 799 m</td>
<td>Carbonates – Ordovician – Lower Plate</td>
</tr>
<tr>
<td>Qtz/Chert – Carbonates</td>
<td>799 – 884 m</td>
<td>Carbonates – Ordovician – Lower Plate</td>
</tr>
<tr>
<td>Carbonates – Sub Qtz/Chert</td>
<td>884 – 1,198 m</td>
<td>Carbonates – Ordovician – Lower Plate</td>
</tr>
</tbody>
</table>
Lithology & Depth & Formation
\begin{tabular}{|c|c|c|}
\hline
\textbf{Lithology} & \textbf{Depth} & \textbf{Formation} \\
\hline
 & 364 – 372 m & Major Lost Circ Zone Assoc with Roberts Mountain Thrust? \\
 & 917 – 924 m & Minor Lost Circ Zone \\
\hline
\end{tabular}

**TEMPERATURE LOGING**

**Temperature vs Depth** – Temperature logs were run on well 56-4 on March 22, April 28 and Nov. 9, 2007. The respective maximum bottom hole temperatures of 121.9°C, 121.2°C and 124.5°C were recorded for each of the three logging runs.

Temperature gradients of 300°C/km, 90°C/km and 50°C/km were calculated for all three temperature logging runs. These gradients correlate very closely with lithology as follows:

\begin{tabular}{|c|c|c|}
\hline
\textbf{Gradient} & \textbf{Depth} & \textbf{Lithology} \\
\hline
300°C/km & 0 – 230 m & Tertiary Lake Beds \\
90°C/km & 230 – 370 m & Valmy Fm shales – Upper Plate \\
50°C/km & 370 – 1,198 m & Ordovician Carbonates – Lower Plate \\
\hline
\end{tabular}

The correlation of temperature with lithology is striking. Additional discussion of the relationship between gradient and geology will be presented in a later section of the report entitled “Geologic Interpretation”.

**Temperature vs Pressure**

Detailed plots, etc. of the temperature – pressure data from well RR 56-4 are shown in Appendix C.

**GEOCHEMISTRY**

Four formation water samples were collected from well 56-4, during an airlift test which took place between November 11 and November 14, 2007. One sample was taken from the Steiner Well which was the source for drilling water for the drilling of 56-4 and for the short injection test. The Steiner well sample was acquired from flow produced from a downhole pump with an approximate flow of 30 l/s.
The samples were analyzed by Thermochem for chemical constituents and by Rafter Lab at GNS for isotope analysis. The results are shown below in the table with the chemical constituents shown in units of mg/l.

<table>
<thead>
<tr>
<th>Smpl Name</th>
<th>Desc</th>
<th>Smpl Date/Time</th>
<th>Smpl T°C</th>
<th>Lab#</th>
<th>pH lab</th>
<th>Na</th>
<th>K</th>
<th>Ca</th>
<th>Mg</th>
<th>Li</th>
<th>NH₃</th>
<th>T-Alk HCO₃</th>
<th>SO₄</th>
<th>Cl</th>
<th>F</th>
<th>SI0₂</th>
<th>B</th>
<th>a-¹⁸O o/oo</th>
<th>a-²H o/oo</th>
<th>Tot.</th>
<th>Tot.</th>
<th>Sum</th>
<th>Dif/ Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW</td>
<td>Steiner well</td>
<td>09/11/2007 17:30</td>
<td>49</td>
<td>13172</td>
<td>7.22</td>
<td>231</td>
<td>35.0</td>
<td>59.4</td>
<td>23.2</td>
<td>1.62</td>
<td>732</td>
<td>71.9</td>
<td>38.9</td>
<td>4.63</td>
<td>28.6</td>
<td>0.944</td>
<td>-16.12</td>
<td>-132.3</td>
<td>16.05</td>
<td>14.84</td>
<td>30.89</td>
<td>3.9%</td>
<td></td>
</tr>
<tr>
<td>56-4A</td>
<td>12/11/2007 12:45</td>
<td>93</td>
<td>13172</td>
<td>8.88</td>
<td>284</td>
<td>12.8</td>
<td>10.9</td>
<td>10.9</td>
<td>0.610</td>
<td>5.32</td>
<td>548</td>
<td>89.4</td>
<td>54.9</td>
<td>8.50</td>
<td>54.9</td>
<td>1.14</td>
<td>-15.84</td>
<td>129.5</td>
<td>13.75</td>
<td>12.84</td>
<td>26.69</td>
<td>3.4%</td>
<td></td>
</tr>
<tr>
<td>56-4B</td>
<td>13/11/2007 16:30</td>
<td>96</td>
<td>13172</td>
<td>9.06</td>
<td>312</td>
<td>10.4</td>
<td>8.37</td>
<td>0.567</td>
<td>0.660</td>
<td>5.76</td>
<td>562</td>
<td>104.7</td>
<td>82.9</td>
<td>7.20</td>
<td>101.0</td>
<td>1.11</td>
<td>-15.47</td>
<td>130.3</td>
<td>14.74</td>
<td>14.11</td>
<td>28.85</td>
<td>2.3%</td>
<td></td>
</tr>
<tr>
<td>56-4C</td>
<td>14/11/2007 15:30</td>
<td>99</td>
<td>13172</td>
<td>8.88</td>
<td>285</td>
<td>10.1</td>
<td>15.6</td>
<td>2.07</td>
<td>0.677</td>
<td>3.64</td>
<td>541</td>
<td>102.3</td>
<td>73.9</td>
<td>6.20</td>
<td>101.4</td>
<td>1.21</td>
<td>-15.77</td>
<td>131.7</td>
<td>13.36</td>
<td>13.43</td>
<td>27.76</td>
<td>2.0%</td>
<td></td>
</tr>
<tr>
<td>56-4D</td>
<td>14/11/2007 15:30</td>
<td>99</td>
<td>13172</td>
<td>9.01</td>
<td>285</td>
<td>8.04</td>
<td>7.92</td>
<td>0.089</td>
<td>0.645</td>
<td>3.77</td>
<td>550</td>
<td>83.8</td>
<td>47.4</td>
<td>3.10</td>
<td>103.0</td>
<td>0.977</td>
<td>-15.88</td>
<td>130.2</td>
<td>13.32</td>
<td>12.47</td>
<td>26.79</td>
<td>3.3%</td>
<td></td>
</tr>
</tbody>
</table>

**Chemical Overview**

The first three samples from 56-4 show similar ion balances of 3.4%, 2.2% and 2.0%. Sample D was reported with total alkalinity at 500 mg/l, which produced an ion balance value of 6.7%, which suggests some remaining error, in spite of re-runs which corrected the sulfate and confirmed chloride and sodium. The remaining error is assumed to be in the alkalinity value. The alkalinity was changed from 500 (reported) to 550 (average of the three preceding samples and listed above), which produced an ion balance for sample D of 3.3%.

The four samples from 56-4 are very similar to one-another and don't show a clear progressive clean-out. TDS from a conductivity meter remained at about 1100 – 1200 the entire time. The sum of anions and cations showed the following sequence: 26.6, 28.8, 27.3, 25.8 meq/l. Cl showed the following sequence: 54.8, 83, 73.6, 47.4 mg/l. (Steiner Cl is 39-45 mg/l) and plots of ions against one-another (Mg vs Cl, Na vs K, SiO₂ vs Cl) don't show linear relationships. This indicates that the samples are either altered Steiner Well water or native water. The samples are believed to be native water though the possibility that they are altered Steiner Well water left from the injection test can not be ruled out.

Mg tends to be very low (0.089 – 2.07 mg/l), which is a strong thermal effect which occurs because Mg gets captured into certain minerals at temperatures of about 100ºC and above. In fact, the last sample at 0.089 mg/l is a very "geothermal" signature.

Chemical geothermometers are modest. Chalcedony is about 110C, Na-K-Ca is 135 to 150ºC, Na-K-Ca-Mg is 105 to 135ºC. K/Mg (Fournier) ranges from 84 to 120ºC (highest at lowest Mg). Na/K (Fournier) is 130 to 155ºC.

This suggests that the production zone for the airlift was at about 110ºC or thereabouts nearby, and that there is somewhat deeper equilibration at about 140ºC, with an uncertainty of about ±15ºC. The measured temperature at the 56-4 production zone was indeed about 115ºC, and temperatures of 125ºC and 150ºC have been measured in Reese wells. Therefore, the geothermometers are compatible with measured temperatures and do not indicate hotter conditions.

The 56-4 samples as analyzed are very oversaturated with calcium carbonate (calcite), both at 25ºC (analysis temperature) and even more oversaturated at 110ºC and higher. This is undoubtedly due to loss of dissolved CO₂ during the airlift. If CO₂ is added back into the water to achieve saturation with calcium carbonate at 110ºC, about 200 mg/kg of CO₂ must be added, and pH at 110ºC is about 6.8. Steiner water is approximately saturated with calcite at low temperature, without addition of lost CO₂.
**Stable Isotopes**

The following three graphs show the stable isotopes of oxygen and hydrogen in the water molecule and Cl, in the four samples from 56-4 and from Steiner. Observations from these data are:

(a) The Steiner water is isotopically very similar to the four samples from 56-4, but is very slightly “lighter” in terms of overall isotopic weight. The difference is larger than statistical uncertainty in the analyses and probably is real. However, it could be an effect of airlift on the samples from 56-4. That is, the 56-4 samples could be Steiner water affected by some evaporation of lighter isotopes, shifting the composition slightly to higher $\delta^1$D and higher $\delta^{18}$O.

(b) Although $\delta^{18}$O vs Cl shows some evidence of mixing (an approximately linear distribution of data points), $\delta^1$D vs Cl does not. Even though analyses of $^{18}$O are more precise than analyses of D, it is likely that the (approximately) linear pattern of $\delta^{18}$O vs Cl is fortuitous, since there is no decent evidence of mixing in the chemical data set.

(c) All five samples show a $\delta^{18}$O displacement of about +1.5 to +1.75 o/oo at constant $\delta^1$D with respect to the world-average meteoric water line. Although the average meteoric line ($\delta^1$D = 8*$\delta^{18}$O +10) can show local variations in position (especially the y-intercept), a $\delta^{18}$O shift as large as +1.5 to 1.75 o/oo is likely to be the result of some mechanism(s) other than simple rainfall. The kinds of processes that can affect isotopes in this way include evaporation (which increases both $\delta^{18}$O and $\delta^1$D) and water-rock exchange of oxygen atoms (which increases only $\delta^{18}$O).

(d) The composition of the Steiner water indicates that either it is meteoric water that has been affected by low-temperature evaporation (causing $\delta^1$D and $\delta^{18}$O both to shift from the meteoric water line), or it is old, cooled geothermal outflow.

Additional data, chemical plots, etc. are presented in Appendix D.

**INJECTIVITY TESTING**

On March 22, 2007 a brief injectivity test was preformed after the slotted liner had been installed. Water was injected at flow rates of 6.3 l/s, 13 l/s and 19 l/s and the pressure and temperature was recorded down hole at a depth of 926 m. At the higher flow rate, the test was interrupted several times to repair leaks at the surface. From the recorded pressure an approximate injectivity index of 10 l/s/MPa was calculated.

Test data and plots from the injectivity test are presented in Appendix E.

**GEOLOGIC INTERPRETATION**

**NOTE:** The reader is referred to Appendix F – Geology, for maps, cross sections, etc. to use as visual aids to aid in understanding the following text. Most of the following discussion refers to the cross section found in this appendix of the report.
**Geologic Overview**

The prospect lies within a northeast trending inter-montane graben, interpreted by us as a pull-apart basin (see N - 001 in Appendix F). The age of the graben boundary faults is believed to straddle the Tertiary – Quaternary boundary and very probably is less than 1 million years (Dohrenwend, et. al., 1996). The southeast bounding fault of the graben is located very near the southeast boundary of the Humboldt Structural Zone (HSZ) (see N – 002 in Appendix F). The HSZ, one of the major structural features in Nevada, is an approx 240 km wide northeast trending structural belt which traverses northern Nevada and partially extends into the neighboring states of Oregon and Idaho.

The southeast boundary fault of the graben juxtaposes upper and lower plate Paleozoic sedimentary rocks of the Roberts Mountain and Golconda thrusts, with Tertiary fanglomerates and lakebed sediments. The displacement along the southeast bounding fault is thought to be on the order of 1.5 km or more. The northwest boundary fault of the graben juxtaposes Tertiary lake bed sediments against the Tertiary Bates Mountain Tuff. The displacement along the northwest bounding fault is thought to be on the order of 1000 m.

The floor of the graben (about 2.4 km wide) is occupied by highly faulted and gently folded Tertiary age lacustrine, tuffaceous siltstones, sandstones and conglomerates (see N – 003 in Appendix F). Field mapping shows that the Quaternary alluvial fans and terrace gravels which overlie the Tertiary sediments are displaced by numerous interior normal faults which cut the floor of the graben, suggesting a Quaternary age displacement for at least some of the previously unmapped faults in the interior of the graben.

The lacustrine and sandstone facies sediments appear to be about 300 m thick and were deposited on a thick sequence of approximately 650 m of welded and non welded ash flow tuffs and andesitic to dacitic volcanic flows. This thick Tertiary sequence of volcanic and volcaniclastic rock appears to unconformably overlie upper plate units of the Roberts Mountain Thrust.

**Stratigraphy and Structure**

Field relationships of the various stratigraphic units found at the prospect are shown on the Prospect Scale and Drill Site Scale Geologic Maps (N – 003 and N –004) are shown in Appendix F. An interpretation of the geology in the vicinity of wells RR 56-4 and RR 13-4 is shown in cross section view (N – 005) in Appendix F. Details of the stratigraphy and structure of the Reese River Prospect as revealed by drilling data are discussed below. These are discussed in the sequence of which the various stratigraphic units at the prospect were penetrated by the drill. A map showing the fault nomenclature (N – 006) is also shown in Appendix F.

More detailed descriptions of the stratigraphy and structure of the Reese River Prospect are available in the Phase 1 report previously prepared by Henkle, et.al.
Tertiary Sediments

RR 56-4 – The well was collared in fine grained, tuffaceous silt stones and shales which outcrop over large areas in the Reese River lease hold. This thick sedimentary sequence is the dominant outcropping rock unit in the central portion of the lease hold. The unit was named Tsu, by Henkle, et. al, for the the GRED III Phase 1 final report. The unit is composed of yellow – red to yellow-green tuffaceous siltstones and claystones, with occasional thin fine grained sandstones, poorly sorted conglomerates and vitric tuffs. The vitric tuff units have been altered to zeolite beds in many places (Deffeyes, 1959).

The unit presents as badland topography in a belt about 500 m wide along the SE boundary of the graben, where it is in fault contact with a tan to buff, fine grained sandstone named as Tsl by Henkle et. al.. The unit dips from 20 to 30 degrees westerly in the badland area and is broken into several discrete fault blocks. RR 56-4 was collared in an antithetic graben, bounded on the east by a normal fault named the SE Heat Cell Boundary Fault and on the west by an antithetic fault named the SE Antithetic Fault.

