TECHNICAL REPORT

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PHASE 2 REESE RIVER GEOTEHRMAL PROJECT

SLIM WELL 56-4 DRILLING AND TESTING

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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:

Casing	Depth	Hole Size
14 in conductor – Sch 30	0 – 15 m	17.5 in
9.625 in - 36 lb/ft	0 – 106 m	12.25 in
7 in – 23 lb/ft	0 – 448 m	8.5 in
Open Hole	448 – 1,198 m	6.25 in

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:

Lithology	Depth	Formation
Loose sand/silt	0 – 18 m	Colluvium – Quaternary
Siltstone / Shale	18 – 124 m	Lake Beds – Tertiary
Sandstone, fine	124 – 260 m	Lake Beds – Tertiary
Grey – Black Shale	260 – 344 m	Valmy Fm. – Ordovician – Upper Plate
Limestone/Dolomite	344 – 649 m	Carbonates – Ordovician – Lower Plate
Mixed Carbonates – Qtz/Chert	649 – 687 m	Carbonates – Ordovician – Lower Plate
Carbonates – Sub Qtz/Chert	687 – 799 m	Carbonates – Ordovician – Lower Plate
Qtz/Chert – Carbonates	799 – 884 m	Carbonates – Ordovician – Lower Plate
Carbonates – Sub Qtz/Chert	884 – 1,198 m	Carbonates – Ordovician – Lower Plate

Lithology	Depth	Formation
	364 – 372 m	Major Lost Circ Zone Assoc with Roberts Mountain Thrust?
	917 – 924 m	Minor Lost Circ Zone

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 121.9ºC, 121.2ºC and 124.5ºC were recorded for each of the three logging runs.

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

Gradient	Depth	Lithology
300ºC/km	0 – 230 m	Tertiary Lake Beds
90ºC/km	230 – 370 m	Valmy Fm shales – Upper Plate
50ºC/km	370 – 1,198 m	Ordovician Carbonates – Lower Plate

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.

Smpl Name	Desc	Smpl Date.time	Smpl T°C	Lab#	pH lab	Na	K	Ca	Mg	Li	NH_3	T-Alk as HCO_3	SO_4	Cl	F	SiO_2	B	δ-^{18}O o/oo	δ-^{2}H o/oo	Tot. +	Tot. -	Sum + & -	Dif/ Sum
SW	Steiner well	09/11/2007 17:30	49	13172	7.22	231	35.0	59.4	23.2	0.986	1.62	732	71.9	38.9	4.63	28.6	0.944	-16.12	-132.3	16.05	14.84	30.89	3.9%
56-4A	56-4-A	11/11/2007 13:00	95	13172	8.88	284	12.8	10.9	1.53	0.610	5.32	548	89.4	54.8	8.50	94.5	1.14	-15.94	-129.6	13.75	12.84	26.59	3.4%
56-4B	56-4-B	12/11/2007 12:45	97	13172	9.05	312	10.4	8.37	0.567	0.660	5.76	562	104.5	83.0	7.25	101.0	1.11	-15.47	-130.0	14.74	14.11	28.85	2.2%
56-4C	56-4-C	13/11/2007 16:30	96	13172	8.88	286	10.1	15.6	2.07	0.677	3.64	541	102.2	73.6	6.29	97.6	1.21	-15.77	-131.7	13.96	13.40	27.36	2.0%
56-4D	56-4-D	14/11/2007 15:30	99	13172	9.01	285	8.04	7.92	0.089	0.645	3.77	550	93.8	47.4	3.16	103.0	0.977	-15.68	-130.2	13.32	12.47	25.79	3.3%

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 25°C (analysis temperature) and even more oversaturated at 110°C and higher. This is undoubtedly due to loss of dissolved CO_2 during the airlift. If CO_2 is added back into the water to achieve saturation with calcium carbonate at 110°C, about 200 mg/kg of CO_2 must be added, and pH at 110°C is about 6.8. Steiner water is approximately saturated with calcite at low temperature, without addition of lost CO_2.

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 δ-D and higher δ-^{18}O.

(b) Although δ-^{18}O vs Cl shows some evidence of mixing (an approximately linear distribution of data points), δ-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 δ-^{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 δ-^{18}O displacement of about +1.5 to +1.75 o/oo at constant δ-D with respect to the world-average meteoric water line. Although the average meteoric line (δ-D = 8*δ-^{18}O +10) can show local variations in position (especially the y-intercept), a δ-^{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 δ-^{18}O and δ-D) and water-rock exchange of oxygen atoms (which increases only δ-^{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 δ-D and δ-^{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 m^3 – 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 – <u>Rhyolite Intrusive (Tri)</u> *– 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 hydrothermaly 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.

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Appendix A: Well Summary 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

Operator: Operator
Working Interest: 100.000 %
AFE Nos: 0630210
API No: 0630210
Spud Date: 09-Feb-07
Location: Slim Geothermal Production Well
Reports for 00:00 on date shown

02-Feb-07

Current Depth (ft):
Hole Drilled (ft):
Ave ROP:
Current Ops: Waiting to rig-up
Operation Summary:
(8 hrs)
Rig-up (8 hrs)
(8 hrs)
Comments:
Mud Data: None
Surveys: None
Daily Costs ($): 0
Well Costs ($):
Drilling Days: 2
Completion Days: 0
Workover Days: 0

03-Feb-07

Current Depth (ft):
Hole Drilled (ft):
Ave ROP:
Current Ops: Rigging up
Operation Summary:
(8 hrs)
Rig-up (8 hrs)
(8 hrs)
Comments:
Mud Data: None
Surveys: None
Daily Costs ($): 0
Well Costs ($):
Drilling Days: 2
Completion Days: 0
Workover Days: 0

04-Feb-07

Current Depth (ft):
Hole Drilled (ft):
Ave ROP:
Current Ops: Waiting to rig up
Operation Summary:
(24 hrs)
Comments:
Mud Data: None
Surveys: None
Daily Costs ($): 0
Well Costs ($):
Drilling Days: 3
Completion Days: 0
Workover Days: 0

05-Feb-07

Current Depth (ft):
Hole Drilled (ft):
Ave ROP:
Current Ops: Continue rig-up
Operation Summary:
(8 hrs)
Rig-up (8 hrs)
(8 hrs)
Comments:
Mud Data: None

Surveys: None
Daily Costs ($): 0 Well Costs ($):
Drilling Days: 2 Completion Days: 0 Workover Days: 0

06-Feb-07

Current Depth (ft): Hole Drilled (ft): Ave ROP:
Current Ops: Continue rig-up
Operation Summary:
(8 hrs)
Rig-up (8 hrs)
(8 hrs)
Comments:
Mud Data: None
Surveys: None
Daily Costs ($): 0 Well Costs ($):
Drilling Days: 2 Completion Days: 0 Workover Days: 0

07-Feb-07

Current Depth (ft): Hole Drilled (ft): Ave ROP:
Current Ops: Continue rig up
Operation Summary:
(8 hrs)
Comments:
Mud Data: None
Surveys: None
Daily Costs ($): 0 Well Costs ($):
Drilling Days: 2 Completion Days: 0 Workover Days: 0

08-Feb-07

Current Depth (ft): Hole Drilled (ft): Ave ROP:
Current Ops: Continue rig-up
Operation Summary:
(8 hrs)
(8 hrs)
(8 hrs)
Comments:
Mud Data: None
Surveys: None
Daily Costs ($): 0 Well Costs ($):
Drilling Days: 2 Completion Days: 0 Workover Days: 0

09-Feb-07

Current Depth (ft): 67.0 Hole Drilled (ft): 46.0 Ave ROP: 11.50
Current Ops: Spud well at 08:00
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 out 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)

Weld surface flow nipple (2 hrs)
Strap BHA (1 hrs)
Clean up shaker, and cellar. (1 hrs)
Wait on cement (1 hrs)
Drill 12 1/4" hole from 49.41 ft to 67.56 ft (3 hrs)

Comments: Pre-spud meeting held at 8:00 with day and night rig crew, on-site geologist, mud company representative, and drilling contractor representative.

Mud Data: MW: Viscosity: Filtrate: MW: 8.4 Viscosity: 45 Filtrate: 22.4MW: 8.5 Viscosity: 46 Filtrate: 20

Surveys: None

Daily Costs ($): 493,492 Well Costs ($): 493,492

Drilling Days: 1

10-Feb-07

Current Depth (ft): 344.5 Hole Drilled (ft): 277.5 Ave ROP: 13.54

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

Operation Summary:
Drill 12 1/4" from 67 ft to 85 ft (4 hrs)
Survey at 74' - 1° (1 hrs)
Drill 12 1/4" from 85 ft to 117 ft (3 hrs)
Drill 12 1/4" from 114 ft to 235 ft (7.5 hrs)
Survey at 198' (0.5 hrs)
Drill 12 1/4" from 235 ft to 325 ft (4 hrs)
Circulate and condition mud (1 hrs)
Drill 12 1/4" from 325 ft to 345 ft (2 hrs)
Survey at 345' (0.5 hrs)
POOH, strap out (0.5 hrs)

Comments: Drilled to 344.5 with no loss of circulation detected.

Mud Data: MW: 8.8 Viscosity: 48 Filtrate: 17.2

Surveys: 74ft - 1 deg Inc, deg Az;

Daily Costs ($): 21,379 Well Costs ($): 514,872

Drilling Days: 2 Completion Days: 0 Workover Days: 0

11-Feb-07

Current Depth (ft): 350.0 Hole Drilled (ft): 5.5 Ave ROP: 11.00

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

Operation Summary:
Continue tripping out of hole, clean BHA and RIH (2 hrs)
Drill 12 1/4" from 344.5 ft to 350 ft (0.5 hrs)
Circulate and condition hole (3.5 hrs)
POOH/lay down BHA (2 hrs)
Continue lay down BHA (1 hrs)
Rig up and run 9 5/8" casing (3 hrs)
Rig up to cement surface casing (2 hrs)
Mix and pump cement. Mix 130 sks API "A" w/4% gel, mix 25 sks API "A". Pump 0:1:4 cement followed cement. Stop pump and drop displacement plug. Displace w/123.4 BBL of water. Good cement returns · Bump plug at 15:00 (1 hrs)
WOC (1 hrs)
Continue WOC (8 hrs)

Comments:

Mud Data: MW: 8.8 Viscosity: 45 Filtrate:

Surveys: 198ft - 0.5 deg Inc, deg Az;

	Daily Costs ($):	29,024	Well Costs ($):	543,895		
	Drilling Days:	3	Completion Days:	0	Workover Days:	0

12-Feb-07

Current Depth (ft):	350.0	Hole Drilled (ft):	0.0	Ave ROP:		

Current Ops: Cutting casing and welding on BOP

Operation Summary:

WOC (1 hrs)
Cut conductor and remove (3 hrs)
Cut surface casing and remove (4 hrs)
Rig Service (0.5 hrs)
Wait on welding contractor (2 hrs)
Weld 9 5/8" casing bowl (5.5 hrs)
Weld 9 5/8" casing bowl (2.5 hrs)
Nipple up BOP (5.5 hrs)

Comments:

Mud Data: MW: 8.8 Viscosity: 45 Filtrate: 16.8

Surveys: None

Daily Costs ($):	22,010	Well Costs ($):	565,906			
Drilling Days:	4	Completion Days:	0	Workover Days:	0	

13-Feb-07

Current Depth (ft):	419.0	Hole Drilled (ft):	69.0	Ave ROP:	11.50	

Current Ops: Drilling 8 1/2" Intermediate hole 419 ft @ 00:00

Operation Summary:

Nipple up BOP (8 hrs)
Continue nipple up BOP (1.5 hrs)
Pressure test BOP (low 150, high 500) (4.5 hrs)
Pick-up BHA (2 hrs)
RIH, tag cement at 264' (2 hrs)
Drill 8 1/2" from 264 ft to 419 ft (6 hrs)

Comments:

Mud Data: MW: 8.8 Viscosity: 40 Filtrate: 14.8

Surveys: None

Daily Costs ($):	38,303	Well Costs ($):	604,209			
Drilling Days:	5	Completion Days:	0	Workover Days:	0	

14-Feb-07

Current Depth (ft):	853.0	Hole Drilled (ft):	434.0	Ave ROP:	22.26	

Current Ops: Drilling 8 1/2" Intermediate hole from 419 ft to 853 ft

Operation Summary:

Drill 8 1/2" from 419 ft to 600 ft (8 hrs)
Drill 8 1/2" from 600 ft to 626 ft (2.5 hrs)
Circulate hole clean (0.5 hrs)
Bit trip (1.5 hrs)
Trip in w/8 1/2" Insert bit (serial 6048740) (1 hrs)
Ream from 581 ft to 626 (0.5 hrs)
Drill 8 1/2" from 626 ft to 660 ft (0.5 hrs)
Survey at 621 ft (0.5 hrs)
Drill 8 1/2" from 660 ft to 711 ft (1 hrs)
Drill 8 1/2" from 711 ft to 812 ft (5.5 hrs)
Survey at 721 ft (0.5 hrs)

Drill 8 1/2" from 721 ft to 853 ft (2 hrs)

Comments:

Mud Data: MW: 8.85 Viscosity: 39 Filtrate: 7.6

Surveys: 481ft - 1.25 deg Inc, deg Az; 621ft - 0.25 deg Inc, deg Az; 781ft - 2.25 deg Inc, deg Az;

Daily Costs ($): 47,712 Well Costs ($): 651,921

Drilling Days: 6 Completion Days: 0 Workover Days: 0

15-Feb-07

Current Depth (ft): 1,187.0 Hole Drilled (ft): 334.0 Ave ROP: 14.84

Current Ops: Drilling 8 1/2" intermediate hole

Operation Summary:

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 (6.5 hrs)
Drill 8 1/2" from 1151 ft to 1187 ft (7.5 hrs)
Loss of circulation, approximate 30% losses (0.5 hrs)

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

Mud Data: MW: 8.85 Viscosity: 41 Filtrate: 6.4

Surveys: 864ft - 1.5 deg Inc, deg Az; 1055ft - 3.5 deg Inc, deg Az;

Daily Costs ($): 24,898 Well Costs ($): 676,819

Drilling Days: 7 Completion Days: 0 Workover Days: 0

16-Feb-07

Current Depth (ft): 1,264.0 Hole Drilled (ft): 77.0 Ave ROP: 3.85

Current Ops: Drilling 8 1/2" intermediate hole. Mixing mud/LCM.