Deffeyes (1959) measured a thickness of 400 m for this unit(Tsu only), just to the west of the mapping area. Fossil vertebrae work by that worker and others indicate an age of 13 my (Clarendonian) to 5 my (Hemphillian) – Mid Pliocene (Deffeyes, 1959).

RR 56-4 penetrated only 107 m of this unit (Tsu) before passing into a fine grained tuffaceous sandstone mapped as Tsl by Henkle, et. al, in the Phase 1 report. This lithology change is interpreted by us as a normal, conformable sedimentary contact. The drill hole then penetrated 149 m of Tsl sandstone and passed into Paleozoic sediments at 256 m.

RR 13-4 – The well was also collared in Tsu sediments, passing from Tsu siltstone/shale to Tsl sandstones at 137 m. This is interpreted by us as a normal conformable sedimentary contact. The well penetrated Tsl sandstones from 137 to 192 m, where it passed into Tbm welded tuff. The thickness of 192 m for Tertiary lake bed sediments (both units) at this location is considerably less than the 400 m thickness that was measured by Deffeyes in 1959 for unit Tsu.

RR 13-4 was collared in a fault block bounded on the west, by the Main Road Fault and on the east by the Central Graben Fault. Bedding dips in this fault are somewhat difficult to determine, due to lack of suitable outcrops. Based on limited observation however, this fault block appears to be synclinal shaped. Bedding dips measured along the outcrop of the Central Graben Fault are towards the east at 5 to 10 degrees. Bedding dips measured on the west side of the Main Road Fault, about 800 m south of well 13-4 are to the west at 15 to 30 degrees.

Bedding dips measured on the east side of the Main Road Fault, between the locations of wells 13-4 and 56-4 are to the west at 20 to 45 degrees.

Structural Significance – The 256 m thickness of Tertiary sediments (both Tsu and Tsl) penetrated in well 56-4 is considerably less than the 400 m of Tsu section that was
measured nearby by Deffeyes in 1959. The section has been shortened by normal faulting at location 56-4, where the drill hole passes through the SE Heat Cell Boundary Fault. This indicates that the SE Heat Cell Boundary Fault is a normal fault, down to the west, with large displacement and that it is probably the main range front fault at the prospect.

The SE Graben Boundary Fault which is the eastern structural boundary of the graben is parallel to and inbound of the main range front fault at the Reese River Prospect. The SE Heat Cell Boundary Fault in well 56-4 was penetrated at 262 m. Comparison of the penetration point of the fault plane, with the location of the fault in outcrop indicates a dip of 45 to 50 degrees to the west at interval between 1,700 and 1,400 m of elevation on this important fault.

The fact that short section was encountered both in well 56-4 and in well 13-4 for the Tertiary sedimentary section is significant in that it reveals the direction and approximate magnitude of movement on both the Main Road and the SE Antithetic Faults. Both of these faults are up to the west – down to the east. The only way that such short Tertiary section can be found in well 13-4, which penetrates beds that dip to the west, is for displacement on both faults to be up to the west – down to the east. Otherwise, 600 m or more of Tertiary sediments would have been encountered in well 13-4 (as was originally interpreted by Henkle, et. al in the Phase 1 report).

Since both these faults are normal faults, the planes of the faults must dip to the east. This indicates that both faults are antithetic faults formed in response to tensional forces generated in the hanging wall of the SE Heat Cell Boundary Fault, during downward movement of the block. Antithetic faults dip towards and generally intersect the master fault which in this case appears to be the SE Heat Cell Boundary Fault.

**Geothermal Significance** – The temperature logs of well RR 56-4 show a temperature gradient of 300ºC/km for the portion of the well that is within the Tertiary sediment package (primarily the Tsl sandstone). The gradient abruptly changes to 90ºC/km when the well passes into the Valmy Fm. The gradient abruptly changes again to 50ºC/km when the well passes into lower plate carbonate rocks.

This abrupt change in gradient indicates that the Tsl sandstones are an outflow aquifer at this well location. It also shows, that the source of the outflow is to the east of the well. The outcrop of the SE Heat Cell Boundary Fault is about 250 m east of well 56-4. The outflow fluids are probably rising along this fault until they intercept the water table at approximately 100 m depth along the fault. The top of the water table is within the Tsl sandstones. The fluids then travel down dip, to the west in this shallow aquifer.
**Tertiary Volcanics**

**RR 56-4** – This well did not encounter the Bates Mountain Tuff (Tbm), which underlies the Tsl sandstone in two other wells at the prospect.

**RR 13-4** – The Bates Mountain Tuff is 189 m thick in well RR 13-4 (192 to 381 m), underlying the Tsl sandstone in apparent conformable contact. A massive lost circulation zone (LCZ) was encountered within the Bates Mountain at 250 to 252 m Because of this LCZ, no samples were able to be collected till 287 m depth. Most likely, this LCZ occurred at the contact of welded tuff with underlying pumiceous sediments (highly porous) within the uppermost cooling unit of the Bates Mountain.

The Bates Mountain outcrops in the high lands to the west of the main graben and is found in well RR 88-5 as well as RR 13-4. The Bates Mountain is also found in limited outcrop along the ridgeline at approximate elevation of 2,000 m, overlying Valmy Fm. in a small graben approximately 1,600 m SSE of well RR 56-4.

**Structural Significance** – The fact that a unit like the Bates Mountain, which was deposited over a widespread area at the prospect was not found in well RR 56-4 is significant. This indicates that down to the west movement on the SE Heat Cell Boundary Fault was in the order of 300 m or more.

**Geothermal Significance** – At the time of this writing, the only well with temperature profile data for the Bates Mountain is RR 13-4. In well 13-4, a gradient of around 300ºC/km was measured both in the Bates Mountain and in the Tsl sandstones. After the well passes into the Valmy Fm, the gradient decreases to around 50ºC/km. This indicates that the Tertiary formations are acting as an outflow aquifer at RR 13-4 also, and that the outflow source is to the east. This is the same situation as discussed earlier for well RR 56-4.

**Paleozoic Sediments**

**RR 56-4** – This well encountered Western Assemblage Ordovician Valmy Fm. siliceous clastic rocks (upper plate) from 256 to 344 m, for a total thickness of 88 m. The drill hole then passed into a thick sequence of Eastern Assemblage Lower Ordovician and probable Cambrian carbonates (lower plate) at 344 m. The well remained in carbonate assemblage rocks to TD at 1,198 m. A major lost circulation zone (LCZ) was encountered at 364 to 372 m and a minor LCZ was encountered at 926 m.

**RR 13-4** – This well encountered Western Assemblage Valmy siliceous clastic rocks (upper plate) from 381 to 1094 m (713 m total). Minor LCZs were encountered at 506 and 640 m and appear to be lithologically related as opposed to structurally related. The well passed into a thick sequence of Eastern Assemblage carbonate rocks (lower plate) from 1094 to 1498 m.
This sequence was tentatively identified as Hanson Creek Formation (Upper Ordovician) by Bill Ehni, the wellsite geologist.

**Structural Significance** – The Roberts Mountain Thrust is located at or near the contact of upper plate and lower plate Paleozoic rocks. At the Reese River Prospect, this is the Valmy / Carbonate contact. The major LCZ encountered in well 56-4 was at a depth of 364 to 372 m, about 20 m below the Valmy / Carbonate contact, and is probably related to the Roberts Mountain Thrust.

**Geothermal Significance** – The thrust fault appears to dip to the east (due to anticlinal folding) in this portion of the prospect. Water temperatures are about 85ºC at this depth in well 56-4. Because the thrust dips to the east in this well, it will intercept the SE Heat Cell Boundary Fault (the apparent master fault) at relatively shallow depths. There is little hope that even if heavily pumped, this highly permeable zone will connect with and produce hotter fluids at depth along the SE Heat Cell Boundary Fault.

**Intrusive Granodiorite**

**RR 56-4** – This well did not encounter any intrusive rocks.

**RR 13-4** – This well encountered granodiorite intrusive from 1498 to TD at 1580 m. A small LCZ was encountered in this unit at 1518 m (8 m³ – 10 minutes). The intrusive is probably related to a large Rhyolite intrusive of uncertain age shown on the county geologic map (Stewart and McKee, 1977). This intrusive plug which is found about three miles to the south of well 56-4, was discussed by Henkle et. al, in the Phase 1 Final Report for the project. These workers believed that the intrusive might be considerably younger than did Stewart and McKee.

The following is a direct quotation from the Phase 1 report:

**Uncertain Age Intrusive Rocks – Rhyolite Intrusive (Tri)** – A rock unit mapped by Stewart and McKee (1977), as “Rhyolite Intrusive – age uncertain”, outcrops in the extreme southern parts of the graben. This is a widespread unit in Lander Co. and was assigned to the mid-Miocene by these authors. The petrology of this unit was not described by Stewart and McKee; we did not visit these outcrops as they are far from the heart of the prospect. What we know of this unit, we know from stereo color air photo mapping.

*We believe that this unit is possibly much younger than mid-Miocene, possibly as young as mid to late Pliocene. A small outlier of the rhyolite intrusion intrudes Valmy Fm. rocks in the southern part of the southeastern boundary ridge of the graben. The intrusion has bowed up and hydrothermally altered the Valmy Fm. strata in this area. About one mile further south, in the very southern most part of the mapping area, the larger intrusion has definitely folded up the Ordovician Valmy Fm. and appears (from air photo work) to have folded up the Pliocene sediments that overlie the Valmy in this area of the prospect. If future field work shows this*
photo interpretation to be accurate, then the intrusion would be considerably younger than as
mapped by Stewart and McKee (1977).

**Structural Significance** – If the granitic intrusive encountered in well 13-4 is indeed a sill which intruded along the SE Heat Cell Boundary Fault (the master fault), this would mean that it was post Tertiary in age, coeval with initiation of Basin and Range faulting at the prospect. An alternative interpretation would be that the intrusive is related to the Ravenswood Pluton (Cretaceous) which outcrops over a two square mile area about nine miles to the south of well 56-4.

Since well 56-4 did not encounter any intrusive, this would mean that if the intrusive in well 13-4 was associated with a pluton, the top of the pluton would have to be below the TD of well 56-4. The pluton would be a geometrically broad and deep igneous body; such a body should show up on reflection seismic. The fact that there is no seismic signature that might be interpreted as a pluton in this part of the prospect supports the tentative interpretation that the intrusive is a sill, intruded along the SE Heat Cell Boundary Fault.

If the granitic intrusive encountered in well 13-4 is a sill, then the SE Heat Cell Boundary Fault would have to be deeper than the TD of the well. This is supported by reflection seismic data; this also means that the dip of the fault plane would be steep at these elevations at the prospect. This also would mean that the fault would not sole out until depths in the 2,000 to 2,500 m range.

**Geothermal Significance** – Pliocene sediments as young as middle Hemphillian (~5my) have been identified from fossil work at the prospect (Deffeyes, 1959). If the intrusion is younger than 5 my, then it may have significance as a geothermal heat source. Additional work is warranted here to determine the age relationships of this intrusive. Radiometric age dating of some of the cuttings from the granitic intrusive would pin an age date on the intrusive and would help to answer this intriguing question.

If the intrusive is a sill, and the SE Heat Cell Boundary Fault lies below the TD of well 13-4, then the fault will cut very deep into the section. This means that very hot temperatures might be encountered at depths of greater than 1,800 m along the plane of this very important fault.

**CONCLUSION**

Well RR 56-4, was not successful in intersecting an exploitable geothermal resource. However, the lack of temperature reversal in the well and the geochemistry information obtained from fluid sampling point towards a large resource of moderate temperature. The encouraging results from 56-4 have lead to continued exploration on the project. The geologic and hydrologic
information collected from 56-4 has proved an invaluable aid when combined with data from well 13-4, in interpreting the geothermal development potential of the Reese River Prospect.

REFERENCES


Klein, C.W., 2008, email, cwk@geothermex.com, Jan 23, 2008.


Appendix A: Well Summary Report
<table>
<thead>
<tr>
<th>Date</th>
<th>Current Depth (ft)</th>
<th>Current Ops</th>
<th>Operation Summary</th>
<th>Ave ROP</th>
<th>Well Drilled (ft)</th>
<th>Hole Drilled (ft)</th>
<th>Ave ROP</th>
<th>Completion Days</th>
<th>Workover Days</th>
<th>Completion Days</th>
<th>Workover Days</th>
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<td>(8 hrs)</td>
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<td>0</td>
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<tr>
<td>05-Feb-07</td>
<td></td>
<td>Continue rig-up</td>
<td>(8 hrs)</td>
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Mud Data: None
Surveys: None
Daily Costs ($): 0
Well Costs ($): 0
Drilling Days: 2
Completion Days: 0
Workover Days: 0
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<th>DATE</th>
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<th>TIME</th>
<th>SPACE</th>
<th>RIMBeta</th>
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<td>06-Feb-07</td>
<td><strong>Current Depth (ft):</strong> 67.0 <strong>Hole Drilled (ft):</strong> 46.0 <strong>Ave ROP:</strong> 11.50</td>
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<td></td>
<td></td>
</tr>
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<td>07-Feb-07</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>08-Feb-07</td>
<td><strong>Current Depth (ft):</strong> 67.0 <strong>Hole Drilled (ft):</strong> 46.0 <strong>Ave ROP:</strong> 11.50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09-Feb-07</td>
<td><strong>Current Depth (ft):</strong> 67.0 <strong>Hole Drilled (ft):</strong> 46.0 <strong>Ave ROP:</strong> 11.50</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Operation Summary:**
- Take on water (4 hrs)
- Mix spud mud to 50 vis. (2 hrs)
- Circulate spud mud (2 hrs)
- Drill 17.5" hole from 0. ft to 50.41 ft (KB) (1 hrs)
- Pull cut and laydown tools (1 hrs)
- Cement conductor - clean up (1 hrs)
- Pick up 12 1/4" tools (1 hrs)
- Drill rat hole, drill mouse hole, cement top of conductor (4 hrs)
## Well Summary Report

**Well ID:** 56-4  
**Field:** Reese River  
**Sect:** 4  
**Town:** 23N  
**Rng:** 43E  
**County:** Lander  
**State:** NV

### Weld Surface Flow Nipple
- **Time:** 2 hrs

### Strap BHA
- **Time:** 1 hr

### Clean Up Shaker, and Cellar
- **Time:** 1 hr

### Wait on Cement
- **Time:** 1 hr

### Drill 12 1/4" Hole from 49.41 ft to 57.56 ft
- **Time:** 3 hrs

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
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<tbody>
<tr>
<td><strong>Comments:</strong></td>
<td>Pre-spud meeting held at 8:00 with day and night rig crew, on-site geologist, mud company representative, and drilling contractor representative.</td>
</tr>
<tr>
<td><strong>Mud Data:</strong></td>
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</tr>
<tr>
<td>MW Viscosity</td>
<td>8</td>
</tr>
<tr>
<td>Filtrate: 22.4 MW: 8.5, Viscosity: 45</td>
<td></td>
</tr>
<tr>
<td>Filtrate: 20</td>
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</tr>
<tr>
<td><strong>Surveys:</strong></td>
<td>None</td>
</tr>
<tr>
<td><strong>Daily Costs ($):</strong></td>
<td>493,492</td>
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<td><strong>Well Costs ($):</strong></td>
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<tr>
<td><strong>Drilling Days:</strong></td>
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### 10-Feb-07

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<th>Current Depth (ft):</th>
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<tr>
<td>Hole Drilled (ft):</td>
<td>277.5</td>
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<tr>
<td>Ave ROP:</td>
<td>13.54</td>
</tr>
</tbody>
</table>

| Current Ops:                        | Well drilled to 344.5, preparing to wiper trip hole |

### Operation Summary:
- **Drill 12 1/4" from 67 ft to 85 ft**  
- **Survey at 74° - 1°**  
- **Drill 12 1/4" from 85 ft to 117 ft**  
- **Drill 12 1/4" from 114 ft to 235 ft**  
- **Survey at 198°**  
- **Drill 12 1/4" from 235 ft to 325 ft**  
- **Circulate and condition mud**  
- **Drill 12 1/4" from 325 ft to 345 ft**  
- **Survey at 345°**  
- **POOH, strap out**  

<table>
<thead>
<tr>
<th>Comments:</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Mud Data:</strong></td>
<td>MW: 8.8 Viscosity: 48 Filtrate: 17.2</td>
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<td><strong>Surveys:</strong></td>
<td>74 ft - 1 deg inc., deg Az</td>
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<td><strong>Daily Costs ($):</strong></td>
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<td><strong>Well Costs ($):</strong></td>
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<td><strong>Drilling Days:</strong></td>
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<tr>
<td><strong>Workover Days:</strong></td>
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### 11-Feb-07

<table>
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<th>Current Depth (ft):</th>
<th>350.0</th>
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<tr>
<td>Hole Drilled (ft):</td>
<td>5.5</td>
</tr>
<tr>
<td>Ave ROP:</td>
<td>11.00</td>
</tr>
</tbody>
</table>

| Current Ops: | WOC, preparing conductor & surface casing for next stage of drilling |

### Operation Summary:
- **Continue tripping out of hole, clean BHA and RIH**  
- **Drill 12 1/4" from 344.5 ft to 350 ft**  
- **Circulate and condition hole**  
- **POOH/lay down BHA**  
- **Continue lay down BHA**  
- **Rig up and run 9 5/8" casing**  
- **Rig up to cement surface casing**  
- **Mix and pump cement. Mix 130 sks API "A" w/4% gel, mix 25 sks API "A". Pump 0:1:4 cement followed by cement. Stop pump and drop displacement plug. Displace with 123.4 BBL of water. Good cement returns. Bump plug at 15:00 (1 hr)**  
- **WOC**  
- **Continue WOC**  

<table>
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<th>Comments:</th>
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<tbody>
<tr>
<td><strong>Mud Data:</strong></td>
<td>MW: 8.8 Viscosity: 45 Filtrate:</td>
</tr>
<tr>
<td><strong>Surveys:</strong></td>
<td>193 ft - 0.0 deg Inc., deg Az</td>
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**Printed:** 18:43 02-Apr-07  
**Page:** 3 of 17  
**RIMBase**
## Well Summary Report

**Well ID:** 56-4  
**Field:** Reese River  
**Sierra Geothermal Power**  
**Well Name:** RR-1  
**Sec:** 4 **Town:** 23N **Rng:** 43E **County:** Lander **State:** NV

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<th>Hole Drilled (ft)</th>
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<th>Well Costs ($)</th>
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<td>29,024</td>
<td>543,895</td>
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<tr>
<td></td>
<td>Cutting casing and welding on BOP</td>
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<td>WOC (1 hrs)</td>
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<tr>
<td></td>
<td>Cut conductor and remove (3 hrs)</td>
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<tr>
<td></td>
<td>Rig Service (0.5 hrs)</td>
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<tr>
<td></td>
<td>Wait on welding contractor (2 hrs)</td>
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<tr>
<td></td>
<td>Weld 8 5/8&quot; casing bowl (5.5 hrs)</td>
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</tr>
<tr>
<td></td>
<td>Weld 9 5/8&quot; casing bowl (2.5 hrs)</td>
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<tr>
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<td>Nipple up BOP (5.5 hrs)</td>
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<tr>
<td></td>
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<tr>
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<td>Pressure test BOP (low 150, high 500) (4.5 hrs)</td>
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<td>Pick-up BHA (2 hrs)</td>
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<tr>
<td></td>
<td>RTH, tag cement at 264&quot; (2 hrs)</td>
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<td>Drill 8 1/2&quot; from 419 ft to 600 ft (8 hrs)</td>
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<tr>
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<td>Drill 8 1/2&quot; from 600 ft to 626 ft (2.5 hrs)</td>
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<tr>
<td></td>
<td>Circulate hole clean (0.5 hrs)</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>Bit trip (1.5 hrs)</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Trip in w/8 1/2&quot; Insert bit (serial 6048740) (1 hrs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ream from 581 ft to 626 (0.5 hrs)</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Drill 8 1/2&quot; from 626 ft to 660 ft (0.5 hrs)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Survey at 621 ft (0.5 hrs)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Drill 8 1/2&quot; from 660 ft to 711 ft (1 hrs)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Drill 8 1/2&quot; from 711 ft to 812 ft (5.5 hrs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Survey at 721 ft (0.5 hrs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Well Summary Report

**Sierra Geothermal Power**

**Well ID:** 56-4  
**Field:** Reese River  
**Sect:** 4  
**Town:** 23N  
**Rng:** 43E  
**County:** Lander  
**State:** NV  

<table>
<thead>
<tr>
<th>Date</th>
<th>Current Depth (ft)</th>
<th>Hole Drilled (ft)</th>
<th>Daily Costs ($)</th>
<th>Well Costs ($)</th>
<th>Drilling Days</th>
<th>Completion Days</th>
<th>Workover Days</th>
<th>Ave ROP</th>
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<tbody>
<tr>
<td>15-Feb-07</td>
<td>1,187.0</td>
<td>334.0</td>
<td>47,712</td>
<td>651,921</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>14.84</td>
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<tr>
<td>16-Feb-07</td>
<td>1,264.0</td>
<td>77.0</td>
<td>24,858</td>
<td>676,819</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>3.85</td>
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<tr>
<td>17-Feb-07</td>
<td>1,476.0</td>
<td>212.0</td>
<td>33,422</td>
<td>710,241</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>15.14</td>
</tr>
</tbody>
</table>

**Operation Summary:**

- **Drill 8 1/2" from 721 ft to 853 ft (2 hrs)**
- **Mud Data:**  
  - MW: 8.85  
  - Viscosity: 39  
  - Filtrate: 7.6  
- **Surveys:**  
  - 4811 - 1.25 deg Inc, deg Az; 6211 - 0.5 deg Inc, deg Az; 7811 - 2.25 deg Inc, deg Az;  
- **Daily Costs ($)**: 47,712  
- **Well Costs ($)**: 651,921  
- **Drilling Days**: 6  
- **Completion Days**: 0  
- **Workover Days**: 0

**Comments:**

- Drilled from 872-1181 ft, ROP decreased throughout interval, encountered a loss of circulation zone at 1181. Experienced 30% losses. ROP increased to 28 prior to loss of circulation.

- **Drill 8 1/2" from 853 ft to 872 ft (1 hrs)**
- **Survey at 864 (0.5 hrs)**
- **Drill 8 1/2" from 872 ft to 1025 ft (6.5 hrs)**
- **Drill 8 1/2" from 1025 ft to 1055 ft (1 hrs)**
- **Survey 3.5" (0.5 hrs)**
- **Drill 8 1/2" from 1055 ft to 1151 ft (8.5 hrs)**
- **Drill 8 1/2" from 1151 ft to 1187 ft (7.5 hrs)**
- **Loss of circulation, approximate 30% losses (0.5 hrs)**

- **Mud Data:**  
  - MW: 8.85  
  - Viscosity: 41  
  - Filtrate: 6.4  
- **Surveys:**  
  - 8641 - 1.5 deg Inc, deg Az; 10651 - 3.5 deg Inc, deg Az;  
- **Daily Costs ($)**: 24,858  
- **Well Costs ($)**: 676,819  
- **Drilling Days**: 7  
- **Completion Days**: 0  
- **Workover Days**: 0

**Operation Summary:**

- **Drill 8 1/2" intermediate hole**
- **Mixing mud/LCM.**
- **Loss of circulation 100% losses. Continue to mix mud w/LCM (2.5 hrs)**
- **Loss of circulation 50% losses. Drill 8 1/2" from 1187 ft to 1212 ft (4 hrs)**
- **Loss of circulation 30% losses. Mix mud/fill tanks (1 hrs)**
- **Loss of circulation 25% losses. Drill 8 1/2" from 1212 ft to 1215 ft (0.5 hrs)**
- **Drill 8 1/2" from 1215 ft to 1236 ft (1.5 hrs)**
- **Survey (0.5 hrs)**
- **Drill 8 1/2" from 1236 ft to 1264 ft (6 hrs)**
- **Drill 8 1/2" from 1264 ft to 1354 ft (8 hrs)**

- **Comments:**
  - Loss of circulation continued during drilling, continue to drill ahead and mix mud/LCM as required.
- **Mud Data:**  
  - MW: 8.45  
  - Viscosity: 35  
  - Filtrate: 21.2  
- **Surveys:** None  
- **Daily Costs ($)**: 33,422  
- **Well Costs ($)**: 710,241  
- **Drilling Days**: 8  
- **Completion Days**: 0  
- **Workover Days**: 0

**Operation Summary:**

- **Intermediate hole at TD (1476). Wiper trips and hole circulation**
- **Circulate hole clean (0.5 hrs)**
Well Summary Report

Well ID: 56-4
Field: Reese River

Survey (0.5 hrs)
Bypass shaker and pump LCM (1 hrs)
Circulate mud/LCM (1.5 hrs)
Trip out of hole (1 hrs)
Trip out, 604 to 482 (0.5 hrs)
Trip in 482 to 1476 (1 hrs)
Circulate hole clean (4 hrs)

Comments:
Mud Data: MW, 8.5 Viscosity: 43 Filtrate: 10.8
Surveys: None
Daily Costs ($): 44,729 Well Costs ($): 754,970
Drilling Days: 9 Completion Days: 0 Workover Days: 0

Current Depth (ft): 1,476.0 Hole Drilled (ft): 0.0 Ave ROP:
Current Ops: WOC
Operation Summary:
Loss of circulation, mix LCM - 70 BBLs (2.5 hrs)
Mix mud-build volume (0.5 hrs)
Circulate and condition hole (5 hrs)
Trip out for casing (2 hrs)
Rig-up to run 7" casing (0.5 hrs)
Run casing (1 hrs)
Continue run casing (3.5 hrs)
Run 3.5 drill pipe w/stinger (1 hrs)
Continue run 3.5" pipe (2 hrs)
Rig up and cement w/Sanjel (1.5 hrs)
Pull 3.5" drill pipe (1.5 hrs)
Rig up cementer to backside to pump (1 hrs)
Wait on cement (2 hrs)
Comments: Ran casing and cemented w/Sanjel. No returns during cement job. Performing cement squeeze in AM
Mud Data: MW: 8.5 Viscosity: 33 Filtrate: 13.2
Surveys: None
Daily Costs ($): 88,194 Well Costs ($): 843,164
Drilling Days: 10 Completion Days: 0 Workover Days: 0

Current Depth (ft): 1,476.0 Hole Drilled (ft): 0.0 Ave ROP:
Current Ops: WOC
Operation Summary:
Wait on cement (8 hrs)
Wait on cement (6.5 hrs)
Rig up and mix cement (1.5 hrs)
Cement squeeze from surface to loss circulation zone (1 hrs)
Clean up - WOC (to 08:00 Feb 20) (31 hrs)
Comments: Performed cement squeeze down annulus to loss circ zone. WOC +/- 18 hrs
Mud Data: None
Surveys: None
Daily Costs ($): 24,651 Well Costs ($): 867,814
Drilling Days: 11 Completion Days: 0 Workover Days: 0
### Well Summary Report

**Well ID: 56-4**  
**Field: Reeseo River**  
**Fields: Sect: 4 Town: 23N Rng: 43E County: Lander State: NV**  
**Sierra Geothermal Power**  
**Well Name: RR-1**

<table>
<thead>
<tr>
<th>Date</th>
<th>Current Depth (ft)</th>
<th>Hole Drilled (ft)</th>
<th>Ave ROP:</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-Feb-07</td>
<td>1,476.0</td>
<td>0.0</td>
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</tr>
<tr>
<td></td>
<td>Picking up BHA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation Summary:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WOC (8 hrs)</td>
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<td></td>
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<tr>
<td>WOC (3 hrs)</td>
<td></td>
<td></td>
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<tr>
<td>Pick up BOP and cut off 7&quot; casing, Install tool guide and lower BOP onto flange (4 hrs)</td>
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<tr>
<td>Pick-up kelly (1 hrs)</td>
<td></td>
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<tr>
<td>Pressure testing (5.5 hrs)</td>
<td></td>
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<tr>
<td>Lay down 16 lts of drill pipe (2.5 hrs)</td>
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<td></td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mud Data:</td>
<td>MW: 8.45</td>
<td>Viscosity: 33</td>
<td>Filtrate: 12.4</td>
</tr>
<tr>
<td>Surveys:</td>
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<tr>
<td>Daily Costs ($)</td>
<td>51,080</td>
<td>Well Costs ($)</td>
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<td>Drilling Days:</td>
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<tr>
<td>Workover Days:</td>
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</table>

<table>
<thead>
<tr>
<th>Date</th>
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<tbody>
<tr>
<td>21-Feb-07</td>
<td>1,415.0</td>
<td>-61.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Working stuck pipe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation Summary:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Make up BHA &amp; kelly bushing/RH (5 hrs)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Drill-out shoe and cement - tag at 1410 (1 hrs)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Work stuck pipe (2 hrs)</td>
<td></td>
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<td></td>
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<tr>
<td>Work stuck pipe (8 hrs)</td>
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<td></td>
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</tr>
<tr>
<td>Work stuck pipe (2 hrs)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Work stuck pipe (6 hrs)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mud Data:</td>
<td>MW: 8.45</td>
<td>Viscosity: 43</td>
<td>Filtrate: 12.4</td>
</tr>
<tr>
<td>Surveys:</td>
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</tr>
<tr>
<td>Daily Costs ($)</td>
<td>24,456</td>
<td>Well Costs ($)</td>
<td>943,351</td>
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<td>Drilling Days:</td>
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<td>Completion Days:</td>
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<tr>
<td>Workover Days:</td>
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</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Current Depth (ft)</th>
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<th>Ave ROP:</th>
</tr>
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<tbody>
<tr>
<td>22-Feb-07</td>
<td>1,415.0</td>
<td>0.0</td>
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</tr>
<tr>
<td></td>
<td>Jarring - fishing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation Summary:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work stuck pipe (8 hrs)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Work stuck pipe (6 hrs)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Break kelly and goosneck off, rig-up Baker Atlas to run free point and back off. Tagged obstruction at next collar. (2 hrs)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Shoot off collars, pull out of hole w/wireline and rig down Baker Atlas (1 hrs)</td>
<td></td>
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<tr>
<td>POOH - 16 1/2 stands of drill pipes, 9 joints of drill collars - pick up fishing tools (1 hrs)</td>
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<tr>
<td>RIW w/fishing tools and drill collars (1 hrs)</td>
<td></td>
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</tr>
<tr>
<td>Rip-up gooseneck and kelly hose (1 hrs)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RIH w/ 15 1/2 stands of drill collars (1.5 hrs)</td>
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<td></td>
</tr>
<tr>
<td>Begin fishing operations - jarring (2.5 hrs)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comments:</td>
<td>Ran free-point and back-off tools. Could not get past obstruction at 1316. Back off at 1311 and began fishing operations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mud Data:</td>
<td>MW: 8.45</td>
<td>Viscosity: 40</td>
<td>Filtrate: 13.2</td>
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<tr>
<td>Surveys:</td>
<td>None</td>
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</tr>
<tr>
<td>Daily Costs ($)</td>
<td>44,018</td>
<td>Well Costs ($)</td>
<td>987,369</td>
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</tbody>
</table>
### Drilling Days: 23-Feb-07

- **Current Depth (ft):** 1,415.0
- **Hole Drilled (ft):** 0.0
- **Ave ROP:**

**Operation Summary:**
- Fishing/jarring operations (8 hrs)
- Wait on coiled tubing equipment (8 hrs)
- Wait on coiled tubing equipment (8 hrs)

**Comments:** Fishing operation unsuccessful. Stop jarring at 07:00. Called for coiled tubing services and wait on services. Baker Atlas on stand-by in Fallon, Weatherford on location.