Operation Summary:

Loss 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)
Drill8 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

17-Feb-07

Current Depth (ft): 1,476.0 Hole Drilled (ft): 212.0 Ave ROP: 15.14

Current Ops: Intermediate hole at TD (1476). Wiper trips and hole circulation

Operation Summary:

Drill 8 1/2" from 1354 ft to 1419 ft (8 hrs)
Drill 8 1/2" from 1419 ft to 1475 ft (6 hrs)
Circulate hole clean (0.5 hrs)

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

18-Feb-07

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

19-Feb-07

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

20-Feb-07

Current Depth (ft): 1,476.0 Hole Drilled (ft): 0.0 Ave ROP:

Current Ops: Picking up BHA

Operation Summary:

WOC (8 hrs)
WOC (3 hrs)
Pick up BOP and cut off 7" casing. Install tool guide and lower BOP onto flange (4 hrs)
Pick-up kelly (1 hrs)
Pressure testing (5.5 hrs)
Lay down 16 jts of drill pipe (2.5 hrs)

Comments:

Mud Data: MW: 8.45 Viscosity: 33 Filtrate: 12.4

Surveys: None

Daily Costs ($): 51,080 Well Costs ($): 918,895

Drilling Days: 12 Completion Days: 0 Workover Days: 0

21-Feb-07

Current Depth (ft): 1,415.0 Hole Drilled (ft): -61.0 Ave ROP:

Current Ops: Working stuck pipe

Operation Summary:

Make up BHA & kelly bushing/RIH (5 hrs)
Drill-out shoe and cement - tag at 1410 (1 hrs)
Work stuck pipe (2 hrs)
Work stuck pipe (8 hrs)
Work stuck pipe (2 hrs)
Work stuck pipe (6 hrs)

Comments:

Mud Data: MW: 8.45 Viscosity: 43 Filtrate: 12.4

Surveys: None

Daily Costs ($): 24,456 Well Costs ($): 943,351

Drilling Days: 13 Completion Days: 0 Workover Days: 0

22-Feb-07

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

Current Ops: Jarring - fishing

Operation Summary:

Work stuck pipe (8 hrs)
Work stuck pipe (6 hrs)
Break kelly and goose neck off, rig-up Baker Atlas to run free point and back off. Tagged obstruction at at next collar. (2 hrs)
Shoot off collars, pull out of hole w/wireline and rig down Baker Atlas (1 hrs)
POOH - 16 1/2 stands of drill pips, 9 joints of drill collars - pick up fishing tools (1 hrs)
RIH w/fishing tools and drill collars (1 hrs)
Rig-up goose neck and kelly hose (1 hrs)
RIH w/ 15 1/2 stands of drill collars (1.5 hrs)
Begin fishing operations - jarring (2.5 hrs)

Comments: Ran free-point and back-off tools. Could not get past obstruction at 1316. Back off at 1311 and began fishing operations.

Mud Data: MW: 8.45 Viscosity: 40 Filtrate: 13.2

Surveys: None

Daily Costs ($): 44,018 Well Costs ($): 987,369

Drilling Days: 14 Completion Days: 0 Workover Days: 0

23-Feb-07

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

Current Ops: Waiting on equipment

Operation Summary:

Fishing/jarring operations (8 hrs)
Wait on coiled tubing equipment (8 hrs)
Wait on coiled tubing equipment (8 hrs)

Comments: Fishing operation unsucessful. 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: 15 Completion Days: 0 Workover Days: 0

24-Feb-07

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

Current Ops: Tripping pipe put of hole - recovered 3 collars and 1reamer (96.41 ft) - stabilizer, cross-over, reamer and bit remaining in wellbore (12.11 ft)

Operation Summary:

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) (
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 h
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: 16 Completion Days: 0 Workover Days: 0

25-Feb-07

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

Current Ops: Waiting on orders

Operation Summary:

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 (8 hrs)

Comments:

Mud Data: MW: 8.5 Viscosity: 36 Filtrate: 13.6MW: 8.5 Viscosity: 33 Filtrate: 14.4

Surveys: None

Daily Costs ($): 44,517 Well Costs ($): 1,155,993

Drilling Days: 17 Completion Days: 0 Workover Days: 0

26-Feb-07

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

Current Ops: Waiting on tools from Baker Oil Tools to sidetrack

Operation Summary:

Waiting on orders (8 hrs)
Waiting on tools (8 hrs)
Waiting on tools (8 hrs)

Comments:

Mud Data: None

Surveys: None

Daily Costs ($): 28,959 Well Costs ($): 1,184,953

Drilling Days: 18 Completion Days: 0 Workover Days: 0

27-Feb-07

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

Current Ops: Waiting on tools from Baker Oil Tools

Operation Summary:

Waiting on tools (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 ($): 40,773 Well Costs ($): 1,225,726

Drilling Days: 19 Completion Days: 0 Workover Days: 0

28-Feb-07

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

Current Ops: Milling retainer

Operation Summary:

Continue mill retainer (8 hrs)
Continue mill retainer (8 hrs)
Continue mill retainer (6 hrs)
Retainer milled off/RIH with mill and drill string to bottom to clear 7" casing for permanent retainer and s sidetrack tools (1 hrs)
Circulate and conditon mud on bottom (1 hrs)

Comments:

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

Surveys: None

Daily Costs ($): 34,436 Well Costs ($): 1,260,161

Drilling Days: 20 Completion Days: 0 Workover Days: 0

01-Mar-07

Current Depth (ft): 1,386.0 Hole Drilled (ft): -29.0 Ave ROP:

Current Ops: Running sidetrack tools

Operation Summary:

POOH from 1417' (1 hrs)

Laydown mill and pick-up retainer (1 hrs)
RIH 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 RIH (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 ($): 23,050 Well Costs ($): 1,283,212

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 6 1/8" bit (0.5 hrs)
RIH 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' (5 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: 7.6

Surveys: 1384ft - 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): 70.0 Ave ROP: 7.78

Current Ops: Drilling ahead at 1554'

Operation Summary:
Make-up BHA/RIH 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-RIH-repair kelly (2 hrs)

Drill 6 1/8" hole from 1492 ft to 1502 ft (1.5 hrs)
Drill 6 1/8" from 1502 ft to 1514 ft (1.5 hrs)
Survey at 1514'-2.5°-129°F (0.5 hrs)
Drill 6 1/8" from 1514 ft to 1554 ft (6 hrs)

Comments: Bottom hole temp at survey depth 129°F@1514'
Drilling break at 17:50, ROP increased to 100, 50, and 25. (1515'). No loss or pit gain noticed

Mud Data: MW: 8.7 Viscosity: 42 Filtrate: 6.8

Surveys: 1514ft - 2.5 deg Inc, deg Az; 1634ft - 4 deg Inc, deg Az;

Daily Costs ($): 28,983 Well Costs ($): 1,428,368

Drilling Days: 23 Completion Days: 0 Workover Days: 0

04-Mar-07

Current Depth (ft): 1,686.0 Hole Drilled (ft): 132.0 Ave ROP: 5.74

Current Ops: Drilling ahead

Operation Summary:
Drill 6 1/8" from 1554 ft to 1584 ft (8 hrs)
Drill 6 1/8" from 1584 ft to 1603 ft (2 hrs)
Rig service (0.5 hrs)
Drill 6 1/8" from 1603 ft to 1634 ft (4 hrs)
Survey at 1634'-4.0°-134°F (0.5 hrs)
Drill 6 1/8" from 1634 ft to 1641 ft (1 hrs)
Drill 6 1/8" from 1641 ft to 1686 ft (8 hrs)

Comments: Bottom hole temp at survey depth 134°F@1634'

Mud Data: MW: 8.7 Viscosity: 37 Filtrate: 8

Surveys: 1754ft - 3.75 deg Inc, deg Az;

Daily Costs ($): 24,021 Well Costs ($): 1,452,389

Drilling Days: 24 Completion Days: 0 Workover Days: 0

05-Mar-07

Current Depth (ft): 1,863.0 Hole Drilled (ft): 177.0 Ave ROP: 7.53

Current Ops: Drilling ahead

Operation Summary:
Drill 6 1/8" from 1686 ft to 1737 ft (8 hrs)
Drill 6 1/8" from 1737 ft to 1754 ft (2 hrs)
Survey, 3.75°, 144°F (0.5 hrs)
Drill 6 1/8" from 1754 ft to 1796 ft (5.5 hrs)
Drill 6 1/8" from 1796 ft to 1863 ft (8 hrs)

Comments: Bottom hole temp at survey depth 144°F@1754'

Mud Data: MW: 8.7 Viscosity: 38 Filtrate: 7.6

Surveys: 1876ft - 4.5 deg Inc, deg Az;

Daily Costs ($): 24,619 Well Costs ($): 1,477,008

Drilling Days: 25 Completion Days: 0 Workover Days: 0

06-Mar-07

Current Depth (ft): 2,026.0 Hole Drilled (ft): 163.0 Ave ROP: 7.58

Current Ops: Drilling ahead

Operation Summary:
Drill 6 1/8" from 1863 ft to 1876 ft (2.5 hrs)
Survey - 4° - 144°F (0.5 hrs)
Drill 6 1/8" from 1876 ft to 1920 ft (5 hrs)
Drill 6 1/8" from 1920 ft to 1937 ft (2 hrs)

Rig service (0.5 hrs)
Dril 6 1/8" from 1937 ft to 1990 ft (5.5 hrs)
Drill 6 /18" 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 2026 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: 2026ft - 6 deg Inc, deg Az;
Daily Costs ($): 23,846 Well Costs ($): 1,500,854
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
Current Ops: Drilling ahead
Operation Summary:
Drill 6 1/8" from 2026 ft to 2030 ft (1.5 hrs)
Survey 6° (0.5 hrs)
Drill 6 /18" 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 communicatio hrs)
Drill 6 1/8" from 2070 ft to 2081 ft (2 hrs)
Rig repair - weld washout on lower kelly (2 hrs)
Drill 6 1/8" from 2081 ft to 2083 ft (0.5 hrs)

Comments: Bottom hole temp at survey depth 145°F@2030'
No communications at well site, operations suspended at 16:30 until communications restored at 19:30

Mud Data: MW: 8.7 Viscosity: 35 Filtrate: 8.4
Surveys: None
Daily Costs ($): 42,630 Well Costs ($): 1,543,485
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
Current Ops: Drilling ahead
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 /18" from 2150 ft to 2226 ft (8 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)

Comments: Bottom hole temp at survey depth 146°F@2121'
Bottom hole temp at survey depth 154°F@2215'

Mud Data: MW: 8.7 Viscosity: 34 Filtrate:

Surveys: 2121ft - 5.75 deg Inc, deg Az;

Daily Costs ($): 22,783 Well Costs ($): 1,566,268

Drilling Days: 28 Completion Days: 0 Workover Days: 0

09-Mar-07

Current Depth (ft): 2,461.0 Hole Drilled (ft): 191.0 Ave ROP: 8.30

Current Ops: Drilling ahead

Operation Summary:

Drill 6 1/8" from 2270 ft to 2275 ft (1 hrs)
Survey 6 1/4° (0.5 hrs)
Drill 6 1/8" from 2275 ft to 2337 ft (6.5 hrs)
Drill 6 1/8" from 2337 ft to 2408 ft (8 hrs)
Drill 6 1/8 " from 2408 ft to 2433 ft (3.5 hrs)
Survey 4° (0.5 hrs)
Drill 6 1/8 " from 2433 ft to 2461 ft (4 hrs)

Comments: Bottom hole temp at survey depth 156°F@2244 ft
Bottom hole temp at survey depth 158°F@2401 ft

Mud Data: MW: 8.75 Viscosity: 35 Filtrate: 8.4

Surveys: 2244ft - 6.25 deg Inc, deg Az; 2401ft - 4 deg Inc, deg Az;

Daily Costs ($): 32,140 Well Costs ($): 1,598,407

Drilling Days: 29 Completion Days: 0 Workover Days: 0

10-Mar-07

Current Depth (ft): 2,570.0 Hole Drilled (ft): 109.0 Ave ROP: 7.03

Current Ops: Drilling ahead

Operation Summary:

Drill 6 1/8" from 2461 ft to 2515 ft (8 hrs)
Drill 6 1/8" from 2515 ft to 2524 ft (1 hrs)
POOH (2.5 hrs)
Rig service (0.5 hrs)
Make-up BHA (2 hrs)
Continue make-up BHA (2 hrs)
RIH (1.5 hrs)
Drill 6 1/8" from 2524 ft to 2570 ft (6.5 hrs)

Comments: Bottom hole temp at survey depth 158°F@2500'

Mud Data: MW: 8.8 Viscosity: 35 Filtrate: 8.4

Surveys: 2500ft - 5.75 deg Inc, deg Az;

Daily Costs ($): 25,076 Well Costs ($): 1,623,483

Drilling Days: 30 Completion Days: 0 Workover Days: 0

11-Mar-07

Current Depth (ft): 2,755.0 Hole Drilled (ft): 185.0 Ave ROP: 8.04

Current Ops: Drilling ahead

Operation Summary:

Drill 6 1/8" from 2570 ft to 2619 ft (8 hrs)
Drill 6 1/8" from 2619 ft to 2646 ft (2 hrs)
Survey (0.5 hrs)
Drill 6 1/8" from 2646 ft to 2710 ft (5.5 hrs)
Drill from 2710 ft to 2740 ft (5 hrs)
Survey (0.5 hrs)

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: 2646ft - 2.25 deg Inc, deg Az; 2708ft - 2 deg Inc, deg Az;

Daily Costs ($):	23,986	Well Costs ($):	1,647,469		
Drilling Days:	31	Completion Days:	0	Workover Days:	0

12-Mar-07

Current Depth (ft):	2,946.0	Hole Drilled (ft):	191.0	Ave ROP:	8.30

Current Ops: Drilling ahead

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 (8 hrs)

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

Mud Data: MW: 8.9 Viscosity: 36 Filtrate: 8

Surveys: None

Daily Costs ($):	30,784	Well Costs ($):	1,678,253		
Drilling Days:	32	Completion Days:	0	Workover Days:	0

13-Mar-07

Current Depth (ft):	3,076.0	Hole Drilled (ft):	130.0	Ave ROP:	12.38

Current Ops: Drilling ahead

Operation Summary:

Drill 6 1/8" from 2938 ft to 2964 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-pull wet-retreive 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 185°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 bit/RIH and continue drilling
Bottom hole temp at survey depth 187°F@3028 ft

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

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

Daily Costs ($):	27,173	Well Costs ($):	1,705,426		
Drilling Days:	33	Completion Days:	0	Workover Days:	0

14-Mar-07

Current Depth (ft):	3,304.0	Hole Drilled (ft):	228.0	Ave ROP:	9.70

Current Ops: Drilling ahead with losses

Operation Summary:

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

Drill 6 1/8" from 3166 ft to 3190 ft (2.5 hrs)
Rig service (0.5 hrs)
Drill 6 1/8" from 3190 ft to 3242 ft (5 hrs)
Drill 6 1/8" from 3242 ft to 3304 ft (8 hrs)

Comments: Drilling ahead with losses
24 bbl/hr losses 00:00-08:00 shift
40 bbl/hr losses 08:00-16:00 shift
50 bbl/hr losses 16:00-00:00 shift

Mud Data: MW: 8.5 Viscosity: 30 Filtrate: 18.8

Surveys: None

Daily Costs ($): 22,311 Well Costs ($): 1,727,737

Drilling Days: 34 Completion Days: 0 Workover Days: 0

15-Mar-07

Current Depth (ft): 3,445.0 Hole Drilled (ft): 141.0 Ave ROP: 7.23

Current Ops: Trip for bit

Operation Summary:
Drill 6 1/8" from 3304 ft to 3383t (8 hrs)
Drill from 3383 ft to 3439 ft (8 hrs)
Drill 6 1/8" from 3439 ft to 3445 ft (3.5 hrs)
Circulate hole clean-drop survey and POOH (1 hrs)
POOH (3.5 hrs)

Comments: Drilling ahead with losses to 3445.
Drilling ROP dropped to 2-5/hr. 158.5 total hrs on bit 1400 ft drilled (5043310)
24 bbl/hr losses 00:00-08:00 shift
ROP dropped, trip out of hole and run new bit

Mud Data: MW: Viscosity: Filtrate:

Surveys: 3445ft - 2.25 deg Inc, deg Az;

Daily Costs ($): 21,489 Well Costs ($): 1,749,225

Drilling Days: 35 Completion Days: 0 Workover Days: 0

16-Mar-07

Current Depth (ft): 3,668.0 Hole Drilled (ft): 223.0 Ave ROP: 11.74

Current Ops: M/U BHA, RIH w/new bit to drill ahead

Operation Summary:
M/U BHA, install new kelly and RIH (4.5 hrs)
Ream from 3400 ft - 3445 ft (0.5 hrs)
Drill 6 1/8" from 3445 ft to 3479 ft (3 hrs)
Drill 6 1/8" from 3479_ ft to 3583 ft (8 hrs)
Drill 6 1/8" from 3583 ft to 3668 ft (8 hrs)

Comments: RIH with new bit to 3400, reamed to 3445 and started drilling ahead
16.5 bbl/hr losses 00:00-08:00 shift

Mud Data: MW: Viscosity: Filtrate:

Surveys: None

Daily Costs ($): 50,647 Well Costs ($): 1,799,873

Drilling Days: 36 Completion Days: 0 Workover Days: 0

17-Mar-07

Current Depth (ft): 3,930.0 Hole Drilled (ft): 262.0 Ave ROP: 14.56

Current Ops: Drill ahead

Operation Summary:
Drill 6 1/8" from 3668 ft to 3785 ft (8 hrs)
Rig service (0.5 hrs)
Drill 6 1/8" from 3785 ft to 3878 ft (7.5 hrs)

Drill 6 1/8" from 3878 ft to 3930 ft (2.5 hrs)
Mix pill and circulate hole clean (1 hrs)
POOH-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:

Surveys: None

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

Drilling Days: 37 Completion Days: 0 Workover Days: 0

18-Mar-07

Current Depth (ft): 3,930.0 Hole Drilled (ft): 0.0 Ave ROP:

Current Ops: Trip out of hole with drill string

Operation Summary:

M/U bit and RIH to 3902-kelly up and clean out to 3930 (2.5 hrs)
Circulate and condition hole-circulate out 10 ft of fill (5.5 hrs)
Circulate and condition hole-mix pill and circulate (1.5 hrs)
Lay down 40 joints of drill pipe (2 hrs)
POOH-23 stands/break kelly (1.5 hrs)
Lay down 6 joints of drill pipe (0.5 hrs)
POOH (2.5 hrs)
Run 5" slotted liner (4 hrs)
RIH w/drill pipe and land 5" slotted liner on bottom (2.5 hrs)
POOH w/drill string (1.5 hrs)

Comments: Ran 2606.471 ft, 15#/ft, L-80, Buttress, slotted liner and landed on bottom (3930 ft) . Backed off J-slot liner hanger and pulled out of hole.

Mud Data: None

Surveys: None

Daily Costs ($): 20,289 Well Costs ($): 1,840,451

Drilling Days: 38 Completion Days: 0 Workover Days: 0

19-Mar-07

Current Depth (ft): 3,930.0 Hole Drilled (ft): 0.0 Ave ROP:

Current Ops: Tripping out w/drillstring

Operation Summary:

Lay down drill pipe and drill collars (8 hrs)
Lay down drill collars (0.5 hrs)
Lay down Kelly, rat hole/mouse hole (2.5 hrs)
Nipple down BOP (3 hrs)
Rig Down (2 hrs)
Cut off casing and weld 7" casing head. Install master valve. Survey to TD (2°-260°F @ 3930). Fill casir water. Continue rig down. (8 hrs)

Comments: Final survey 2° - 260°F

Mud Data: None

Surveys: 3930ft - 2 deg Inc, deg Az;

Daily Costs ($): 21,264 Well Costs ($): 1,861,714

Drilling Days: 39 Completion Days: 0 Workover Days: 0

20-Mar-07

Current Depth (ft): 3,930.0 Hole Drilled (ft): 0.0 Ave ROP:

Current Ops: RIG RELEASE 16:00 - MAR 20
Rigging down

Operation Summary:
Rigging down (12 hrs)
Filling casing with water (1.5 hrs)
Rigged up to pump down casing. 185 GPM @ 150 PSI (2.5 hrs)
Continue rig down/prepare well for pressure/temperature logging (8 hrs)

Comments: Static fluid level 326' (1560 bottom hole pressure)
Well unable to support fluid weight
Pumped fresh water down casing to establish baseline pumping rates/pressures. (185 GPM @ 150 PSI maximum)
Rig Release 16:00 - Mar 20

Mud Data: MW: Viscosity: Filtrate:

Surveys: None

Daily Costs ($):	19,451	Well Costs ($):	1,881,166		
Drilling Days:	40	Completion Days:	0	Workover Days:	0

21-Mar-07

Current Depth (ft):	3,930.0	Hole Drilled (ft):	0.0	Ave ROP:	

Current Ops: Continue rigging down

Operation Summary:
Rigging down (24 hrs)

Comments:

Mud Data: None

Surveys: None

Daily Costs ($):	3,755	Well Costs ($):	1,884,921		
Drilling Days:	41	Completion Days:	0	Workover Days:	0

22-Mar-07

Current Depth (ft):	3,930.0	Hole Drilled (ft):		Ave ROP:	

Current Ops: Performing Injection Tests

Operation Summary:
Drilling rig rig-down (8 hrs)
Rig-up Cogco Wireline (1 hrs)
Run Pressure/Temperature Logs to TD (1 hrs)
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 pumper to repair leak (1.833333 hrs)
Leak repaired - start pumping at 300 GPM (0.1666667 hrs)
Shut down fluid pumper to repair leak (1.166667 hrs)
Leak repaired - continue 300 GPM test (0.08333334 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		
Drilling Days:	41	Completion Days:	1	Workover Days:	0

Appendix B: Mud Log

Scale 1:240 (5"=100') Imperial
Measured Depth Log

Well Name:	Reese River #56-4		
Location:	Section 56-4, Township 23N, Range 43E		
Licence Number:	State Permit #667	Region:	Lander County
Spud Date:	Feb 9, 2007	Drilling Completed:	March 17, 2007
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		

Printed by WellSight Log Viewer from WellSight Systems 1-800-447-1534 www.WellSight.com

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

ROCK TYPES

Anhy
Bent
Brec
Cht
Clyst
Coal
Congl
Dol
Gyp
Igne
Lmst
Meta
Mrlst
Salt
Shale
Tuff
Shcol
Shgy
Sltst
Ss
Till
Quartz

ACCESSORIES

MINERAL
Anhy
Arggrn
Arg
Bent
Bit
Brecfrag
Calc
Carb
Chtdk
Chtlt
Dol
Feldspar
Ferrpel
Ferr
Glau
Gyp
Hvymin
Mica
Kaol
Marl
Minxl
Nodule
Phos
Pyr
Salt
Sandy
Silt
Sil
Sulphur
Tuff

FOSSIL
Algae
Amph
Belm
Bioclst
Brach
Bryozoa
Cephal
Coral
Crin
Echin
Fish
Foram
Fossil
Gastro
Oolite
Ostra
Pelec
Pellet
Pisolite
Plant
Strom

STRINGER
Anhy
Arg
Bent
Coal
Dol
Gyp
Quartz
Ls
Mrst
Sltstrg
Ssstrg

TEXTURE
Boundst
Chalky
Cryxln
Earthy
Finexln
Grainst
Lithogr
Microxln
Mudst
Packst
Wackest