**Mud Data:** None

**Surveys:** None

- **Daily Costs ($):** 21,184
- **Well Costs ($) :** 1,008,553

### Drilling Days: 24-Feb-07

- **Current Depth (ft):** 1,415.0
- **Hole Drilled (ft):** 0.0
- **Ave ROP:**

**Operation Summary:**
- Tripping pipe put of hole - recovered 3 collars and 1 reamer (96.41 ft) - stabilizer, cross-over, reamer and bit remaining in wellbore (12.11 ft)
- Wait on coiled tubing equipment (8 hrs)
- Wait on coiled tubing equipment (6 hrs)
- Rig-up coiled tubing equipment (2 hrs)
- Continue rig-up coiled tubing (2 hrs)
- RIH w/coiled tubing and wash out drill pipe/drill collars/BHA. Tag bottom at 1442 ft (top of first reamer) 1
- Rig up and run free point and back off. Back off at top of first stabilizer - 12.11 ft of fish still in well (1.5 t
- Trip out of hole w/1415.57 of pipe, collars, fishing tools and partial fish (95.41 ft) (1 hrs)
- Continue trip out of hole (1 hrs)

**Comments:** Ran Sanjel coiled tubing down drillstring to top of first reamer. Circulated hole clean and pulled out. Ran free-point and back off and started pulling drillstring from hole.

**Mud Data:** 
- MW: 8.5
- Viscosity: 32
- Filtrate: 14.8

**Surveys:**
- 1363ft - 3.75 deg Inc., deg Az;

- **Daily Costs ($):** 102,923
- **Well Costs ($) :** 1,111,476

### Drilling Days: 25-Feb-07

- **Current Depth (ft):** 1,415.0
- **Hole Drilled (ft):** 0.0
- **Ave ROP:**

**Operation Summary:**
- Waiting on orders
- Lay down tools (0.5 hrs)
- Make-up fishing tools, RIH w/fishing tools (3 hrs)
- Circulate casing to top of fish (1.5 hrs)
- Jar fish - no progress (3 hrs)
- Continue jar fish - no progress (2 hrs)
- Rig up Baker Atlas - back off tools (1 hrs)
- POOH w/fishing string (2 hrs)
- Laydown drill collar and fishing tools (3 hrs)
- Wait on orders (6 hrs)

**Comments:**

**Mud Data:** 
- MW: 8.5
- Viscosity: 36
- Filtrate: 13.6

**Surveys:** None

- **Daily Costs ($):** 44,517
- **Well Costs ($) :** 1,155,993
# Well Summary Report

**Well ID:** 56-4  
**Field:** Reese River  
**Well Name:** RR-1  
**Sect:** 4  **Town:** 23N  **Rng:** 43E  **County:** Lander  **State:** NV

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Drilling Days</th>
<th>Completion Days</th>
<th>Workover Days</th>
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<td>27-Feb-07</td>
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<td>18</td>
<td>0</td>
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<tr>
<td>28-Feb-07</td>
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<td>19</td>
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<td>0</td>
</tr>
<tr>
<td>01-Mar-07</td>
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<td>20</td>
<td>0</td>
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<table>
<thead>
<tr>
<th>Date</th>
<th>Current Depth (ft)</th>
<th>Hole Drilled (ft)</th>
<th>Ave ROP:</th>
</tr>
</thead>
<tbody>
<tr>
<td>26-Feb-07</td>
<td>1,415.0</td>
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</tr>
<tr>
<td>27-Feb-07</td>
<td>1,415.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>28-Feb-07</td>
<td>1,415.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>01-Mar-07</td>
<td>1,386.0</td>
<td>-26.0</td>
<td></td>
</tr>
</tbody>
</table>

**Current OPerations:**
- Waiting on tools from Baker Oil Tools to sidetrack
- Waiting on orders (8 hrs)
- Waiting on tools (8 hrs)
- Waiting on tools (3.5 hrs)
- Pick-up tools to run retainer (0.5 hrs)
- Retainer set at 40.97" KB (1 hrs)
- Rig-up to mill out retainer (0.5 hrs)
- Mill retainer (2.5 hrs)

**Comments:**
- Mud Data: None
- Surveys: None

**Daily Costs ($):**
- 28,959
- 40,773
- 34,436
- 1,260,161

**Well Costs ($):**
- 1,184,953
- 1,225,726
- 1,260,161

**Operation Summary:**
- Milling retainer
- Continue mill retainer (8 hrs)
- Continue mill retainer (8 hrs)
- Continue mill retainer (6 hrs)
- Retainer milled off/RH with mill and drill string to bottom to clear 7" casing for permanent retainer and sidetrack tools (1 hrs)
- Circulate and condition mud on bottom (1 hrs)

**Mud Data:**
- MW: 8.5  
- Viscosity: 47  
- Filtrate: 17.6

**Surveys:**
- None

**Printed:** 16:43 02-Apr-07  
**Page:** 9 of 17

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Sierra Geothermal Power Corporation, 56-4 End of Well Report
Well Summary Report

Well ID: 56-4
Field: Reese River

Sierra Geothermal Power
Well Name: RR-1
Sect: 4  Town: 23N  Rng: 43E  County: Lander  State: NV

Operation Summary:
Laydown mill and pick-up retainer (1 hrs)
RH w/retainer (2.5 hrs)
Set plug at 1382' (1 hrs)
Service rig (0.5 hrs)
POOH from 1382' (1.5 hrs)
Laydown tools (0.5 hrs)
Pick-up sidetrack tools and RH (3.5 hrs)
Mill sidetrack window (4.5 hrs)
Continue to mill window (5 hrs)
Circulate hole clean (1 hrs)
POOH (mill tight spots) - lay-down mills (2 hrs)

Comments:
Retainer set at 1391' (top)
Whipstock window milled at 1373' - 1386' (joint #3 of 7" casing)

Mud Data:
MW: 8.55  Viscosity: 40  Filtrate: 8.8

Surveys: None

Daily Costs ($): 23,050  Well Costs ($): 1,233,212
Drilling Days: 21  Completion Days: 0  Workover Days: 0

02-Mar-07

Current Depth (ft): 1,484.0  Hole Drilled (ft): 98.0  Ave ROP:

Current Ops: Drilling 6 1/8" hole back to initial TD

Operation Summary:
Make up 5 1/8" bit (0.5 hrs)
RH to 1373' (1.5 hrs)
Ream out whipstock from 1373' to 1386' (1.5 hrs)
Drill from 1386' to 1391' (4.5 hrs)
Drill from 1391' to 1423' (6 hrs)
Survey @ 1384' 1.75', Temp 126°F (0.5 hrs)
Drill from 1423' to 1424' (2.5 hrs)
Drill from 1424' to 1484' (6.5 hrs)
Survey @ 1453' (0.5 hrs)
POOH (1 hrs)

Comments:
Drilled from 1423' to 1484'
Bottom hole temp at survey depth 126°F@1384'
Bottom hole temp at survey depth 128°F@1453'

Mud Data:
MW: 8.6  Viscosity: 39  Filtrate: 7.5

Surveys: 1384'ft - 1.75 deg Inc, deg Az

Daily Costs ($): 116,174  Well Costs ($): 1,399,385
Drilling Days: 22  Completion Days: 0  Workover Days: 0

03-Mar-07

Current Depth (ft): 1,554.0  Hole Drilled (ft): 76.0  Ave ROP: 7.78

Current Ops: Drilling ahead at 1554'

Operation Summary:
Make-up BHA/RH to 1373' (3 hrs)
Reaming from 1323' to 1428' (5 hrs)
Reaming from 1428' to 1484' (0.5 hrs)
Drill from 1484' to 1492' (1 hrs)
Survey at 1363' (0.5 hrs)
POOH-laydown 4 singles-pick up drilling jars (2 hrs)
Rig service (0.5 hrs)
Strap pipe-pick up 4-4 3/4" drill collars-RH-repair Kelly (2 hrs)
<table>
<thead>
<tr>
<th>Date</th>
<th>Current Depth (ft)</th>
<th>Hole Drilled (ft)</th>
<th>Ave ROP</th>
<th>Daily Costs ($)</th>
<th>Well Costs ($)</th>
<th>Drilling Days</th>
<th>Completion Days</th>
<th>Workover Days</th>
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## Well Summary Report

**Well ID:** 56-4  
**Field:** Reese River  
**Well Name:** RR-1  
**Sect:** 4  
**Town:** 23N  
**Rng:** 43E  
**County:** Lander  
**State:** NV

### Rig Service
- Drill 5 1/8" from 1937 ft to 1990 ft (5.5 hrs)
- Drill 6 1/8" from 1990 ft to 2000 ft (1.5 hrs)
- Mis-run survey (0.5 hrs)
- Wiper Trip to 1290 ft (1 hrs)
- Drill 6 1/8" from 2000 ft to 2028 ft (5 hrs)

**Comments:** Bottom hole temp at survey depth 144°F@1876'  
Bottom hole temp at survey depth 145°F@2000'

### Mud Data
- **MW:** 8.7  
- **Viscosity:** 35  
- **Filtrate:**

### Surveys
- 2028ft - 6 deg Inc, deg Az;

### Daily Costs ($)
- 23,846

### Well Costs ($)
- 1,530,854

### Drilling Days
- 26  
**Completion Days:** 0  
**Workover Days:** 0

#### 07-Mar-07
- **Current Depth (ft):** 2,083.0  
- **Hole Drilled (ft):** 57.0  
- **Ave ROP:** 4.75

**Operation Summary:**
- Drill 6 1/8" from 2026 ft to 2030 ft (1.5 hrs)
- Survey 6" (0.5 hrs)
- Drill 6 1/8" from 2030 ft to 2038 ft (2 hrs)
- Circulate and condition mud, pump pill (0.5 hrs)
- Bit trip (3.5 hrs)
- Rig service (0.5 hrs)
- Trip to bottom (2 hrs)
- Drill 6 1/8" from 2038 ft to 2066 ft (5.5 hrs)
- Drill 6 1/8" from 2066 ft to 2070 ft (0.5 hrs)
- Circulate well/wait on orders. No communications at well site, operations suspended until communication restored at 10:30
- Comments: Bottom hole temp at survey depth 145°F@2030'
  
**Mud Data:**
- **MW:** 8.7  
- **Viscosity:** 35  
- **Filtrate:** 8.4

**Surveys:**
- None

### Daily Costs ($)
- 42,630

### Well Costs ($)
- 1,543,465

### Drilling Days
- 27  
**Completion Days:** 0  
**Workover Days:** 0

#### 08-Mar-07
- **Current Depth (ft):** 2,270.0  
- **Hole Drilled (ft):** 187.0  
- **Ave ROP:** 8.13

**Operation Summary:**
- Drill 6 1/8" from 2083 ft to 2121 ft (4 hrs)
- Survey 5 3/4" - 146°F (0.5 hrs)
- Drill 6 1/8" from 2121 ft to 2150 ft (3.5 hrs)
- Drill 6 1/8" from 2150 ft to 2226 ft (9 hrs)
- Drill 6 1/8" from 2226 ft to 2244 ft (3.5 hrs)
- Survey (0.5 hrs)
- Drill 6 1/8" from 2244 ft to 2270 ft (4 hrs)
# Well Summary Report

**Well Name:** RR-1  
**Field:** Reese River  
**Well ID:** 56-4  
**Sect:** 4  
**Town:** 23N  
**Rng:** 43E  
**County:** Lander  
**State:** NV

### 09-Mar-07

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<th>Current Depth (ft):</th>
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<th>Hole Drilled (ft):</th>
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<th>Ave ROP:</th>
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<td><strong>Current Ops:</strong></td>
<td>Drilling ahead</td>
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<tr>
<td><strong>Operation Summary:</strong></td>
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<tr>
<td>Drill 6 1/8&quot; from 2270 ft to 2275 ft (1 hrs)</td>
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<tr>
<td>Survey 6 1/4&quot; (0.5 hrs)</td>
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<tr>
<td>Drill 6 1/8&quot; from 2275 ft to 2337 ft (6.5 hrs)</td>
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<td>Drill 6 1/8&quot; from 2337 ft to 2408 ft (8 hrs)</td>
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<td>Drill 6 1/8&quot; from 2408 ft to 2435 ft (3.5 hrs)</td>
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<tr>
<td>Survey 4&quot; (0.5 hrs)</td>
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<tr>
<td>Drill 6 1/8&quot; from 2435 ft to 2461 ft (4 hrs)</td>
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### 10-Mar-07

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<td><strong>Current Ops:</strong></td>
<td>Drilling ahead</td>
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<tr>
<td><strong>Operation Summary:</strong></td>
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<tr>
<td>Drill 6 1/8&quot; from 2461 ft to 2515 ft (8 hrs)</td>
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<tr>
<td>Drill 6 1/8&quot; from 2515 ft to 2524 ft (1 hrs)</td>
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<tr>
<td>POOH (2.5 hrs)</td>
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<tr>
<td>Rig service (0.5 hrs)</td>
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<tr>
<td>Make-up BHA (2 hrs)</td>
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<tr>
<td>Continue make-up BHA (2 hrs)</td>
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<tr>
<td>RIH (1.5 hrs)</td>
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<tr>
<td>Drill 6 1/8&quot; from 2524 ft to 2570 ft (6.5 hrs)</td>
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### 11-Mar-07