OTHER SYMBOLS

POROSITY
Earthy
Fenest
Fracture
Inter
Moldic
Organic
Pinpoint
Vuggy

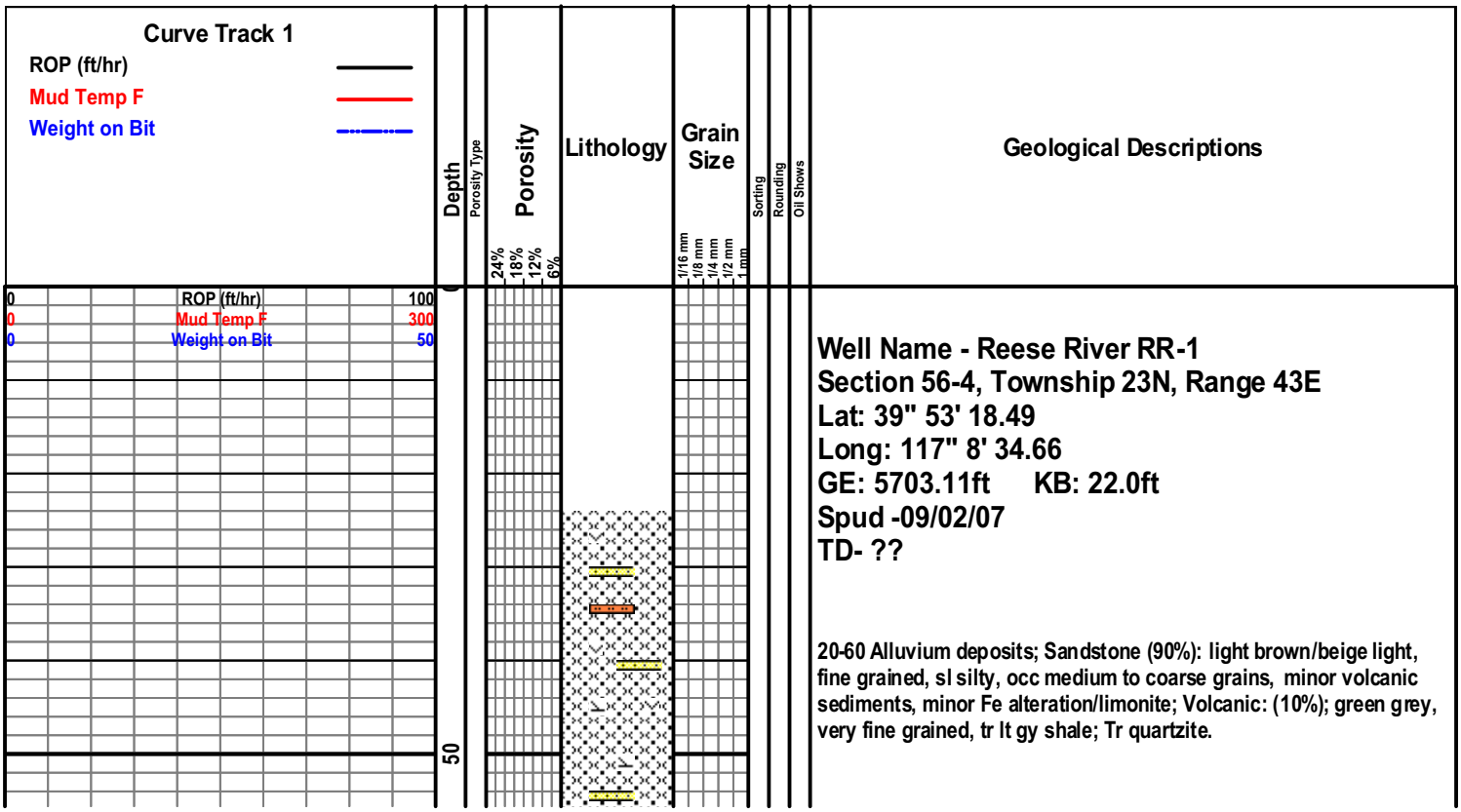
SORTING
Well
Moderate
Poor

ROUNDING
Rounded
Subrnd
Subang
Angular

OIL SHOW
Even
Spotted
Ques
Dead

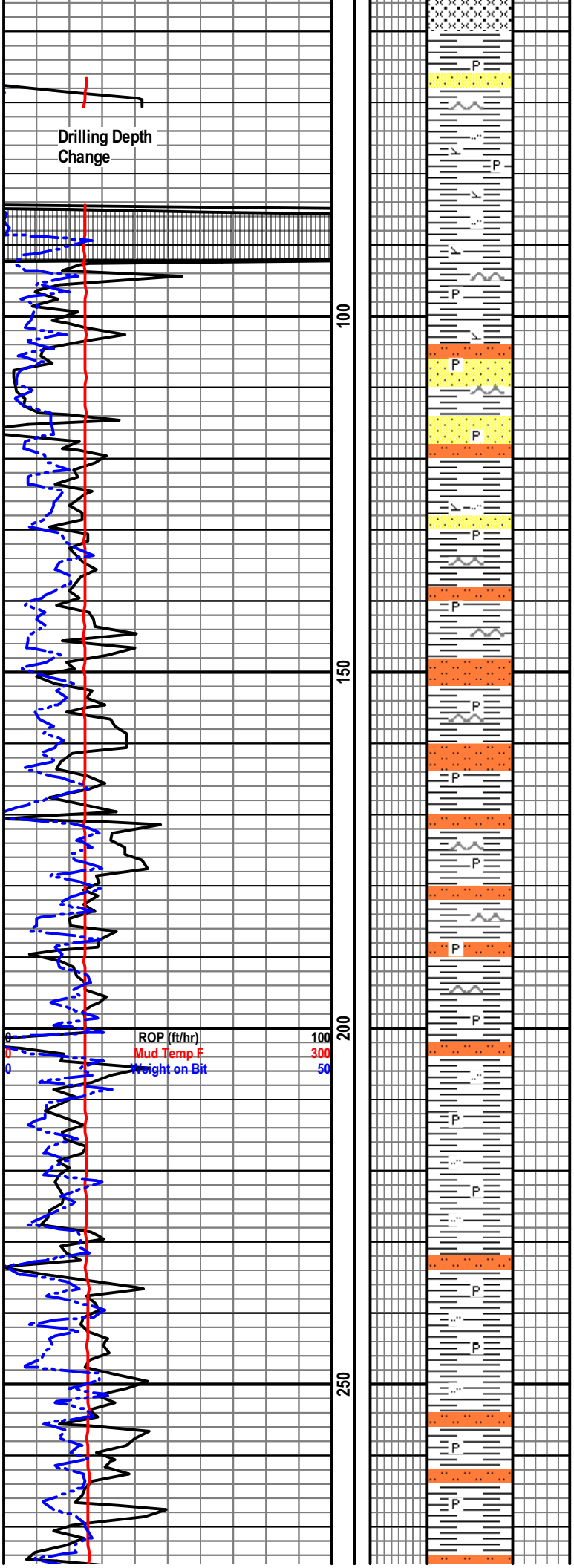
INTERVAL
Core
Dst

EVENT
Rft
Sidewall



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 lt gy, silty, 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 silty, 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 silty, 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, silty, 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 silty, trace sand, tr Fe sulfide minerals throughout and occasional veins/pockets of deposition w quartz.

150-170 Shale (70%): light grey/wht, occ very light greenish grey, very silty, 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.

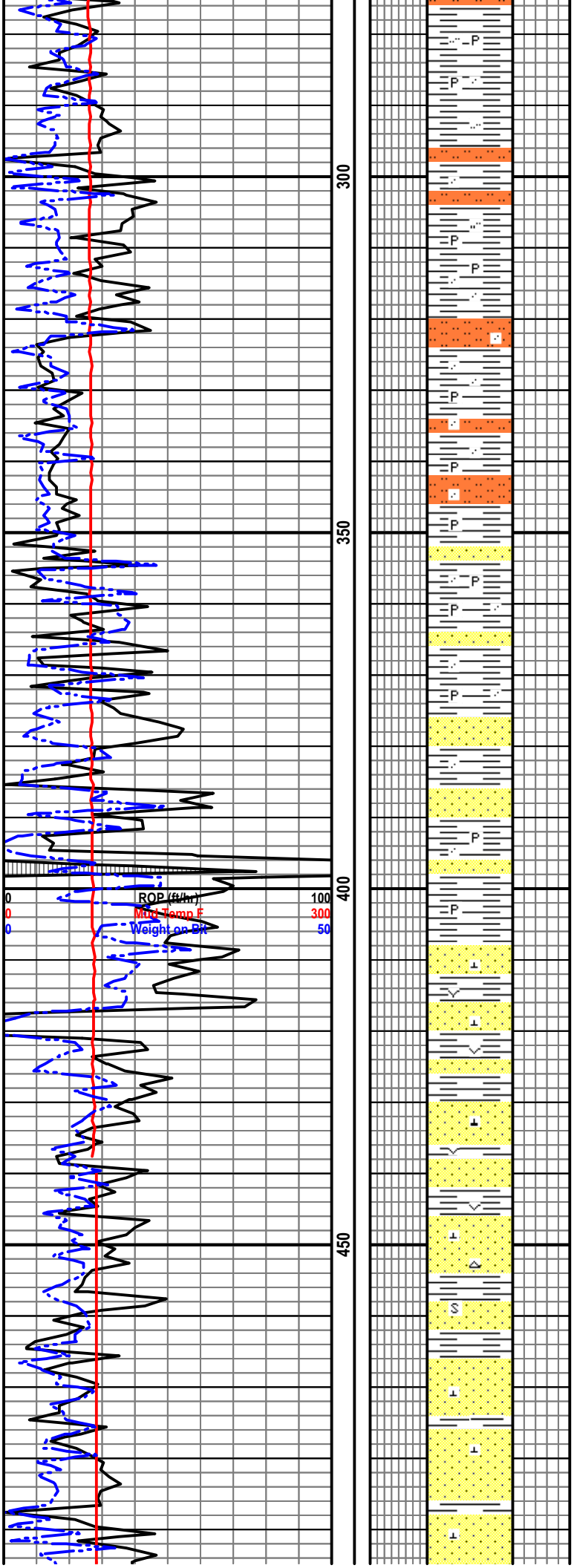
170-190 Shale (80%): light grey, very light greenish grey, silty, tr Fe sulfide minerals, occ pockets of mineralization, tr med quartz grains; Siltstone (20%): light grey, abnt arg w minor sand grains, poor porosity.

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

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

230-260 Shale (100%): light grey, very light beige, slightly silty 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, silty 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.

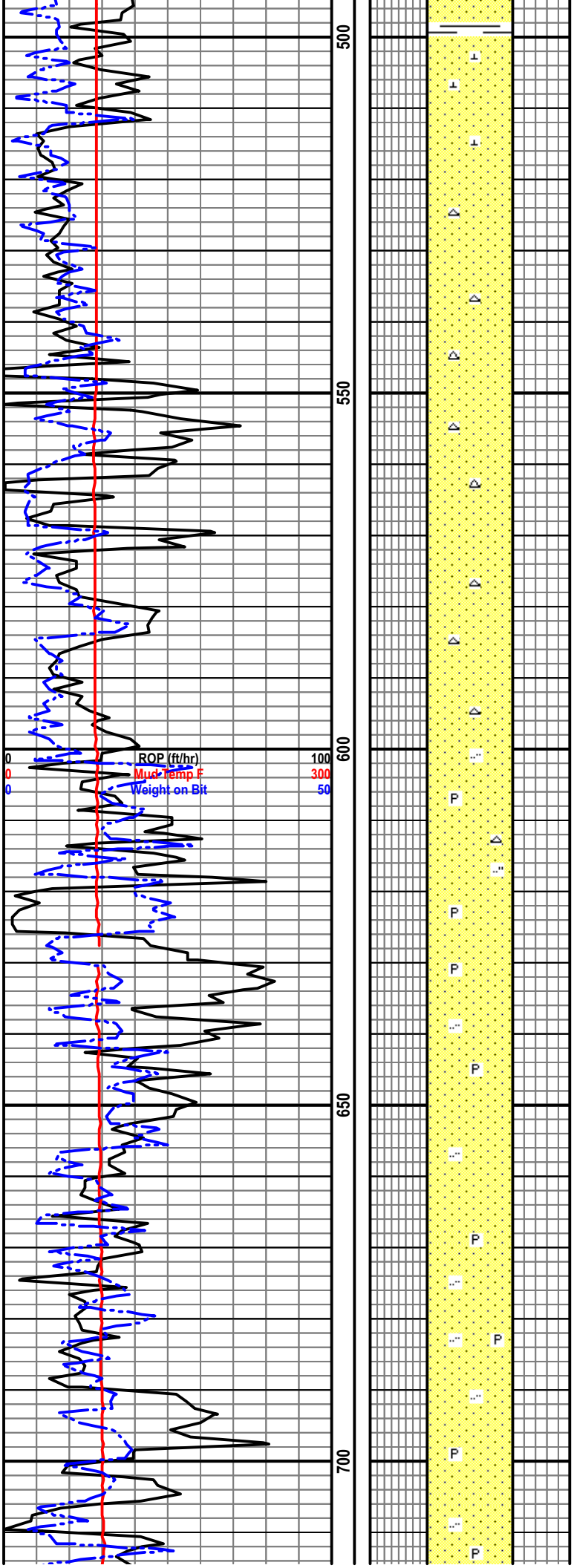
420-430 Volcanic Sandstone (80%): light- medium grey, slightly silty, mnr arg, fine-med grained poorly sorted, quartz w tr calc cmt, 3-6% porosity; Shale (20%): light grey, tr wht, sl silty, tr sand, tr biotite.

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, rr 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 Suphide minerals, occ coarse quartz grains.

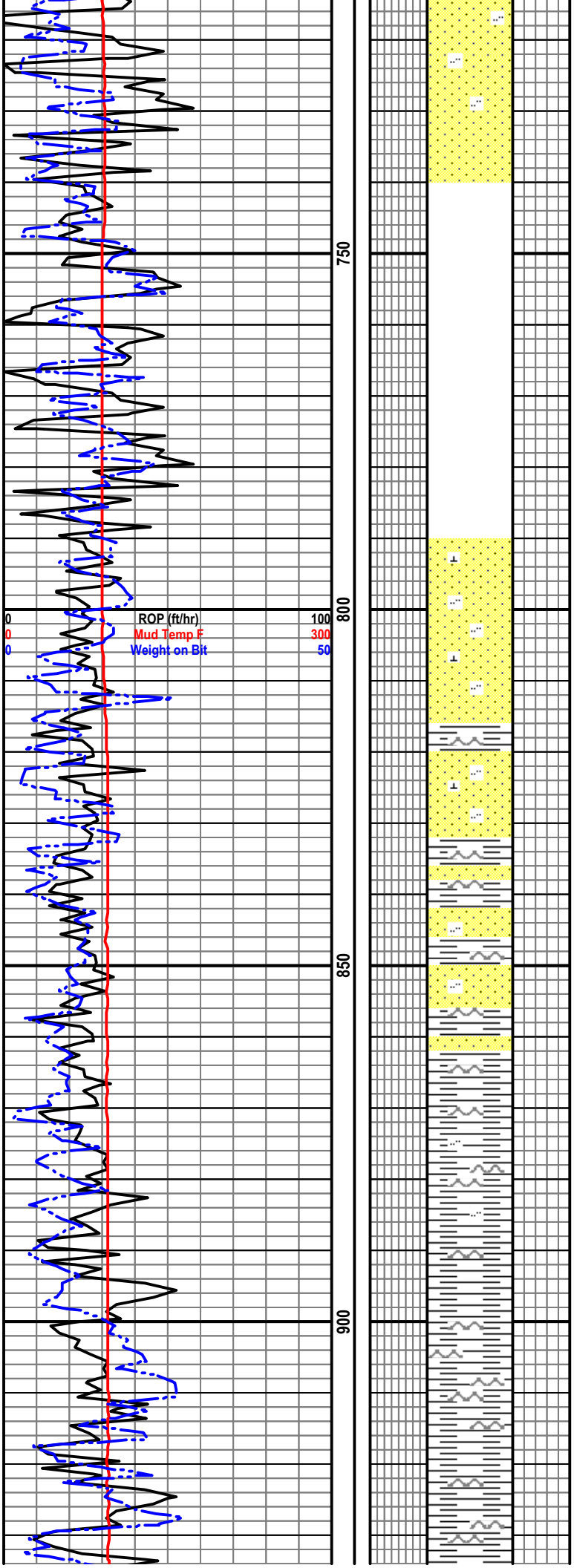
640-650 Volcanic Sandstone (100%): pred very light grey, mnr light blue grey, very fine grained, occ fine grained, very well indurated, tr biotite, tr Fe Suphide minerals.

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 microcrystaline, tr fine grained, very well indurated, tr biotite, tr Fe Suphide minerals.

680-690 Volcanic Sandstone (100%): very light grey, light blue grey, very fine grained, tr fine grained, very well indurated, tr Fe Suphide 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 silty, 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 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, rr calcite, tr quartz grains, tight porosity, 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, rr calcite; Shale (30%): dark blue grey, blocky, very well indurated, tr qtz veining; Quartz (15%): clear, frosted, blocky, subrounded, occ fractured, (veining?).

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

850-860 Volcanic Sandstone (80%): white, very light grey, very fine to fine grained, occ med grained fragments, sl silty, mod indurated, rr calcite, tight porosity; Shale (10%): dark blue grey, blocky, very well indurated, tr qtz veining; Quartz (10%): clear, blocky.

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

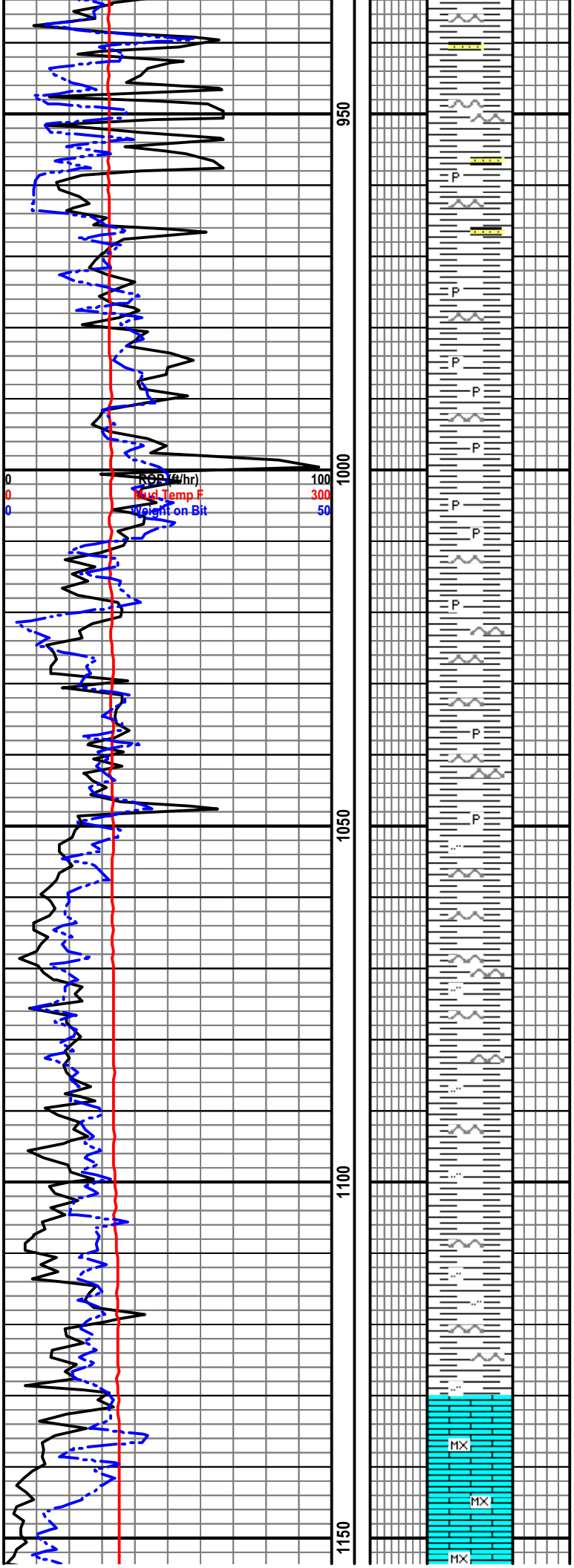
870-890 Shale (100%): dark gray to black, blocky, very well indurated, sl silty, mnr pyrite, rr quartz veining.

890-900 Shale (75%): dark grey, blue gray, blocky, well indurated, tr pyrite, tr quartz veining; Quartz: (20%): clear, frosted, blocky, subrounded, mnr fractured; Volcanic Sandstone (5%): white, very light grey, very fine/ 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 (80%): med - dark gray, blocky, very well indurated, abnt quartz veining, sl silty, tr pyrite; Quartz (20%): clr, frosted lt gy, blocky, angular/fractured.

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

1070-1080 Shale (90%): med gray, mnr dark gray and blue gray, blocky, sl silty, very well indurated, abnt quartz contacts; Quartz (10%): lt gy, frosted, crystals and veining, subangular to fractured/angular.

1080-1100 Shale (100%): medium to dark gray, tr black, blocky to platy, sl silty, very well indurated, tr quartz veining.

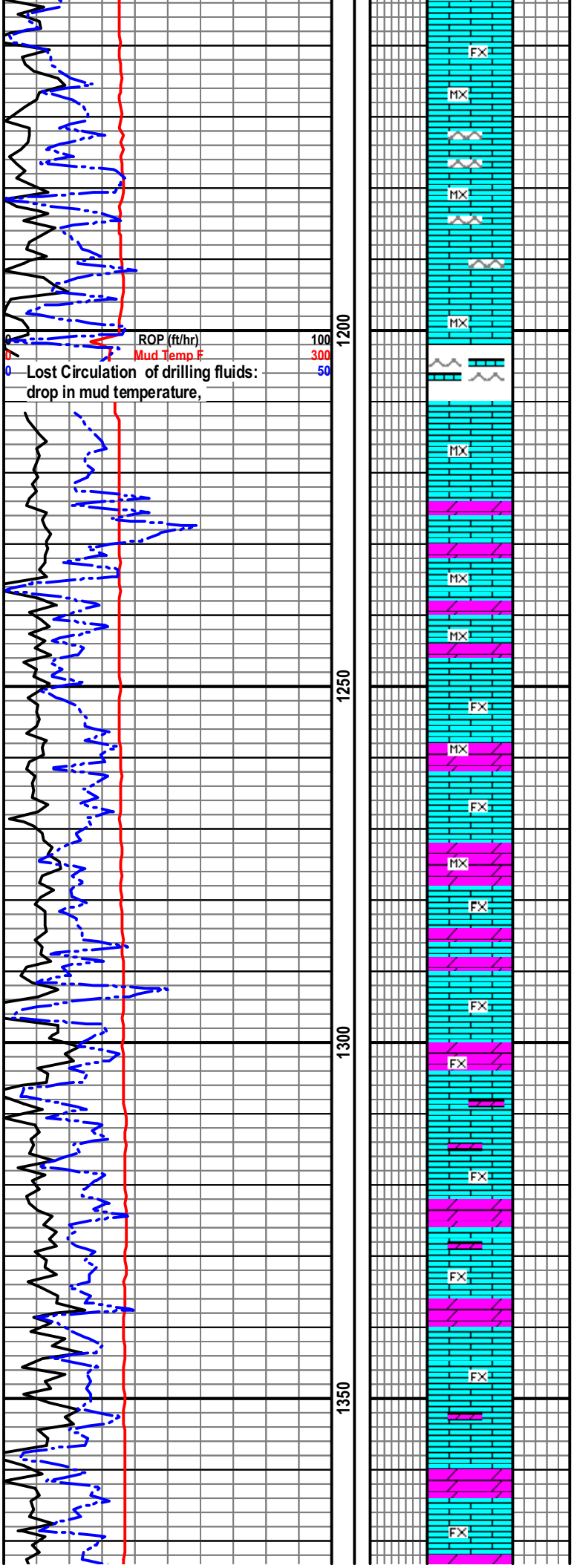
1100-1120 Shale (100%): medium to dark gray, tr black, blocky, silty, very well indurated, rr quartz veining.

1120-1130 Shale (95%): dark gray to 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

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.



1160-1180 Limestone (90%): light blue gray, light gray, mnr white & clr, blocky, very fine grained to microcrystalline, rr pyrite, tr blue gray shale(washout?); Quartz (10%): clr, frosted lt gy, blocky, angular/fractured.

1180-1195 Limestone (75%): light blue gray, light gray, mnr white & clr, (minor rock samples have hetrogenous colors, appear fractured and reformed), tr dark blue grey with pyrite, blocky, fine grained to microcrystalline (again hetrogenous in nature; Quartz (25%): clr, frosted lt gy, blocky, angular/fractured to subangular.

Potential Fault Zone

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 gy, 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 gy, angular, fine grained, very well indurated. Abundant loss circulation materials.

1250-1260 Limestone (85%): white, light grey, occ blue grey, mnr hetrogenous 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 materials 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%): white, light grey, tr blue gray, blocky, very fine grained; Dolomite (30%): clear, frosted light grey, blocky, angular, very well indurated, moderate indurated, fine grained.

1290-1310 Limestone (85%): light grey to blue gray, mnr white, blocky, very fine grained, minor med grained, hetrogenous 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?)

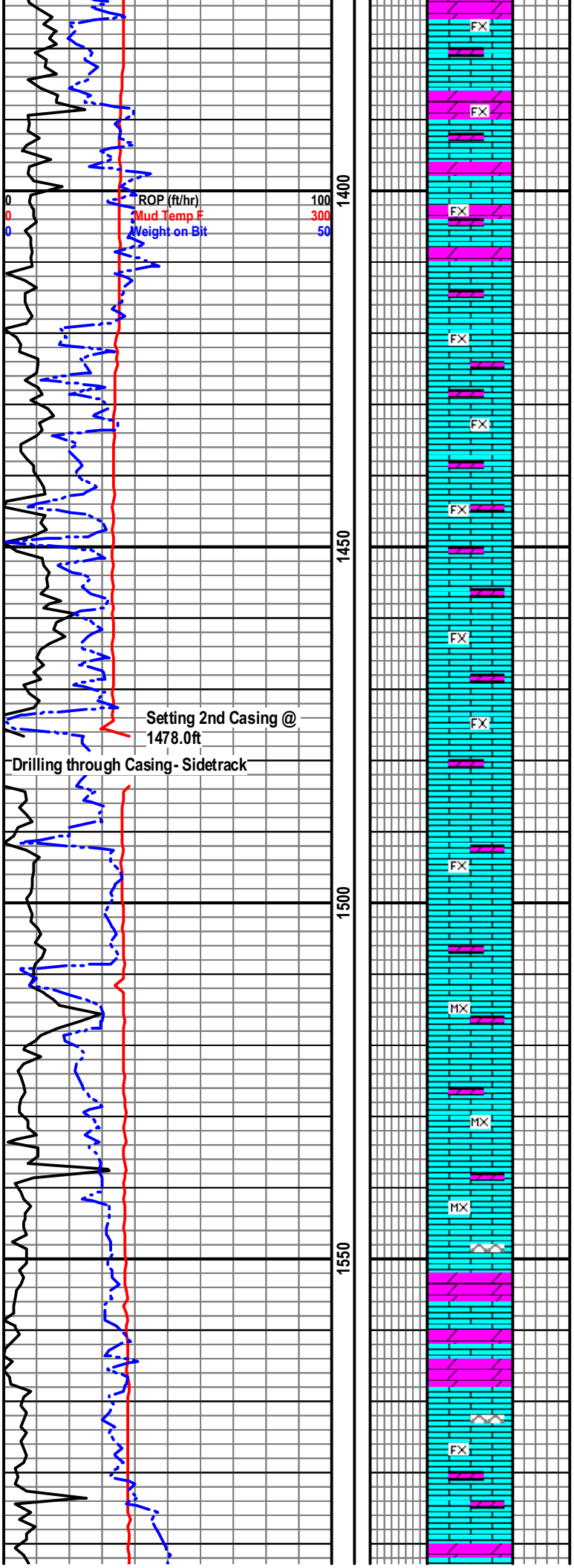
1310-1330 Limestone (95%): light grey to lt blue gray, mnr white, blocky, very fine grained, minor fine grained, hetrogenous color: Dolomite (5%): aa; Abundant LCM in sample (predominantly micas, walnut).