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<td><strong>Operation Summary:</strong></td>
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<tr>
<td>Drill 6 1/8&quot; from 2570 ft to 2619 ft (8 hrs)</td>
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<tr>
<td>Drill 6 1/8&quot; from 2519 ft to 2646 ft (2 hrs)</td>
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<tr>
<td>Survey (0.5 hrs)</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Drill 6 1/8&quot; from 2646 ft to 2710 ft (5.5 hrs)</td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Drill from 2710 ft to 2740 ft (5 hrs)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Survey (0.5 hrs)</td>
<td></td>
<td></td>
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</tbody>
</table>
### Well Summary Report

**Sierra Geothermal Power**

**Well ID:** 56-4  
**Field:** Reese River  
**Section:** 4  
**Town:** 23N  
**Rng.:** 43E  
**County:** Lander  
**State:** NV

#### Drill 6 1/8" from 2740 ft to 2755 ft (2.5 hrs)

**Comments:** Bottom hole temp at survey depth 175°F @ 2740 ft (suspect incorrect reading)

**Mud Data:**  
MW: 8.9  
Viscosity: 36  
Filtrate: 

**Surveys:**  
2646 ft - 2.25 deg Inc. deg Az; 2768 ft - 2 deg Inc. deg Az;

**Daily Costs ($):** 23,966  
**Well Costs ($):** 1,647,169

**Drilling Days:** 31  
**Completion Days:** 0  
**Workover Days:** 0

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<thead>
<tr>
<th>Date</th>
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<th>Hole Drilled (ft)</th>
<th>Ave ROP</th>
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<td>14-Mar-07</td>
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</table>

**Operation Summary:**

- **Drill 6 1/8" from 2755 ft to 2817 ft (8 hrs)**
- **Drill 6 1/8" from 2817 ft to 2836 ft (1.5 hrs)**
- **Survey (0.5 hrs)**
- **Drill 6 1/8" from 2836 ft to 2855 ft (3 hrs)**
- **Circulate hole clean (0.5 hrs)**
- **Drill 6 1/8" from 2855 ft to 2876 ft (2.5 hrs)**
- **Drill 6 1/8" from 2876 ft to 2938 ft (3 hrs)**

**Comments:** Bottom hole temp at survey depth 165°F @ 2836 ft

**Mud Data:**  
MW: 8.9  
Viscosity: 36  
Filtrate: 

**Surveys:** None

**Daily Costs ($):** 30,764  
**Well Costs ($):** 1,678,253

**Drilling Days:** 32  
**Completion Days:** 0  
**Workover Days:** 0

**Operation Summary:**

- **Drill 6 1/8" from 2938 ft to 2994 ft (2 hrs)**
- **Survey-185° (0.5 hrs)**
- **Drill 6 1/8" from 2964 ft to 3011 ft (5.5 hrs)**
- **Drill 6 1/8" from 3011 ft to 3028 ft-loss of circulation, mix pill (1.5 hrs)**
- **Drill 6 1/8" from 3028 ft to 3038 ft-stop for survey (1.5 hrs)**
- **Survey-wireline separated (0.5 hrs)**
- **Trip out-out wet-retrieve survey tool and thermometer 187°F (2.5 hrs)**
- **Rig service (0.5 hrs)**
- **Make-up BHA (1.5 hrs)**

**Comments:** 
- Bottom hole temp at survey depth 135°F @ 2964 ft
- Experienced minor circulation loss when making connection-pumped LCM and recovered full circulation
- Survey wireline separated when pulling out of hole on 3028 ft survey-trip out and check bbl/RH and continue drilling
- Bottom hole temp at survey depth 187°F @ 3028 ft

**Mud Data:**  
MW: 8.9  
Viscosity: 32  
Filtrate: 9.6

**Surveys:**  
2964 ft - 4 deg Inc. deg Az; 3028 ft - 2.25 deg Inc. deg Az;

**Daily Costs ($):** 27,173  
**Well Costs ($):** 1,705,426

**Drilling Days:** 33  
**Completion Days:** 0  
**Workover Days:** 0

**Operation Summary:**

- **Drill 6 1/8" from 3076 ft to 3166 ft-losing 20 bbl/hr (8 hrs)**

---

Sierra Geothermal Power Corporation, 56-4 End of Well Report  
17 of 499
<table>
<thead>
<tr>
<th>Date</th>
<th>Current Depth (ft)</th>
<th>Hole Drilled (ft)</th>
<th>Ave ROP</th>
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<td>Hole Drilled (ft)</td>
<td>Ave ROP</td>
<td>Current Ops</td>
<td>Operation Summary</td>
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<tr>
<td>18-Mar-07</td>
<td>3,930.0</td>
<td>0.0</td>
<td></td>
<td>Trip out of hole with drill string</td>
<td>M/U bt and RIH to 3902-kelly up and clean out to 3930 (2.5 hrs)</td>
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<tr>
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<td>Circulate and condition hole-circulate out 10 ft of fill (5.5 hrs)</td>
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<td>Circulate and condition hole-mix pill and circulate (1.5 hrs)</td>
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<td></td>
<td>Lay down 40 joints of drill pipe (2 hrs)</td>
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<td>PCOH-23 stands/break kelly (1.5 hrs)</td>
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<td>Lay down 6 joints of drill pipe (0.5 hrs)</td>
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<td>PCOH (2.5 hrs)</td>
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<td>Run 5&quot; slotted liner (4 hrs)</td>
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<td>RIH w/drill pipe and /and 5&quot; slotted liner on bottom (2.5 hrs)</td>
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<td>PCOH w/drill string (1.5 hrs)</td>
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<td>Tripping out w/driftstring</td>
<td>Lay down drill pipe and drill collars (8 hrs)</td>
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<td>Lay down drill collars (0.5 hrs)</td>
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<td>Lay down Kelly, rat hole/mouse hole (2.5 hrs)</td>
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<td>Nipple down BOP (3 hrs)</td>
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<td></td>
<td></td>
<td>Rig Down (2 hrs)</td>
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<td></td>
<td></td>
<td>Cut off casing and weld 7&quot; casing head, install master valve. Survey to TD (2°-260°F @ 3930). Fill casir water. Continue rig down. (8 hrs)</td>
<td></td>
</tr>
<tr>
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<td></td>
<td>Final survey 2° - 260°F</td>
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<tr>
<td>20-Mar-07</td>
<td>3,930.0</td>
<td>0.0</td>
<td></td>
<td>RIG RELEASE 16:00 - MAR 20</td>
<td>Rigging down</td>
<td></td>
</tr>
</tbody>
</table>

**Drill 6 1/8" from 3878 ft to 3930 ft (2.5 hrs)**
**Mix pill and circulate hole clean (1 hrs)**
**PCOH-laydown BHA (4.5 hrs)**

**Comments:**
- 15 bbl/hr losses 00:00-08:00 shift
- 7.5 bbl/hr losses 08:00-16:00 shift

**Mud Data:**
- MW: Viscosity: Filtrate: None

**Surveys:**

**Daily Costs ($)**: 20,289  **Well Costs ($)**: 1,820,162

**Drilling Days**: 37  **Completion Days**: 0  **Workover Days**: 0
<table>
<thead>
<tr>
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<td>22-Mar-07</td>
<td>3,930.0</td>
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**Operation Summary:**
- Drilling rig rig-down (8 hrs)
- Rig-up Cogco Wireline (1 hr)
- Run Pressure/Temperature Logs to TD (1 hr)
- Set logging tools at depth and begin injection tests at 100 GPM (0.8333333 hrs)
- 100 GPM test completed - increase rate to 200 GPM (1.5 hrs)
- Shut down fluid pump to repair leak (1.666667 hrs)
- Leak repaired - start pumping at 300 GPM (0.1666667 hrs)
- Shut down fluid pump to repair leak (1.166667 hrs)
- Leak repaired - continue 300 GPM test (0.0333333 hrs)
- End of 300 GPM test - shut down fluid pump - begin leak off test (0.1666667 hrs)
- End of leak off test - begin POOH w/Cogco equipment (0.9166667 hrs)
- Equipment at surface - begin R/D Cogco equipment (0.3333333 hrs)
- Rig-down Cogco Equipment (0.5 hrs)
- Continue drilling rig rig-down (6.5 hrs)

**Comments:**
- Injection test completed

**Mud Data:**
- None

**Surveys:**
- None

**Daily Costs ($)**
- 23,150

**Well Costs ($)**
- 1,908,071
Appendix B: Mud Log
Well Name: Reese River #56-4
Location: Section 56-4, Township 23N, Range 43E
Licence Number: State Permit #667
Spud Date: Feb 9, 2007
Drilling Completed: March 17, 2007
Region: Lander County
Surface Coordinates: Lat: 39° 53' 18.49
Long: 117° 8' 34.66
Bottom Hole Coordinates: same as above
Ground Elevation (ft): 5703.1
K.B. Elevation (ft): 22.0
Logged Interval (ft): 0 To: TD
Total Depth (ft): 3930
Formation: PreCambrian Limestone
Type of Drilling Fluid: Gelchem, Water to TD

OPERATOR
Company: Sierra Geothermal
Address: 304-850 Burrard St.
Vancouver British Columbia V6Z 2J1

GEOLOGIST
Name: Craig Dunn
Company: WellDunn Consulting
Address: 29 Springborough Pt. SW
Calgary, Alberta
T3H 5T5

Cores

DSTs

Comments
Well Name - Reese River RR-1
Section 56-4, Township 23N, Range 43E
Lat: 39° 53' 18.49
Long: 117° 8' 34.66
GE: 5703.11ft      KB: 22.0ft
Spud -09/02/07
TD- ??

20-60 Alluvium deposits; Sandstone (90%): light brown/beige light, fine grained, sl silty, occ medium to coarse grains, minor volcanic sediments, minor Fe alteration/limonite; Volcanic: (10%); green grey, very fine grained, tr lt gy shale; Tr quartzite.
60-70 Shale (80%): light green grey, occ wht/v it gy, sity, minor medium to coarse quartz grains, minor volcanic clasts, occ alteration zones with gold mineral (pyrite flakes?), occ grdg to limonite.; Sandstone (20%): Alluvium sediments, as above.

70-80 Shale (100%): light grey, very light greenish grey, very sity, trace medium quartz grains, trace volcanic clasts, occ Fe oxidized alteration/mineralized zones (sphalerite?).

80-100 Shale (100%): light grey, very light greenish grey, very sity, trace quartz grains, occ volcanic clasts, abnt Fe sulfide minerals (sphalerite, chalcopyrite, pyrite), tr quartz deposits.

100-110 Sandstone (70%): light greyish brown, silty mnr grading to Siltstone, pred quartz with minor mafic, minor Fe mineralization, occassional bedding planes, tight porosity ; Shale (30%): light grey, very light greenish grey, sity, abnt Fe sulfide minerals, occ quartz inclusions/veining.

110-120 Sandstone (50%): light greyish brown, very silty grading to Siltstone, pred quartz with minor mafic, trace Fe mineralization, rare bedding planes, tight porosity ; Shale (50%): light grey, very light greenish grey, very silty, trace sand, trace Fe sulfide minerals,

120-150 Shale (100%): light grey, beige, very light greenish grey, very sity, trace sand, tr Fe sulfide minerals throughout and occassional veins/pockets of deposition w quartz.

130-170 Shale (70%): light grey/wht, occ very light greenish grey, very sity, trace sand, tr Fe sulfide minerals throughout and occassional veins/pockets of deposition w quartz; Siltstone (30%): light grey, sl sandy, occ mafic sand, quartz rich, tight porosity.

170-190 Shale (80%): light grey, very light greenish grey, sity, tr Fe sulfide minerals, occ pockets of mineralization, tr med quartz grains; Siltstone (20%): light grey, abnt arg w minor sand grains, poor porosity.

190-200 Shale (100%): light grey, very light greenish grey, sity, tr Fe sulfide minerals, rare well crystallized pyrite with quartz.

200-230 Shale (100%): light grey, very light beige, slightly sity, tr Fe sulfide minerals, occassional loose Fe sulphide minerals (chalcopyrite, pyrite).

230-260 Shale (100%): light grey, very light beige, slightly sity in part grading to Siltstone, rare Fe sulfide minerals through out, but occassional loose Fe sulphide minerals (chalcopyrite, pyrite).

260-270 Shale (80%): light grey, light beige, tr very light brown, sity in part grading to Siltstone(20%): trace loose Fe sulphide minerals (chalcopyrite, pyrite).
270-310 Shale (100%): light grey, very light greenish grey, tr wht, sl silty, tr sand, tr Fe sulfide minerals.

310-320 Shale (80%): light grey, very light greenish grey, tr wht, sl silty, tr sand, tr Fe sulfide minerals; Siltstone (20%): light grey, very light brown, arg, minor sand grains, tight porosity, well consolidated.

320-330 Shale (100%): light grey, very light greenish grey, tr wht, sl silty, tr sand, tr Fe sulfide minerals.

330-350 Shale (75%): light grey, very light greenish grey, tr wht, sl silty, tr sand, minor Fe sulfide minerals through out with minor veining; Siltstone (25%): light grey, very light brown/beige, arg, tr sand grains, sl banding/bedding, tight porosity, well consolidated.

350-390 Shale (70%): light grey, tr wht, sl silty, tr sand, minor Fe sulfide minerals through out; Volcanic Sandstone (30%): light grey, very light brown/beige, fine grained, sl arg, occ m sand grains, tight porosity, well consolidated.

390-410 Shale (100%): v light grey, tr wht, sl silty occ grdg to siltstone, rr sand, tr Fe sulfide minerals, tr biotite.

410-420 Shale (50%): light grey, tr wht, sl silty, tr sand, tr biotite; Volcanic Sandstone (50%): light- medium grey, slightly silty, mnr arg, fine-med grained poorly sorted, quartz w tr calc cmt, 3-6% porosity.

420-430 Volcanic Sandstone (80%): light- medium grey, slightly silty, mnr arg, fine-med grained poorly sorted, quartz w tr calc cmt, 3-6% porosity; Shale (20%): light grey, tr wht, sl silty, tr sand, tr biotite.

430-440 Tuffaceous Shale (50%): blue grey, light to med grey, very quartz rich, argillic alteration, no bedding plane, minor fracturing; Shale (30%): light grey, tr wht, sl silty, tr sand; Volcanic Sandstone (20%): light- medium grey, slightly silty, mnr arg, fine-med grained, poorly sorted, quartz w tr calc cmt, 3-6% porosity.

440-460 Shale (60%): light grey, tr wht, sl silty, tr sand; Sandstone (30%): light- medium grey, sl silty, mnr arg, w sand grains, fine-med grained, quartz w tr calc cmt, 3-6% porosity; Tuffaceous Shale (10%): aa.

460-480 Volcanic Sandstone (100%): light grey, biege, sl silty, fine-med grained, poorly sorted, tr calcite, tr tuffaceous grey blue grey shale.