1330-1340 Dolomite (80%): light grey to blue gray, blocky, fine to med grained, hetrogenous color, 3-6% intergranular porosity, likely fracturing porosity. Limestone (20%): aa; Abundant LCM in sample.

1340-1350 Limestone (70%): light grey, occ lt blue gray, blocky, fine grained; Dolomite (30%): light grey to blue gray, blocky, fine to med grained, hetrogenous color, 3-6% porosity: Abundant LCM in sample.

1350-1360 Limestone (100%): light grey, lt blue to blue gray, mnr white, clear, blocky, fine grained, hetrogenous coloring, tr dolomite (aa); Minor LCM in sample.

1360-1380 Dolomite (65%): light grey to blue gray, clear, blocky, fine to med grained, hetrogenous color, 3% intergranular porosity: Limestone (35%): light grey, lt blue, clear, blocky, fine grained.



1380-1400 Dolomite (60%): light grey to blue gray, clear, blocky, fine to med grained, hetrogenous color, tr intergranular porosity: Limestone (40%): light grey, lt blue, clear, blocky, fine grained.

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

1420-1440 Limestone (80%): light grey, lt blue grey to blue grey, occ clear, blocky, fine-med grained, (20%) dolomitic mottling (light grey to blue gray to clear, hetrogenous 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, hetrogenous coloring and grain size).

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

Drilling Error- Stuck in Casing

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

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

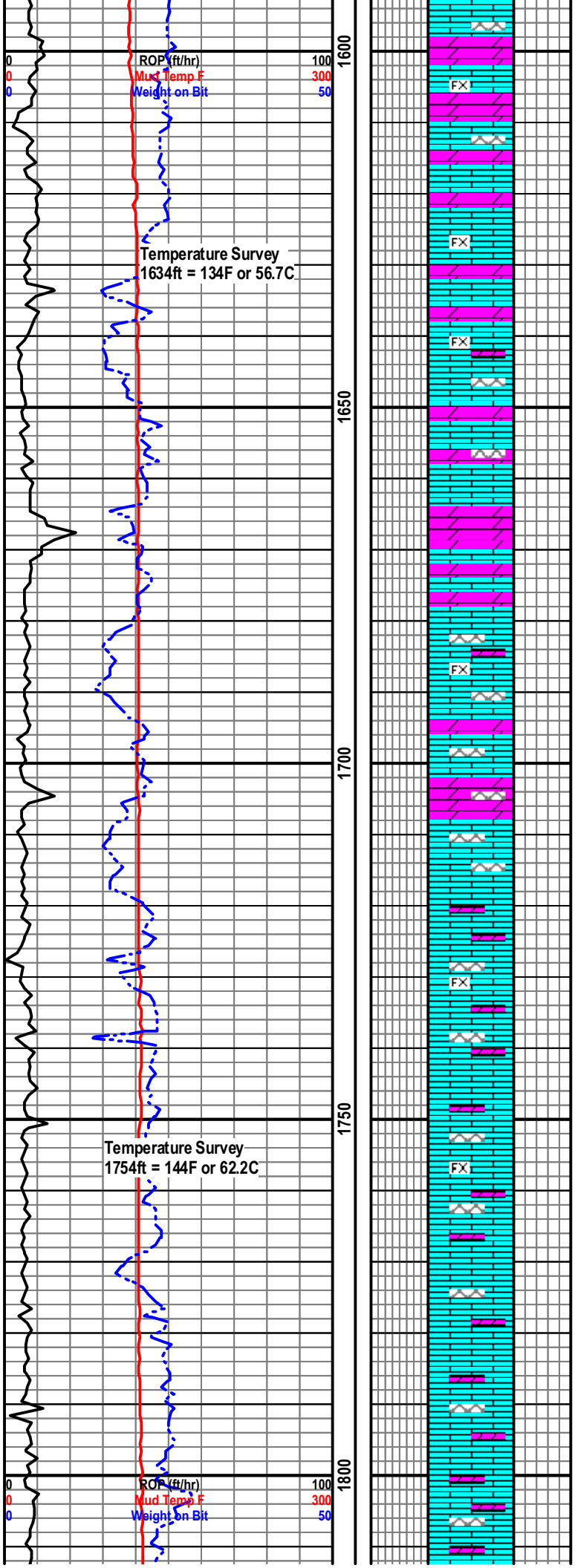
1510-1530 Limestone (100%): light grey, clear, tr blue gray, hetrogenous coloring within sample, microcrystalline to fine, tr dolomitic mottling.

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

1550-1560 Limestone (80%): light grey, blue grey, blocky, fine-med 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-med grained.

1570-1590 Limestone (85%): light grey, mnr blue grey, blocky, fine-med grained, rr intercrystalline porosity; Dolomite (15%): frosted, clear, mnr tan/beige (earthy), fine grained to microcrystalline, blocky.



1590-1610 Limestone (65%): light grey, blue grey, blocky, fine-medium grained, mnr fracture zones; Dolomite (35%): frosted, clear, fine grained to microcrystalline, mottled in limestone, blocky, appears to be reworked.

1610-1630 Limestone (80%): blue grey, mnr lt gy, mnr hetrogenous coloring, blocky, medium grained; Dolomite (20%): frosted, clear, fine grained to microcrystalline, blocky.

1630-1650 Limestone (90%): blue grey, mnr lt gy, mnr hetrogenous coloring, blocky, medium grained; Dolomite 10%): frosted, clear, fine grained to microcrystalline, blocky.

1650-1660 Limestone (85%): blue grey, lt gy, hetrogenous coloring, blocky, fine to mnr medium grained; Dolomite (15%): frosted, clear, fine grained to microcrystalline, blocky mottled in limestone, appears reworked.

1660-1670 Dolomite (60%): frosted, clear, fine grained to microcrystalline, tr earthy, blocky; Limestone (40%): light grey/frosted, lt blue grey, blocky, fine-med grained.

1670-1690 Limestone (80%): blue grey, mnr dk grey blue, mnr lt gy, mnr hetrogenous coloring, blocky, medium grained; Dolomite 20%): lt gy, beige, tr earthy, fine grained.

1690-1700 Limestone (85%): blue grey, mnr dk grey blue, mnr lt gy, mnr hetrogenous coloring, blocky, medium grained; Dolomite (15%): lt gy, beige, sl earthy, fine grained, mottled with limestone.

1700-1720 Dolomite (45%): frosted, clear, fine grained to microcrystalline, tr earthy, blocky; Quartz (30%): clear, angular fragments, blocky, mottled with dolomite; Limestone (25%): light grey/frosted, blue grey, blocky, fine-med grained.

1720-1740 Limestone (85%): blue grey, mnr dk grey blue, tr lt gy, blocky, medium grained, tr mica and FeS mineralization, tr intercrystalline & fracture porosity; Dolomite (15%): lt gy, beige, white, slightly earthy, fine grained, trace mottled with quartz.

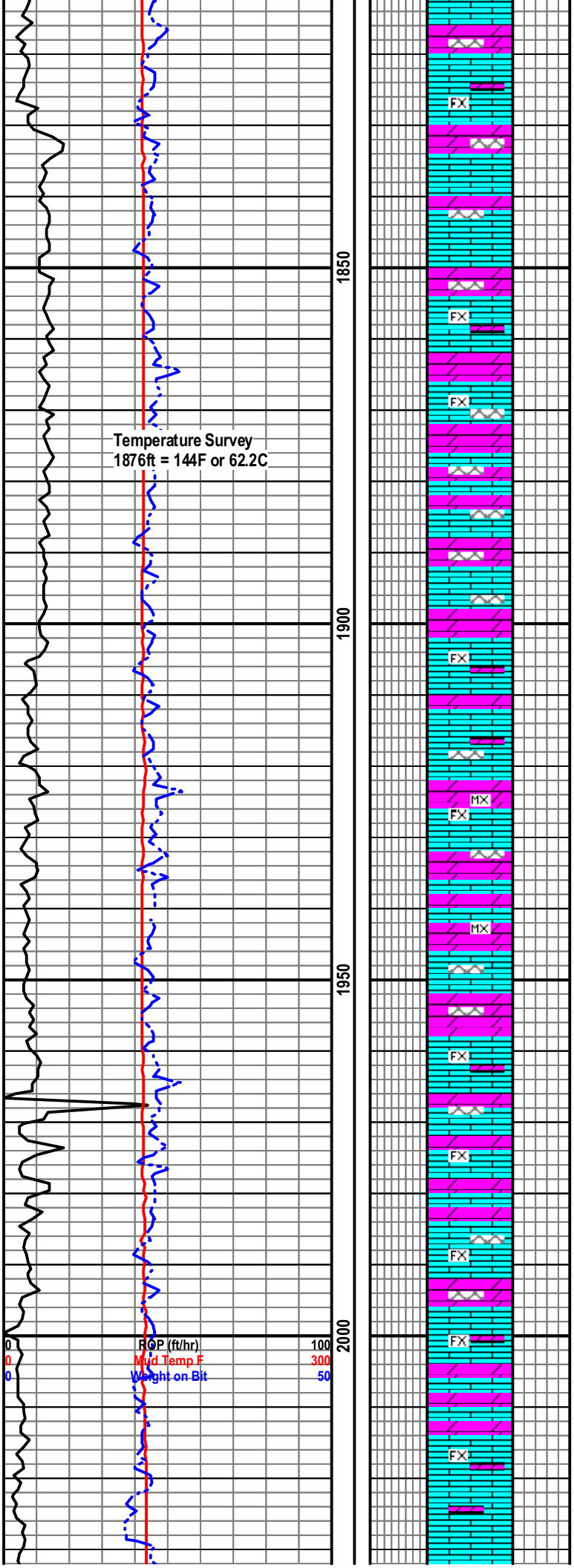
1740-1750 Limestone (80%): blue grey, lt blue gy, blocky, medium grained, tr intercrystalline & fracture porosity; Dolomite (20%): lt gy, wht, beige, tr clr, sl earthy, fine grained, mnr mottled with clr quartz.

1750-1770 Limestone (70%): blue grey, lt blue gy, blocky, medium grained, trace fracture porosity & FeS mineralization; Dolomite (30%): lt gy, wht, beige, tr clr, earthy, fine grained, mnr mottled with clr quartz.

1770-1790 Limestone (80%): lt blue grey, lt gy, occ clr blocky, fine to medium grained, trace fracture porosity & FeS mineralization; Dolomite (20%): lt gy, wht, beige (earthy), mnr clear mottled with Limestone, fine grained, tr quartz.

1790-1800 Limestone (100%): lt blue grey, frosted lt gy, blocky, fine-mnr medium grained, occ lt gy/wht Dolomite mottled with Limestone.

1800-1820 Limestone (75%): lt blue grey, clr, blocky, fine to medium grained, trace fracture porosity and infilling with dolomite and quartz; Dolomite (15%): lt gy, wht, frosted grey, fine grained; Quartz (10%):



clr, frosted, blocky, fracture filling.

1820-1840 Limestone (60%): lt blue grey, clr, 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%): clr, frosted, blocky, fracture filling.

1840-1870 Limestone (50%): lt blue grey, clr, 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%): clr, frosted, blocky.

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

1880-1890 Dolomite (50%): lt gy, wht, mnr beige (earthy) frosted grey, fine grained, tr fractures, tr FeS minerals; Limestone (30%): lt blue grey, clr, mnr dark blue gry, blocky, fine to medium grained, mottled with dolomite, Quartz (20%): clr, frosted, blocky.

1890-1910 Dolomite (65%): wht, mnr beige (earthy), frosted grey, fine grained, tr fractures, tr FeS minerals; Limestone (20%): lt blue grey, clr, blocky, fine grained, mottled with dolomite, Quartz (15%): clr, frosted, blocky.

1910-1920 Limestone (80%): lt blue grey, frosted grey, blocky, medium -coarse grained; Dolomite (35%): lt gy, wht, fine grained, tr quartz fragments.

1920-1930 Dolomite (75%): wht, frosted lt gy, fine grained, tr fractures, tr FeS minerals, mnr fracturing; Quartz (15%): clr, frosted, blocky; Limestone (10%): lt blue grey, clr, blocky, medium.

1930-1940 Dolomite (50%): wht, frosted lt gy, mnr earthy, microcystalline - fine grained, tr fractures, tr pyrite; Limestone (40%): lt blue grey, clr, fine-med grained; Quartz (10%): clr, frosted, blocky.