480-500 Volcanic Sandstone (90%): light grey, biege, fine-med grained, occ med grey (fine to very fine grained), abnt calcite; Shale (10%); very light grey, tr silty, well indurated.
500-520 Volcanic Sandstone (100%): light grey, biege, fine-med grained, occ med grey (fine to very fine grained), mnr calcite, tight porosity.

520-540 Volcanic Sandstone (100%): beige, v light grey, quartz rich, tr lt gy, pred fine grained, tr biotite, tr med-coarse grained quartz crystals, tight porosity.

540-570 Volcanic Sandstone (100%): pred light grey, mnr beige, v light grey, pred fine grained, mnr quartz grains, tr biotite, tr light green shale, tight porosity.

570-600 Volcanic Sandstone (100%): pred light grey, tr whitish yellow, pred fine grained, tr biotite, occ coarse quartz grains, tight -3% porosity.

600-620 Volcanic Sandstone (100%): pred very light grey, sl blueish white, very fine to fine grained, tr Fe sulphide minerals, tr biotite, tr medium quartz grains.

620-640 Volcanic Sandstone (100%): pred very light grey, tr whitish yellow, very fine to fine grained, tr biotite, tr Fe Sulphide minerals, occ coarse quartz grains.

640-650 Volcanic Sandstone (100%): pred very light grey, mnr light blue grey, very fine grained, occ fine grained, very well indurated, tr biotite, tr Fe Sulphide minerals.

650-660 Volcanic Sandstone (100%): pred light grey, tr whitish yellow, very fine to fine grained, tr biotite, rare coarse quartz grains.

660-680 Volcanic Sandstone (100%): pred very light grey, light blue grey, very fine grained to microcrystalline, tr fine grained, very well indurated, tr biotite, tr Fe Sulphide minerals.

680-690 Volcanic Sandstone (100%): very light grey, light blue grey, very fine grained, tr fine grained, very well indurated, tr Fe Sulphide minerals in small viens, tr medium quartz crystals.

690-710 Volcanic Sandstone (100%): very light grey/wht, tr light blue grey, very fine to fine grained, sl sily, well indurated, tr biotite, tr medium to coarse quartz crystals.
710-740 Volcanic Sandstone (100%): very light grey/wht, tr light blue grey, specs of fine mafic rock, very fine to fine grained, sl silty, well indurated, tr biotite, tr medium to coarse quartz crystals.

740-790 Poor sampling quality- sample unavailable.

790-820 Volcanic Sandstone (100%): wht, very light grey, tr light blue grey, pred very fine grained grading to silty, mnr very fine grained, well indurated, tr calcite, rr mafic sediments.

820-830 Volcanic Sandstone (90%): white, very light grey, mnr light blue grey, very fine to fine grained, sl silty, well indurated, tr calcite, mnr mafic sediments. Shale (10%): dark blue grey, blocky (non-bedded), very well indurated, tr quartz veining.

830-840 Volcanic Sandstone (55%): white, very light grey, very fine to fine grained, sl silty, well indurated, tr calcite; Shale (30%): dark blue grey, blocky, very well indurated, tr qtz veining; Quartz (15%): clear, frosted, blocky, subrounded, mnr fractured, (veining?).

840-850 Shale (65%): dark grey, blue grey, blocky, well indurated, tr pyrite, occ quartz veining; Volcanic Sandstone (25%): white, very light grey, very fine to fine grained, tr pyrite; Quartz (10%): clear, frosted, blocky, subrounded, mnr fractured.

850-860 Volcanic Sandstone (90%): white, very light grey, very fine to fine grained, mnr silty, well indurated, tr mafic sediments; Shale (10%): dark blue grey, blocky, very well indurated, tr qtz veining; Quartz (10%): clear, blocky.

860-870 Shale (85%): dark grey, blue grey, blocky, very well indurated, tr silty, rr pyrite; Shale (10%): aa; SS (5%): aa.

870-890 Shale (100%): dark gray to black, blocky, very well indurated, sl silty, mnr pyrite, rr quartz veining.

890-900 Shale (75%): dark grey, blue grey, blocky, well indurated, tr pyrite, tr qtz veining; Quartz (20%): clear, frosted, blocky, subrounded, mnr fractured; Volcanic Sandstone (5%): white, very light grey, very fine to fine grained, tr pyrite.

900-920 Shale (60%): dark blueish gray, blocky, very well indurated, abnt contacts with quartz veins; Quartz (40%): light gray, frosted, mnr clear, blocky, subrounded to subangular.

920-930 Shale (70%): dark blueish gray, blocky, very well indurated, abnt contacts with quartz veins, quartz infused; Quartz (30%): light gray, frosted, blocky, fine to medium crystalization, subrounded to subangular.

930-940 Shale (70%): dark blueish gray, blocky, very well indurated,
abnt contacts with quartz veins, quartz infused; Volcanic Sandstone (20%): light gray, very fine grained, tr silty, tight porosity; Quartz (10%); aa.

940-950 Shale (95%): dark gray to black, blocky, very well indurated, tr pyrite, occ quartz contacts; Quartz (5%): clear, light blue gray, blocky, fractured/angular.

950-970 Shale (90%): dark gray, minor medium gray, blocky, tr quartz contacts, tr pyrite, very well indurated; Sandstone (10%): light gray, very fine grained, sl silty.

970-980 Shale (100%): dark gray, tr medium gray, blocky, very well indurated, tr quartz crystals/contacts, tr pyrite.

980-1000 Shale (100%): dark gray, blocky, very well indurated, tr quartz crystals/contacts, mnr pyrite (veining and speckled).

1000-1020 Shale (90%): dark gray, blocky, very well indurated, abnt quartz veining (10%), mnr pyrite (veining and speckled).

1020-1040 Shale (75%): dark gray, blocky, very well indurated, abnt quartz veining, tr pyrite; Quartz (25%): clr, frosted lt gy, blocky, angular/fractured.

1040-1050 Shale (90%): med - dark gray, blocky, very well indurated, abnt quartz veining, sl silty, tr pyrite; Quartz (10%): lt gy, frosted wht, subangular to fractured.

1050-1070 Shale (90%): med gray, mnr dk gy, occ lt bm/tan, blocky, very well indurated, abundant quartz veining/contacts, sl silty in part; Quartz (10%): lt gy, frosted wht, subangular to fractured/angular.

1070-1100 Shale (100%): medium to dark gray, tr black, blocky to platy, sl silty, very well indurated, tr quartz veining.

1100-1120 Shale (100%): medium to dark gray, tr black, blocky, sl silty, mnr quartz viening, very well indurated, rare pyrite; Quartz (5%): clr, frosted wht, blocky, veining and fractured/angular.

Unconformity - Fault Zone

1120-1130 Shale (95%): dark gray to black, blocky, sl silty, mnr quartz veining, very well indurated, rare pyrite; Quartz (5%): clr, frosted wht, blocky, veining and fractured/angular.

1130-1140 Limestone (95%): light gray, light blue gray, tr medium blue gray, blocky, very fine to microcrystalline, rr pyrite flecks; Shale (5%): aa.

1140-1160 Limestone (100%): blue gray, light gray, mnr white, blocky, very fine grained to microcrystalline, rr quartz fragments.
Lost Circulation of drilling fluids:
- drop in mud temperature,
- ROP (ft/hr)
- Mud Temp (F)
- Weight on Bit

Potential Fault Zone
- 1160-1180 Limestone (90%): light blue gray, light gray, mnr white &
  clear, very fine grained to microcrystalline, tr pyrite, tr blue gray
  shale (washout?), Quartz (10%): clear, frosted lt gray, blocky,
  angular/fractured.
- 1180-1195 Limestone (75%): light blue gray, light gray, mnr white &
  clear, (minor rock samples have heterogenous colors, appear fractured
  and reformed, tr dark blue grey with pyrite, blocky, fine grained to
  microcrystalline (again heterogenous in nature; Quartz (25%): clear,
  frosted lt gray, blocky, angular/fractured to subangular.

1195-1220 Lost Circulation Zone - Samples consisted of Lost
circulation materials (sawdust, walnut shell): no rock samples over
shaker.
- 1220-1230 Limestone (100%): 95% white (earthy & softer than grey
  unit), 5% blue grey/light grey (very well indurated, blocky, very fine
  grained to microcrystalline, tr dolomitic; Quartz (tr): clear, frosted lt
  gray, angular frags; Abundant Loss circulation materials (walnut shells,
  mica flakes, sawdust).
- 1230-1250 Limestone (100%): white, light blue grey, light grey,
  blocky, very fine crystalline to microcrystalline texture; Dolomite(tr):
  clear, frosted lt gray, angular, fine grained, very well indurated.
  Abundant loss circulation materials.
- 1250-1260 Limestone (85%): white, light grey, occ blue grey, mnr heterogenous blocky,
  angular, very fine grained, tr med grained, minor quartz contacts; Dolomite (15%): clear,
  frosted gray, angular, very well indurated, fine grained. Minor loss circulation material's
  still in sample.
- 1260-1270 Limestone (95%): white, light blue grey, mnr blue grey, blocky, white - fine
  grained, blue grey - microcrystalline, well indurated, Dolomite(5%): clear, frosted, gray,
  angular, very well indurated, fine grained.
- 1270-1280 Dolomite (80%): clear, frosted light grey, blocky, angular, very well indurated,
  softer unit than above, moderate indurated, fine grained; Limestone (20%): white, light
  grey, tr blue gray, blocky, very fine grained.
- 1280-1290 Limestone (70%): light grey to blue gray, mnr white,
  blocky, very fine grained, minor med grained, heterogenous nature
  (color and crystal size): Dolomite (15%): clear, frosted light grey,
  blocky, angular, very well indurated, moderate indurated, fine grain.
  Minor Loss circulation materials after absence in samples (sampling
  technique?)
- 1290-1310 Limestone (85%): light grey to blue gray, mnr white,
  blocky, very fine grained, minor med grained, heterogenous color
  (color and crystal size): Dolomite (15%): clear, frosted light grey,
  blocky, angular, very well indurated, moderate indurated, fine grain.

1310-1330 Limestone (95%): light grey to lt blue gray, mnr white,
blocky, very fine grained, minor fine grained, heterogenous color:
Dolomite (5%): as; Abundant LCM in sample (predominantly micas,
walnut).
- 1330-1340 Dolomite (65%): light grey to blue gray, blocky, fine to
  med grained, heterogenous color, 3-6% intergranular porosity, likely
  fracturing porosity. Limestone (35%): light grey, clear, blocky, fine grained,
  heterogenous coloring, tr dolomite (aa); Minor LCM in sample.
- 1340-1350 Limestone (70%): light grey, occ lt blue gray, blocky, fine
gained; Dolomite (30%): light grey to blue gray, blocky, fine to med
  grained, heterogenous color, 3-6% porosity: Abundant LCM in sample.
- 1350-1360 Limestone (100%): light grey, It blue to blue gray, mnr
  white, clear, blocky, fine grained, heterogenous coloring, tr dolomite
  (aa); Minor LCM in sample.

Potential Fault Zone
- 1160-1180 Limestone (90%): light blue gray, light gray, mnr white &
  clear, very fine grained to microcrystalline, tr pyrite, tr blue gray
  shale (washout?), Quartz (10%): clear, frosted lt gray, blocky,
  angular/fractured.
- 1180-1195 Limestone (75%): light blue gray, light gray, mnr white &
  clear, (minor rock samples have heterogenous colors, appear fractured
  and reformed, tr dark blue grey with pyrite, blocky, fine grained to
  microcrystalline (again heterogenous in nature; Quartz (25%): clear,
  frosted lt gray, blocky, angular/fractured to subangular.

1195-1220 Lost Circulation Zone - Samples consisted of Lost
circulation materials (sawdust, walnut shell): no rock samples over
shaker.
- 1220-1230 Limestone (100%): 95% white (earthy & softer than grey
  unit), 5% blue grey/light grey (very well indurated, blocky, very fine
  grained to microcrystalline, tr dolomitic; Quartz (tr): clear, frosted lt
  gray, angular frags; Abundant Loss circulation materials (walnut shells,
  mica flakes, sawdust).
- 1230-1250 Limestone (100%): white, light blue grey, light grey,
  blocky, very fine crystalline to microcrystalline texture; Dolomite(tr):
  clear, frosted lt gray, angular, fine grained, very well indurated.
  Abundant loss circulation materials.
- 1250-1260 Limestone (85%): white, light grey, occ blue grey, mnr heterogenous blocky,
  angular, very fine grained, tr med grained, minor quartz contacts; Dolomite (15%): clear,
  frosted gray, angular, very well indurated, fine grained. Minor loss circulation material's
  still in sample.
- 1260-1270 Limestone (95%): white, light blue grey, mnr blue grey, blocky, white - fine
  grained, blue grey - microcrystalline, well indurated, Dolomite(5%): clear, frosted, gray,
  angular, very well indurated, fine grained.
- 1270-1280 Dolomite (80%): clear, frosted light grey, blocky, angular, very well indurated,
  softer unit than above, moderate indurated, fine grained; Limestone (20%): white, light
  grey, tr blue gray, blocky, very fine grained.
- 1280-1290 Limestone (70%): light grey to blue gray, mnr white,
  blocky, very fine grained, minor med grained, heterogenous nature
  (color and crystal size): Dolomite (15%): clear, frosted light grey,
  blocky, angular, very well indurated, moderate indurated, fine grain.
  Minor Loss circulation materials after absence in samples (sampling
  technique?)
- 1290-1310 Limestone (85%): light grey to blue gray, mnr white,
  blocky, very fine grained, minor med grained, heterogenous color
  (color and crystal size): Dolomite (15%): clear, frosted light grey,
  blocky, angular, very well indurated, moderate indurated, fine grain.
  Minor Loss circulation materials after absence in samples (sampling
  technique?)
- 1310-1330 Limestone (95%): light grey to lt blue gray, mnr white,
  blocky, very fine grained, minor fine grained, heterogenous color:
  Dolomite (5%): as; Abundant LCM in sample (predominantly micas,
  walnut).
- 1330-1340 Dolomite (65%): light grey to blue gray, blocky, fine to
  med grained, heterogenous color, 3-6% intergranular porosity, likely
  fracturing porosity. Limestone (35%): light grey, clear, blocky, fine grained,
  heterogenous coloring, tr dolomite (aa); Minor LCM in sample.
- 1340-1350 Limestone (70%): light grey, occ lt blue gray, blocky, fine
gained; Dolomite (30%): light grey to blue gray, blocky, fine to med
  grained, heterogenous color, 3-6% porosity: Abundant LCM in sample.
- 1350-1360 Limestone (100%): light grey, It blue to blue gray, mnr
  white, clear, blocky, fine grained, heterogenous coloring, tr dolomite
  (aa); Minor LCM in sample.
1380-1400 Dolomite (60%): light grey to blue gray, clear, blocky, fine to medium grained, heterogeneous color, tr intergranular porosity; Limestone (40%): light grey, lt blue, clear, blocky, fine grained.

1400-1420 Limestone (60%): light grey to blue grey, mnr clear, blocky, fine-mid grained, dolomitic mottling; Dolomite (40%): light grey to blue gray, clear, blocky, fine to medium grained, grading to Limestone.

1420-1440 Limestone (80%): light grey, lt blue grey to blue grey, occ clear, blocky, fine-medi grained, (20%) dolomitic mottling (light grey to blue gray to clear, heterogeneous coloring).

1440-1450 Limestone (85%): light grey, lt blue grey to blue grey, occ clear, blocky, fine-medium grained, tr coarse grained, (15%) dolomitic mottling (light grey to blue gray to clear, heterogeneous coloring and grain size).

1450-1470 Limestone (100%): light grey, blue gray, occasionally clear, minor blue gray, heterogenous coloring, fine to medium grained, minor dolomitic mottling.

1470-1490 Limestone (100%): light grey, blue gray, occasionally clear, it blue gray, (heterogenous coloring), fine to medium grained, minor dolomitic mottling.

1490-1510 Limestone (100%): light grey/blue, clear, minor blue gray, tr beige, heterogenous coloring within sample, fine to medium grained, minor dolomitic mottling, appears re-worked.

1510-1530 Limestone (100%): light grey, clear, tr blue gray, heterogenous coloring within sample, microcrystalline to fine, tr dolomitic mottling.

1530-1550 Limestone (100%): light grey, frosted, clear, abnt blue gray, frosted samples - microcrystalline, blue grey and clear heterogeneous coloring within sample - fine to med crystalline, apparent fractured zones & dolomitic mottling.

1550-1560 Limestone (80%): light grey, blue grey, blocky, fine-medi grained; Dolomite (20%): frosted, clear, fine grained to microcrystalline, blocky.

1560-1570 Dolomite (70%): frosted, clear, fine grained to microcrystalline, blocky; Limestone (30%): light grey/frosted, lt blue grey, blocky, fine-medi grained.

1570-1590 Limestone (85%): light grey, mnr blue grey, blocky, fine-medi grained, nr intercrystalline porosity; Dolomite (15%): frosted, clear, mnr tan/beige (earthy), fine grained to microcrystalline, blocky.
Temperature Survey
1876 ft = 144°F or 62.2°C

1820-1840 Limestone (60%): light blue grey, cl, blocky, fine to medium grained, trace fracture porosity and infilling with dolomite and quartz; Dolomite (25%): lt gy, wht, mnr beige frosted grey, fine grained; Quartz (15%): cl, frosted, blocky, fracture filling.

1840-1870 Limestone (50%): lt grey, cl, blocky, fine to medium grained, trace fracture porosity and infilling with dolomite and quartz; Dolomite (35%): lt gy, wht, mnr beige frosted grey, fine grained; Quartz (15%): cl, frosted, blocky.

1870-1880 Dolomite (60%): lt gy, wht, mnr beige (earthy) frosted grey, fine grained; Limestone (20%): lt blue grey, cl, blocky, fine to medium grained, mottled with dolomite; Quartz (20%): cl, frosted, blocky.

1880-1890 Dolomite (50%): lt gy, wht, mnr beige (earthy) frosted grey, fine grained, travertine; Limestone (30%): lt blue grey, cl, blocky, fine to medium grained, mottled with dolomite; Quartz (20%): cl, frosted, blocky.

1890-1910 Dolomite (65%): wht, mnr beige (earthy), fine grained, tr quartz fragments; Limestone (20%): lt blue grey, cl, blocky, fine to medium grained, mottled with dolomite; Quartz (15%): cl, frosted, blocky.

1910-1920 Limestone (80%): light blue grey, cl, blocky, fine to medium grained; Dolomite (20%): lt gy, wht, fine grained, tr quartz fragments.

1920-1930 Dolomite (75%): wht, frosted lt gy, fine grained, tr FeS minerals; Limestone (20%): lt blue grey, cl, blocky, medium.

1930-1940 Dolomite (50%): wht, frosted lt gy, mnr earthy, microcrystalline, fine grained, tr fractures; Limestone (10%): lt blue grey, cl, mnr dark blue grey, blocky; Quartz (10%): cl, frosted, blocky.

1940-1950 Dolomite (80%): wht, frosted lt gy, tr earthy, very microcrystalline; Limestone (10%): lt blue grey, cl, fine to medium grained; Quartz (10%): cl, frosted, blocky.

1950-1970 Limestone (60%): lt grey, mnr lt blue grey, blocky, fine grained, mnr medium grained; Dolomite (40%): lt grey, cl, blocky, fine to medium grained, mnr medio-dolomitized, tight to 3% intercrystalline porosity.

1970-1980 Limestone (80%): blue grey, lt grey, blocky, fine grained, rare pyrite; Dolomite (20%): lt grey, wht, mnr beige (earthy) fine grained, tr quartz fragments.

1980-1990 Limestone (80%): blue grey, lt grey, blocky, fine grained, rare pyrite; Dolomite (20%): lt grey, wht, mnr beige (earthy) fine grained, tr quartz fragments.

1990-2010 Limestone (60%): lt grey, mnr lt blue grey, blocky, fine grained, mnr medium to coarse grained, dolomitic; Dolomite (40%): lt grey, wht, mnr beige (earthy) fine grained, appears slightly reworked.

2010-2030 Limestone (70%): lt grey, mnr lt blue grey, beige, blocky, fine grained, mnr medium grained, dolomitic/mottled, light to 3% intercrystalline porosity; Dolomite (30%): lt grey, wht, mnr beige (earthy) fine grained, appears slightly reworked.

2030-2040 Limestone (95%): lt grey, beige, tr lt blue grey, blocky, microcrystalline, tr fine grained, dolomitic/mottled, light to 3% intercrystalline porosity; Dolomite (5%): lt blue grey, cl, blocky.
Temperature Survey

2121 ft = 146°F or 63.3°C

Temperature Survey

2244 ft = 156°F or 68.9°C

Microcrystalline to fine grained, dolomitic/mottled, light to 3% intercrystalline porosity; Dolomite (5%): lty, wht, mnr beige (earthy), fine grained, grdg to limestone.

2040-2050 Limestone (65%): lty, mnr lt blue grey, beige, blocky, fine grained, mnr dolomitic/mottled, trace porosity; Quartz (35%): clear, frosted, blocky, tr mica, tr pyrite, occ fine crystalline.

2050-2060 Limestone (100%): lty, tbl blue grey, mnr beige (earthy), blocky, microcrystalline to fine grained, occ dolomitic/mottled, tr mica in fracture porosity, light to 3% intercrystalline porosity, tr quartz.

2060-2080 Limestone (95%): lty, tbl blue grey, mnr beige (earthy), blocky, microcrystalline, no porosity; Dolomite (5%): clear, light grey, blocky, microcrystalline, tr fine grained with tr mica and biotite.

2080-2100 Limestone (90%): lty blue grey, mnr beige (sl earthy), mnr blue grey, blocky, microcrystalline, sl dolomitic in part; Dolomite (10%): light grey, frosted grey, blocky, tbl quartz fragments.

2100-2130 Limestone (100%): lty grey, mnr blue grey, rr clear/frosted grey, blocky, microcrystalline, occ fine grained, sl dolomitic in part, tbl quartz.

2130-2150 Quartz (75%): clear, frosted lty, angular/blocky, appears fractured, rr pyrite; Limestone (25%): lty, wht, mnr blue grey, fine grained, blocky, mnr dolomitic in part, infused with quartz.

2150-2160 Limestone (50%): light blue grey, minor light grey, blocky, occ quartz veining, tr fracture porosity; Quartz (50%): clear, frosted grey, occ dark blue grey (chert), angular, slightly med recrystallized fragments.

2160-2180 Chert (60%): dark blue grey, frosted grey, blocky nodules in limestone: Limestone (40%): light blue grey to light grey, blocky, dolomitic occ grading to dolomite, no porosity.

2180-2190 Limestone (80%): light blue grey, light grey, microcrystalline, blocky, slightly siliceous, minor dolomitic; Quartz/Chert (20%): dark blue grey, grey, nodules in Limestone.

2190-2210 Limestone (90%): light grey, light blue grey, occ beige, microcrystalline, blocky, tr siliceous, slightly dolomitic; Quartz (10%): clear, frosted grey, angular, blocky, tr dark blue chert.

2210-2220 Limestone (75%): light blue grey, light grey, microcrystalline, blocky, slightly siliceous, grading to dolomite; Quartz/Chert (25%): dark blue grey, grey, nodules in Limestone.

2220-2240 Limestone (50%): clear, beige/white, microcrystalline, blocky, slightly siliceous, grading to dolomite; Quartz (50%): frosted light grey, angular fragments, cryptocrystalline, tr dark blue grey chert.

2240-2270 Quartz (75%): clear, frosted light grey, white (chert),
Temperature Survey

2401 ft = 158°F or 70.0°C

2270-2290 Limestone (80%): light blue grey, mnr light grey, microcrystalline, angular, trace dolomitic, tr fracture porosity w quartz: Quartz (20%): clear, frosted grey, angular, cryptocrystalline.

2290-2310 Limestone (50%): clear, light grey, mnr light blue grey, microcrystalline, angular, minor dolomite, tr fracture porosity w quartz: Quartz (50%): clear, frosted grey, angular, cryptocrystalline.

2310-2330 Limestone (65%): clear, light grey, tr light blue grey, microcrystalline, angular, tr dolomite, veined with quartz; Quartz (35%): clear, frosted grey, angular, cryptocrystalline to microcrystalline.

2330-2350 Limestone (50%): clear, light grey, tr light blue grey, microcrystalline, angular, tr dolomite, veined with quartz; Quartz (50%): clear, frosted grey, angular, cryptocrystalline.

2350-2370 Limestone (60%): light grey, light blue grey, mnr beige (earthy), angular, microcrystalline, rare pyrite; Quartz (40%): clear, frosted grey, angular, cryptocrystalline.

2370-2390 Limestone (50%): light grey, wht, mnr beige (earthy), angular, microcrystalline, tr dark blue & white chert.

2390-2400 Quartz (70%): clear, wht, frosted grey, angular, cryptocrystalline, rare contacts with blue grey chert; Limestone (30%): light grey, wht, tr beige, angular, microcrystalline, slightly siliceous.

2400-2420 Limestone (85%): light blue grey, white to beige, oc clear, blocky, microcrystalline-fine grained, tr quartz veining, rare bedding/banded, siliceous; Quartz (15%): clear, frosted grey, angular, cryptocrystalline.

2420-2430 Limestone (95%): light blue grey, white to beige, mnr clear, blocky, microcrystalline, tr fine grained, mnr siliceous, slightly dolomitic; Quartz (5%): clear, frosted grey, angular, cryptocrystalline.

2430-2440 Limestone (85%): light blue grey, white to beige, mnr clear & blue grey, blocky, microcrystalline, tr fine grained, tr siliceous. Quartz (15%): clear, frosted grey, angular, cryptocrystalline.

2440-2460 Limestone (100%): blue grey, mnr light blue grey, mnr white/frosted, beige, blocky, microcrystalline to mnr fine grained, rare clear quartz fragments.

2460-2480 Limestone (100%): blue grey, mnr light blue grey, beige/white, blocky, microcrystalline-fine grained, rare clear angular
2480-2500 Limestone (100%): blue grey, light blue grey, mnr beige/white, blocky, predominately microcrystalline-minor fine grained, trace clear angular quartz fragments with rare pyrite.

2500-2520 Limestone (100%): blue grey, light blue grey, mnr very light grey, blocky, predominately microcrystalline-trace fine grained, trace clear angular quartz fragments.

2520-2540 Limestone (95%): dark-light blue grey, mnr light grey/white, blocky, microcrystalline to fine grained; Quartz (5%): clear, frosted light grey, angular, veining with limestone, rare pyrite.

2540-2560 Limestone (98%): dark-light blue grey, mnr light blue grey, occ grey/white, blocky, very fine to fine grained; Quartz (2%): clear, frosted light grey, rare pyrite.

2560-2580 Limestone (95%): dark-light blue grey, mnr light grey/white, blocky, microcrystalline to fine grained; Quartz (5%): clear, frosted light grey, angular, fine grained crystals, rare pyrite.

2580-2600 Limestone (90%): dark-light blue grey, mnr light grey/white, blocky, very fine to fine grained; Quartz (10%): clear, frosted light grey, angular, microcrystalline, rare pyrite.

2600-2610 Limestone (85%): dark-light blue grey, mnr light grey/white, blocky, very fine grained, sl siliceous; Quartz (10%): clear, frosted light grey, angular, microcrystalline, veining with limestone.

2610-2620 Quartz (80%): clear, frosted light grey, angular, predominantly microcrystalline, tr fine grained, abundant micas (biotite, muscovite), mnr pyrite; Limestone (20%): wht, occ blue grey, blocky, very fine grained, abundant contacts/veining with quartz.

2620-2630 Quartz (85%): white/very light grey, dull frosted grey, angular to sub-angular, cryptocrystalline to microcrystalline; Limestone (15%): white, tr blue grey, blocky, very fine grained, veining with quartz.

2630-2650 Quartz (75%): white/very light grey, dull frosted grey, angular, cryptocrystalline & microcrystalline, tr FeCuSulphide minerals (bornite?); Limestone (25%): white/clear, mnr blue grey, blocky, microcrystalline, very fine grained, tr metal shavings (casing?).

2650-2670 Quartz (90%): white/very light grey, dull frosted grey, occ beige, angular, cryptocrystalline & microcrystalline; Limestone (10%): white, mnr blue grey, blocky, very fine grained, veining with quartz, loose metal shavings (casing?).

2670-2700 Quartz (70%): white/very light arev. dull frosted arev.
Temperature Survey
2708 ft = 175°F or 79.5°C

2700-2710 Limestone (60%): blue grey, white/clear, blocky, microcrystalline, very fine grained, tr metal shavings (casing?).

2710-2730 Quartz (70%): white, frosted light grey, mnr clear, angular, microcrystalline, mnr crypto crystalline; Limestone (30%): white, mnr blue grey, blocky, microcrystalline - very fine grained, tr mineralization at contacts.

2730-2750 Quartz (80%): white/beige, frosted light grey, tr clear, angular, pred crypto crystalline; Limestone (20%): white, mnr blue grey, dark grey, tr clear, blocky, microcrystalline, tr mineralization at contacts.

2750-2770 Quartz (85%): clear, white, frosted light grey, angular, crypto crystalline, occ microcrystalline, abundant contacts with limestone; Limestone (15%): white, blue grey, tr clear, blocky, microcrystalline.

2770-2810 Quartz (65%): white, frosted grey, clear, tr dark grey (chert), angular, crypto crystalline, contacts with limestone, tr pyrite; Limestone (35%): white, mnr blue grey, tr clear, blocky, microcrystalline.

2810-2830 Quartz (65%): white, frosted grey, clear, tr dark grey (chert), angular, crypto crystalline, contacts with limestone, tr pyrite; Limestone (35%): white, mnr blue grey, blocky, microcrystalline, siliceous.