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

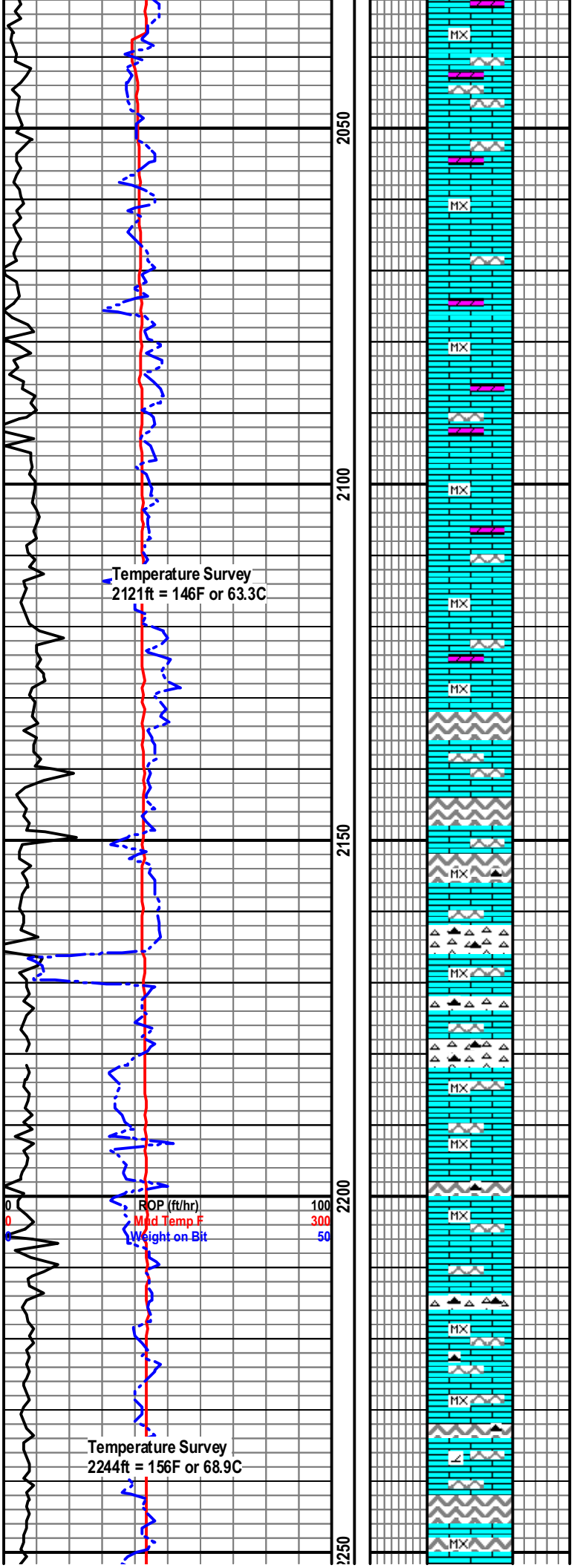
1950-1970 Limestone (60%): lt blue grey, frosted grey, mnr dark blue grey, blocky, fine grained; Dolomite (40%): lt gy, wht, mnr beige (earthy) fine grained, tr quartz fragments.

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

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

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

2030-2040 Limestone (95%): lt grey, beige, tr lt blue grey, blocky,



microcrystalline to fine grained, dolomitic/mottled, tight to 3% intercrystalline porosity; Dolomite (5%): lt gy, wht, mnr beige (earthy), fine grained, grdg to limestone.

2040-2050 Limestone (65%): lt grey, 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%): lt grey, lt blue grey, mnr beige (earthy), blocky, microcrystalline to fine grained, occ dolomitic/mottled, tr mica in fracture porosity, tight to 3% intercrystalline porosity, tr quartz.

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

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

2100-2130 Limestone (100%): lt grey, beige (earthy), mnr blue grey, rr clear/frosted grey, blocky, microcystalline, occ fine grained, sl dolomitic in part, tr quartz.

2130-2150 Quartz (75%): clear, frosted lt gy, angular/blocky, appears fractured, rr pyrite; Limestone (25%): lt gy, wht, mnr blue gray, fine grained, blocky, sl 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.

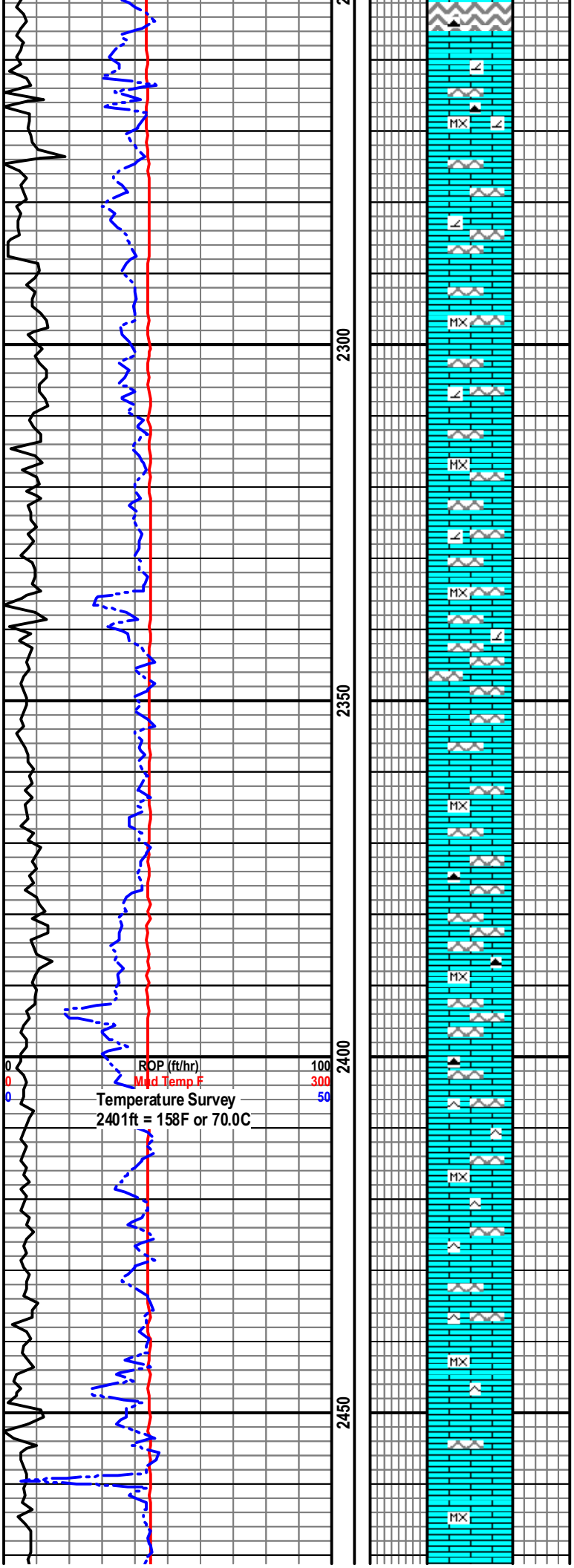
2180-2190 Limestone (80%): light blue grey, light grey, microcrystalline, blocky, slightly siliceous, minor dolomitic; Quartz/Chert (20%): dark blue grey, grey, nodules in Limestone.

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, minor dolomitic; 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),



cryptocrystalline, rare dark blue grey chert, angular fragments, tr fracture porosity; Limestone (25%): clear, beige/white, microcrstalline, blocky, sl dolomitic.

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.

2330-2340 Limestone (50%): clear, light grey, tr light blue grey, microcrystalline, angular, tr dolomite, veined with quartz; Quartz (50%): clear, frosted grey, angular, cryptocrystalline to microcrystalline.

2340-2350 Quartz (70%): clear, frosted grey, angular, cryptocrystalline, occ microcrystalline; Limestone (30%): light grey, tr light blue grey, microcrysalline, tr dolomite.

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; Quartz (50%): clear, frosted grey, angular, cryptpcrystalline, 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.

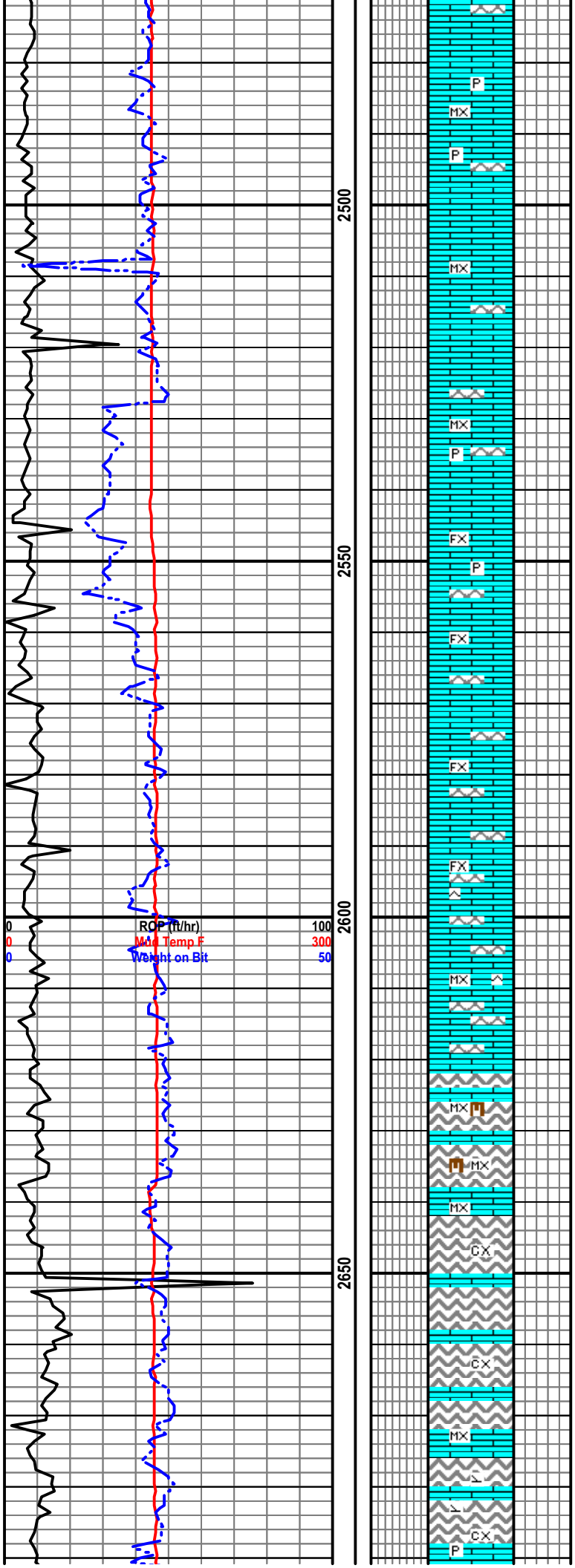
2400-2420 Limestone (85%): light blue grey, white to beige, occ clear, blocky, microcrystalline-fine grained, tr quartz vieining, rare bedding/banded, siliceous, ; Quartz (15%): clear, frosted grey, angular, cryptocrystalline.

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



quartz fragments.

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, vieining 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; Quartz (10%): clear, frosted light grey, angular, microcrystalline, rare pyrite.

2610-2620 Limestone (60%): light blue grey, mnr blue grey & grey/white, blocky, very fine grained, sl siliceous; Quartz (40%): frosted light grey, angular, microcrystalline, veining with limestone.

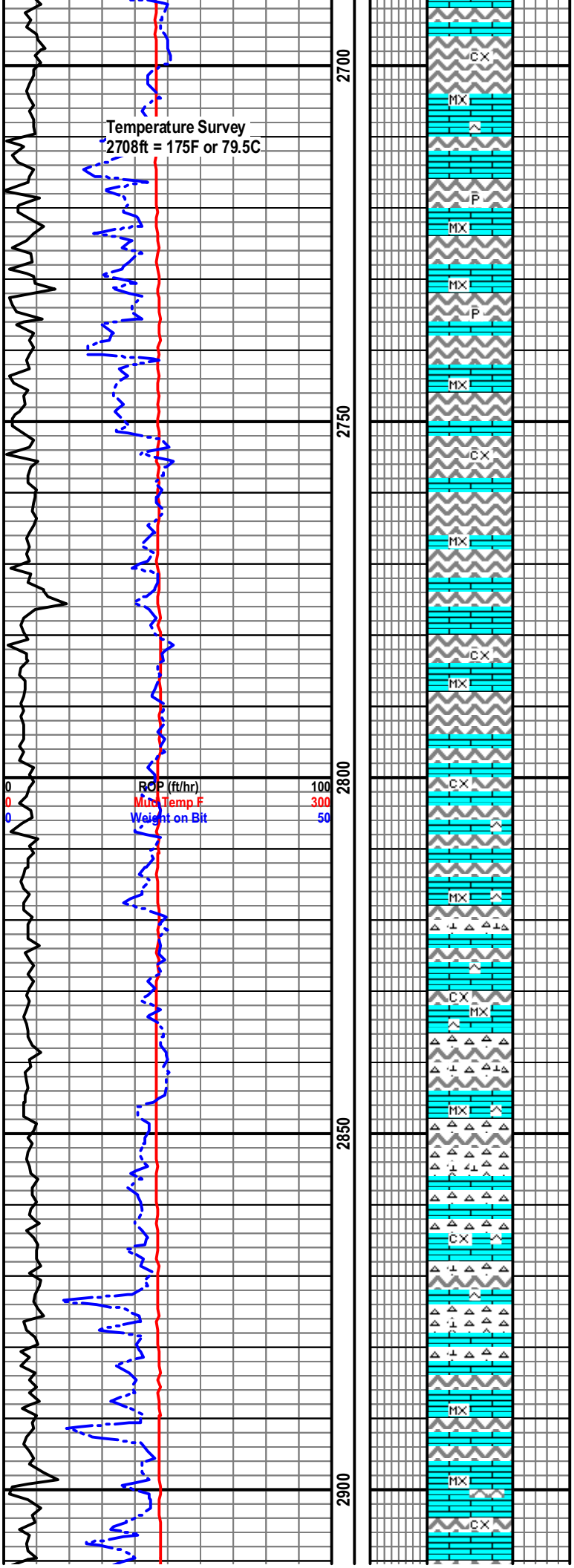
2620-2630 Quartz (80%): clear, frosted light grey, angular, predominantly microcrystalline, tr fine grained, abundant micas (biotite, mucscovite), mnr pyrite; Limestone (20%): wht, occ blue grey, blocky, very fine grained, abundant contacts/veining with quartz.