2830-2850 Chert (75%): dark blue grey, fine grained nodules with limestone, very well indurated; Limestone (15%): light blue grey, white, blocky, intergranular in chert, siliceous; Quartz (10%): white, frosted grey, tr clear, angular, crypto crystalline.

2850-2880 Chert/Limestone (85%): dark blue to dark grey, mnr light blue grey, fine grained nodules within limestone matrix grading to siliceous limestone; Quartz (15%): clear, white, mnr frosted grey, angular, crypto crystalline.

2880-2900 Chert (65%): dark blue grey, fine grained nodules within limestone matrix; Limestone (30%): light grey blue, mnr white, blocky, crypto crystalline, angular, siliceous in part; Quartz (5%): clear, white, frosted grey, angular, crypto crystalline.

2900-2910 Limestone (75%): blue grey, mnr white, blocky, microcrystalline, angular, siliceous in part, slightly siliceous in part; Quartz (25%): clear, white, frosted grey, angular, crypto crystalline, rare FeS mineralization at contacts.

2900-2910 Limestone (85%): blue grey, mnr white, blocky, microcrystalline, angular, tr siliceous; Quartz (15%): light grey, tr white, angular, crypto crystalline, trace mineralizations.
Temperature Survey
2964 ft = 185°F or 85.0°C

Minor Lost Circulation Zone 3038 ft
Tripped for broken wireline.

2910-2930 Limestone (90%): light blue/grey to blue grey, white/beige, angular, microcrystalline; Quartz (10%): light grey, tr white, angular, cryptocrystalline, rare mineralization.

2930-2940 Limestone (80%): blue grey, mnr light grey, white/beige, angular, microcrystalline to very fine grained; Quartz (20%): light frosted grey, trace white, angular, cryptocrystalline, tr metal shavings (casing).

2940-2960 Limestone (80%): light grey/beige, blue grey, angular, microcrystalline, occ very fine grained (blue grey), abundant contacts with quartz; Quartz (20%): light frosted grey, angular, cryptocrystalline.

2960-2990 Limestone (90%): light grey/beige, (sl earthy), mnr blue grey, angular, microcrystalline, tr very fine grained (blue grey); Quartz (10%): light frosted grey, angular, cryptocrystalline, tr pyrite at contacts with limestone.

2990-3000 Limestone (95%): light grey/beige (sl earthy), occ light blue grey, tr dark blue grey, angular, microcrystalline; Quartz (5%): clear, frosted light grey, angular, cryptocrystalline.

No sample - strictly lost circulation material (LCM).

3020-3040 Limestone (100%): blue grey, light grey, angular blocky, appears fine grained to medium grained, minor tight to 3% intergranular porosity, trace clear quartz. Poor sample quality due to LCM (sawdust, mica and walnut shells).

3040-3070 Limestone (100%): blue grey, light grey, white, mnr earthy, blocky, microcrystalline to very fine grained, minor tight to 5% intergranular porosity, (wide assortment of calcite types), trace clear quartz. Poor sample quality due to LCM (sawdust, mica and walnut shells, plastic).

3070-3090 Limestone (100%): blue grey (medium grained), light grey, white (microcrystalline), mnr earthy, angular, blocky, microcrystalline to medium grained, minor tight to 5% intercrystalline porosity, tr fracture porosity, (wide assortment of calcite types), trace clear quartz. Very Poor sample quality due to LCM (sawdust, mica and walnut shells, plastic).

3090-3100 Limestone (100%): blue grey, clear/frosted grey, occ white, microcrystalline to medium grained, angular, blocky, trace intercrystalline porosity. LCM in sample.

3110-3130 Limestone (100%): blue grey, clear/frosted grey, occ white, microcrystalline to medium grained, heterogenous crystal size and colors, angular, blocky. LCM in sample.
3130-3150 Limestone (100%): light frosted grey to white (cryptocrystalline), blue grey (medium grained), blocky, angular, heterogeneous crystal size and color and numerous contacts between limestone units, rare quartz fragments. LCM in sample.

3150-3170 Limestone (95%): light blue grey (fine grained, tr intercrystalline porosity), light frosted grey to white (microcrystalline), contacts between limestone units, blocky, angular; Quartz (5%): clear, tr frosted grey, angular, blocky.

3170-3180 Limestone (90%): white/beige, light grey, minor blue grey, predominantly microcrystalline, mnr fine grained, sl dolomitic in part, blocky, angular; Quartz (10%): clear, tr frosted grey, angular, blocky.

3180-3200 Limestone (50%): white/beige, light grey, minor blue grey, predominantly microcrystalline, mnr fine grained, sl dolomitic in part, blocky, angular; Quartz (50%): frosted grey, mnr white, angular, blocky.

3200-3210 Limestone (60%): white/beige, light grey, minor blue grey, predominantly microcrystalline, mnr fine grained, sl dolomitic in part, blocky, angular; Quartz (40%): frosted grey, mnr white, angular, blocky.

3210-3230 Limestone (70%): light frosted grey, (translucent), blue grey, microcrystalline, mnr fine grained, sl dolomitic in part, blocky, angular; Quartz (30%): frosted light grey, clear, angular, blocky.

3230-3250 Limestone (90%): light grey, blue grey, tr beige, microcrystalline, mnr fine grained, blocky, angular; Quartz (10%): frosted grey, mnr white, angular, blocky.

3250-3260 Limestone (60%): blue grey, light grey, occ dark grey, microcrystalline, blocky, angular, tr dolomitic; Quartz (40%): brownish grey mixed with clear crystals, abundant intercrystalline mineralization (pyritized, mica), angular.

3260-3280 Limestone (90%): light grey, light-med blue grey, tr beige (earthy) microcrystalline, blocky, angular; Quartz (10%): frosted light grey, clear, angular, blocky.

3280-3300 Limestone (95%): light grey to blue grey, rare beige, microcrystalline to fine grained, heterogeneous coloring and grain size, blocky, angular, tr pyrite mineralization; Quartz (5%): clear, frosted grey, blocky, angular to subangular.

3300-3310 Limestone (90%): light grey, light-med blue grey, minor beige (earthy), predominantly microcrystalline, blue grey is fine-grained, blocky, angular; Quartz (10%): clear, frosted grey, cryptocrystalline, angular, numerous contacts with limestone.

3310-3340 Limestone (95%): light grey to blue grey, occasional beige, microcrystalline to fine grained, heterogeneous coloring and grain size, blocky, angular; Quartz (5%): clear, frosted grey, blocky, angular to subangular.

3340-3360 Limestone (95%): light grey to blue grey, trace beige, fine grained, minor microcrystalline (light grey) heterogeneous coloring and
3360-3380 Limestone (95%): light grey to light blue grey, minor beige, fine grained, minor microcrystalline (light grey), blocky, angular; Quartz (5%): clear, frosted grey, blocky, angular to subangular.

3380-3400 Limestone (90%): light grey, light to dark blue grey, fine grained, minor microcrystalline (light grey), blocky, angular; Quartz (10%): clear, frosted grey, blocky, angular to subangular.

3400-3420 Limestone (95%): light grey, light blue grey, predominantly fine grained, minor microcrystalline (light grey), contacts between limestone grain sizes & color; Quartz (5%): clear, frosted grey, blocky, angular to subangular, rare pyritization.

3420-3440 Limestone (90%): light grey, blue grey, predominantly fine grained, minor microcrystalline (light grey), trace intercrystalline/vuggy porosity; Quartz (10%): clear, frosted grey, blocky, angular.

3440-3460 Limestone (90%): blue grey, minor light grey, fine grained to microcrystalline, blocky, angular, trace fracture porosity, tr dolomite, tr clear quartz.

3460-3480 Limestone (95%): blue grey, minor light grey, fine grained to microcrystalline, blocky, angular, trace fracture porosity, tr dolomite, tr clear quartz.

3480-3500 Limestone (100%): light blue grey, light grey, predominantly fine grained, blocky, angular, heterogeneous coloring, tr dolomitic, tr clear quartz.

3500-3520 Limestone (100%): light grey to blue grey, fine grained to microcrystalline, blocky, angular, heterogeneous coloring, tr dolomitic, tr clear quartz.

3520-3540 Limestone (95%): light grey to blue grey, fine grained to microcrystalline, blocky, angular, heterogeneous coloring, tr dolomitic; Quartz (5%): clear, frosted grey, angular, blocky, cryptocrystalline.

3540-3560 Limestone (95%): light grey to blue grey, minor beige (earthy), fine grained to microcrystalline, blocky, angular, heterogeneous coloring, tr dolomitic; Quartz (5%): clear, frosted grey, angular, blocky, cryptocrystalline.

3560-3580 Limestone (95%): light grey, minor blue grey, trace beige (earthy), microcrystalline, tr fine grained, blocky, angular, tr
3580-3600 Limestone (100%): light to dark blue grey, fine grained, blocky, angular, trace intercrystalline porosity, tr light grey/quartz.

3600-3620 Limestone (100%): light to dark blue grey, minor light grey, fine grained, blocky, angular, heterogeneous coloring trace intercrystalline porosity, tr light grey/quartz.

3620-3630 Limestone (95%): light to blue grey, minor dark blue grey, fine grained, blocky, angular, heterogeneous coloring, trace intercrystalline porosity; Quartz (5%): light frosted grey, clear, angular, blocky, contacts with limestone.

3630-3650 Limestone (100%): light to dark blue grey, minor light grey, fine grained, blocky, angular, heterogeneous coloring trace intercrystalline porosity, minor light grey/quartz.

3650-3660 Limestone (95%): light to dark blue grey, minor light grey, fine grained, blocky, angular, heterogeneous coloring, trace intercrystalline porosity; Quartz (5%): light frosted grey, clear, angular, blocky, contacts with limestone.

3660-3680 Limestone (95%): light grey, minor blue grey, microcrystalline, fine grained, blocky, angular, slightly dolomitic; Quartz (5%): clear, frosted grey, tr white, angular, blocky, cryptocrystalline.

3680-3700 Limestone (95%): light to dark blue grey, minor light grey, fine grained, blocky, angular, heterogeneous coloring trace intercrystalline porosity; Quartz (5%): light frosted grey, clear, angular, blocky, contacts with limestone.

3700-3720 Limestone (100%): light to dark blue grey, light grey, fine grained, occ microcrystalline, blocky, angular, heterogeneous coloring, trace intercrystalline porosity, minor frosted grey quartz.

3720-3740 Limestone (95%): light to dark blue grey, minor light grey, tr beige, fine grained, occ microcrystalline, blocky, angular, heterogeneous coloring; Quartz (5%): frosted light grey, clear, angular, blocky.

3740-3750 Limestone (100%): light grey to light blue grey, minor blue grey, tr beige, fine grained-microcrystalline, blocky, angular, tr clear/light grey quartz.

3750-3770 Limestone (95%): light to dark blue grey, minor light grey, tr beige, fine grained, occ microcrystalline, blocky, angular, heterogeneous coloring; Quartz (5%): frosted light grey, clear, angular, blocky.

3770-3790 Limestone (90%): light grey, light to dark blue grey, tr beige, fine grained to microcrystalline, blocky, angular, heterogeneous coloring; Quartz (10%): frosted light grey to white, angular, blocky, cryptocrystalline.
3790-3800 Limestone (100%): light grey, light blue grey, minor dark blue grey, microcrystalline, minor fine grained blocky, angular, trace light grey quartz.

3800-3820 Limestone (100%): light grey, light blue grey, minor dark blue grey, occ beige, predominantly microcrystalline, minor fine grained, blocky, angular, sl dolomitic in part, trace light grey quartz.

3820-3840 Limestone (100%): light grey to light blue grey, minor dark blue grey, beige, predominantly microcrystalline, minor fine grained, blocky, angular, sl dolomitic in part, trace light grey quartz.

3840-3850 Limestone (100%): very light grey to light blue grey, minor dark blue grey, beige, predominantly microcrystalline, blocky, angular, sl dolomitic in part, trace light grey quartz.

3850-3860 Limestone (100%): clear, white to very light grey, minor beige, trace blue grey, micro to cryptocrystalline, blocky, angular, trace dolomitic, trace clear quartz.

3860-3880 Limestone (100%): clear, white to very light grey, minor beige, minor blue grey, microcrystalline, blocky, angular, trace dolomitic, trace clear quartz.

3880-3890 Limestone (100%): clear, white to very light grey, minor beige (sl earthy), trace blue grey, micro to cryptocrystalline, blocky, angular, trace dolomitic, trace clear quartz.

3890-3910 Limestone (100%): clear, white to very light grey, minor beige (sl earthy), rare blue grey, microcrystalline, blocky, angular, trace dolomitic, trace clear quartz.

3910-3930 Limestone (100%): clear, white to very light grey, minor beige (sl earthy), rare blue grey, microcrystalline, blocky, angular, trace dolomitic, trace clear quartz.

TD: 3930 ft - March 17th, 2007 19:15
Appendix C: Temperature and Pressure Logs
## Report of Analysis

Lab Number: 13172 - 1  
Descriptor: RRP SW 11-09-07 17:30

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<td>Lab pH (units)</td>
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Report of Analysis

Lab Number: 13172 - 2
Descriptor: RRP 56-4-A  11-11-07  13:00

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Report of Analysis

Lab Number: 13172 - 3
Descriptor: RRP 56-4-B  11-12-07  12:45

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Report of Analysis

Lab Number: 13172 - 4
Descriptor: RRP 56-4-C  11-13-07  16:30

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Lab Number: 13172 - 5
Descriptor: RRP 56-4-D 11-14-07 15:30

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NA = Not Applicable
Chloride - Quartz Geothermometer Enthalpy

Chloride (ppm) vs. Quartz Geothermometer Enthalpy (kJ/kg)

Steam:

RRP 56-4 - RRP 56-4-A - RRP 56-4-B - RRP SW
## STABLE ISOTOPE RESULTS

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All results are reported with respect to VSMOW, normalized to our internal standards: INS9 with reported values of -17.4‰ for δ¹⁸O, -131.0‰ for δ²H, and INS11 with reported values of -0.4‰ for δ¹⁸O, -4.6‰ for δ²H. Samples were run in duplicate with the standard deviation provided for each sample. The analytical precision for this instrument is 0.1‰ for δ¹⁸O and 1.0‰ for δ²H.

Samples will be kept for 3 months from the date of the report and discarded unless otherwise notified.
Stable Isotope Plots for Reese River
Appendix E: Injectivity Testing
Sierra Geothermal, 56-4, Injectivity Test

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pressure dropped to 180 after initial spike
leak on pump line/shut down to repair; surface pressure at shutdown 50
leak on pump line/shut down to repair; surface pressure at shutdown 51

**Instantaneous pressure spikes**
Sierra Geothermal Power Corp. 56-4 Injectivity Test
Appendix F: Geology
WGP PROSPECT AREAS:
1 - Reese River
2 - Salt Wells
3 - Silver Peak

Prospect Location Map
Preliminary Geologic Map
REESE RIVER GEOTHERMAL PROSPECT
LANDER COUNTY, NEVADA, USA