2630-2650 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.

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?).

2670-2690 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?).

2690-2700 Quartz (70%): white/very light grey, dull frosted grey,



angular, pred cryptocrystalline, tr pyrite; Limestone (30%): white/clear, mnr blue grey, blocky, microcrystalline, very fine grained, tr metal shavings (casing?).

2700-2710 Limestone (60%): blue grey, white/clear, blocky, microcrystalline, occ very fine grained, sl siliceous; Quartz (40%): clear, frosted light grey, angular, cryptocrystalline.

2710-2730 Quartz (70%): white, frosted light grey, mnr clear, angular, microcrystalline, mnr cryptocrystalline; 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 cryptocrystalline; 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, cryptocrystalline, occ microcystalline, abundant contacts with limestone; Limestone (15%): white, blue grey, tr clear, blocky microcrystalline.

2770-2780 Quartz (65%): white/beige, frosted light grey, tr clear, angular, pred cryptocrystalline; Limestone (35%): white, mnr blue grey, tr clear, blocky, microcrystalline

2780-2810 Quartz (80%): white, frosted light grey, mnr beige, angular, cryptocrystalline; Limestone (20%): white, occ blue grey, tr clear, blocky, microcrystalline.

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

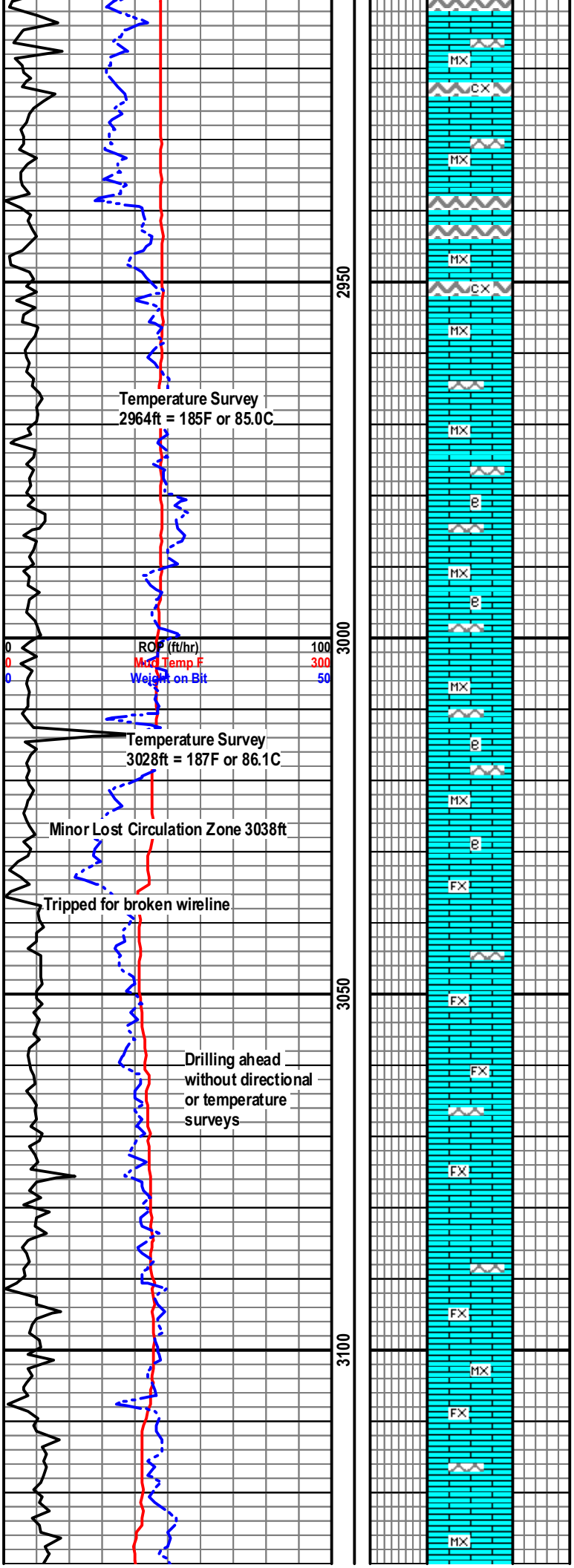
2830-2850 Chert (75%): dark blue grey, fine grained nodules with limestone, very well indurated; Limestone (15%): light blue grey, white, blocky, intergranular in chert, siliceous; Quartz (10%): white, frosted grey, tr clear, angular, cryptocrystalline.

2850-2860 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, cryptocrystalline.

2860-2880 Chert (65%): dark blue grey, fine grained nodules within limestone matrix; Limestone(30%): light grey blue, mnr white, blocky, cryptocrystalline, angular, siliceous in part; Quartz (5%): clear, white, frosted grey, angular, cryptocrystalline.

2880- 2900 Limestone (75%): blue grey, mnr white, blocky, microcrystalline, angular, siliceous in part, slightly siliceous in part; Quartz (25%): clear, white, frosted grey, angular, cryptocrystalline, 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, cryptocrystalline, trace mineralizations.



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.

3000-3010 Limestone (98%): blue grey, mnr light grey, white angular, blocky, microcrystalline to very fine grained; Quartz (2%): frosted light grey, angular, cryptocrystalline, trace metal shavings.

No sample -strictly lost circulation material (LCM).

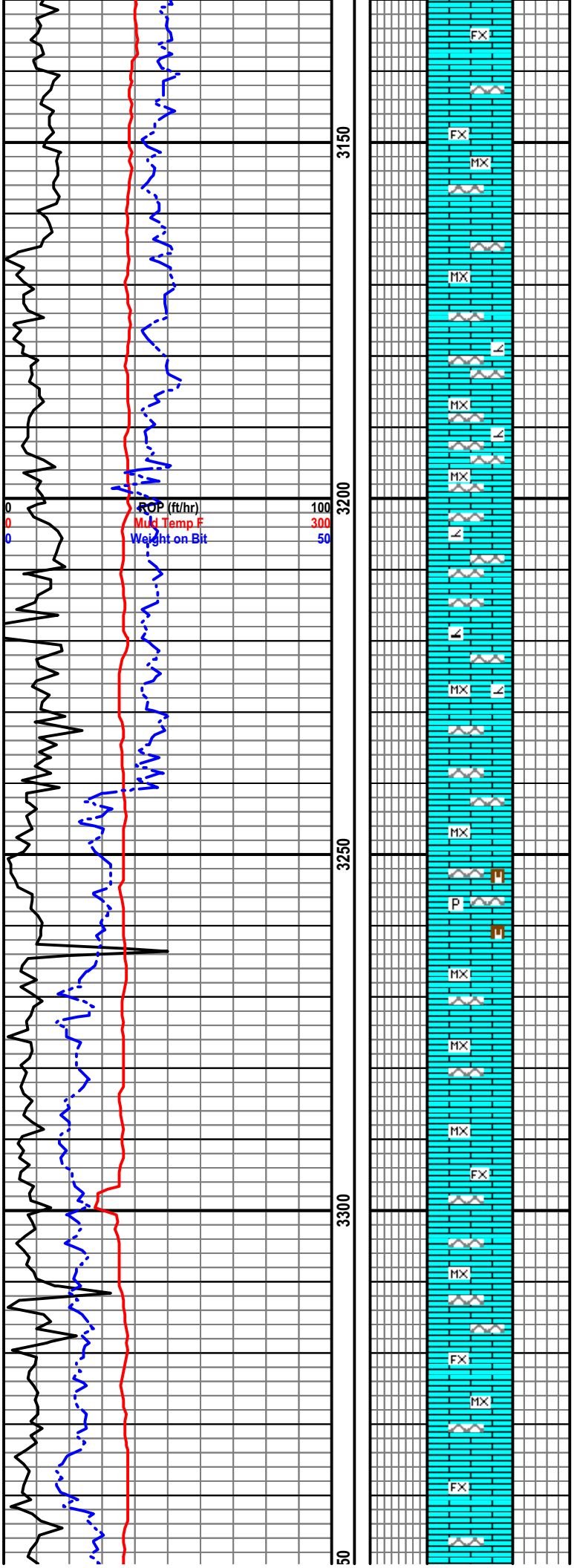
3020-3040 Limestone (100%): blue grey, light grey, angular blocky, appears fine grained to medium grained, minor tight to 3% intergranular porosity, trace clear quartz. Poor sample quality due to LCM (sawdust, mica and walnut shells).

3040-3070 Limestone (100%): blue grey, light grey, white, mnr earthy, angular, blocky, appears fine grained to medium 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, hetrogenous crystal size and colors, angular, blocky. LCM in sample.



3130-3150 Limestone (100%): light frosted grey to white (crypto to microcrystalline) , blue grey (medium grained), blocky, angular, hetrogenous 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 grey, mnr white, 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.

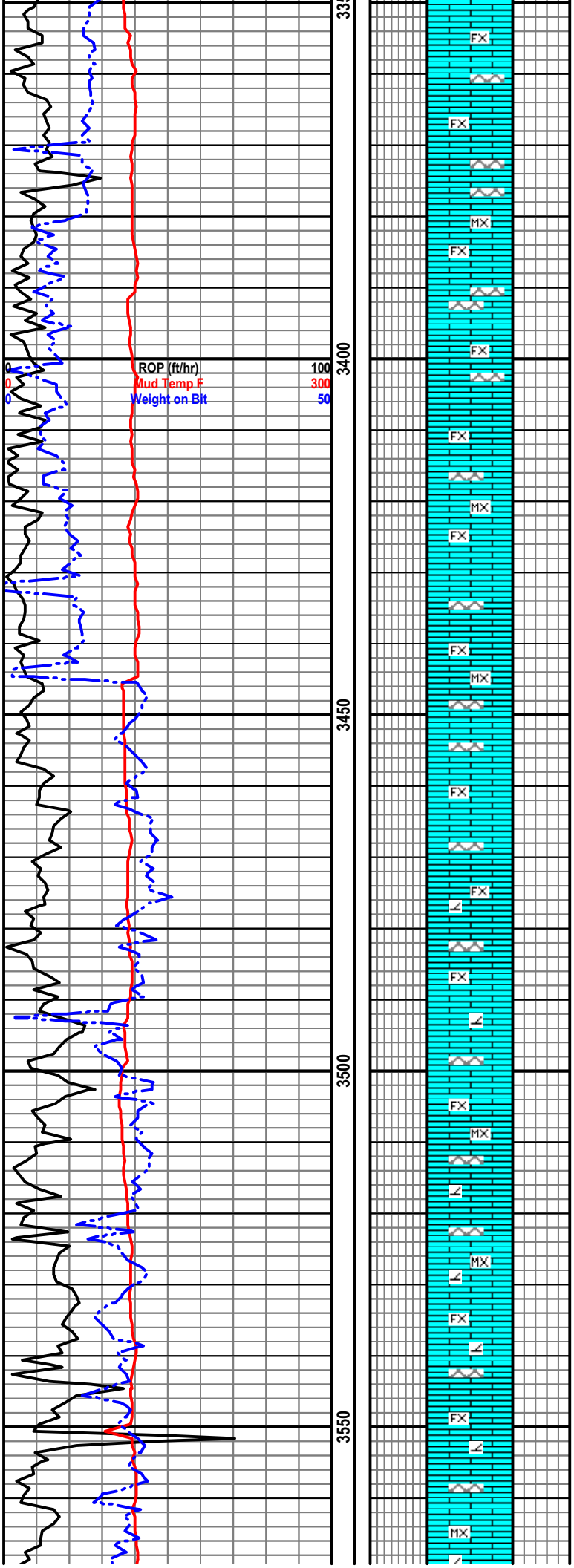
3260-3280 Limestone (90%): light grey, light-med blue grey, tr beige (earthy) microcrystalline, blocky, angular; Quartz (10%): frosted light grey, clear, angular, blocky.

3280-3300 Limestone (95%): light grey to blue grey, rare beige, microcrystalline to fine grained, hetrogenous 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), predominately microcrystalline, blue grey is fine-grained, blocky, angular; Quartz (10%): clear, frosted grey, cryptocystalline, angular, numerous contacts with limestone.

3310-3340 Limestone (95%): light grey to blue grey, occassional beige, microcrystalline to fine grained, hetrogenous 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) hetrogenous coloring and



grain size and numerous contacts between limestone types, blocky, angular; Quartz (5%): clear, frosted grey, blocky, angular to subangular.

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, fine grained, minor microcrystalline (light grey), tr beige, blocky, angular; Quartz (5%): clear, frosted grey, blocky, angular to subangular, rare dark blue chert.

3420-3440 Limestone (95%): light grey, light to dark blue grey, predominantly fine grained, minor microcrystalline (light grey), blocky, angular, contacts between limestone grain sizes & color; Quartz (5%): clear, frosted grey, blocky, angular to subangular, rare pyritization.

3440-3460 Limestone (90%): light grey, blue grey, predominantly fine grained, minor microcrystalline (light grey), blocky, angular, trace intercrystalline/vuggy porosity; Quartz (10%): clear, frosted grey, blocky, angular.

3460-3480 Limestone (95%): blue grey, minor light grey, predominantly fine grained, minor microcrystalline (light grey), blocky, angular, trace intercrystalline/vuggy porosity; Quartz (5%): clear, frosted grey, blocky, angular, rare pyrite.

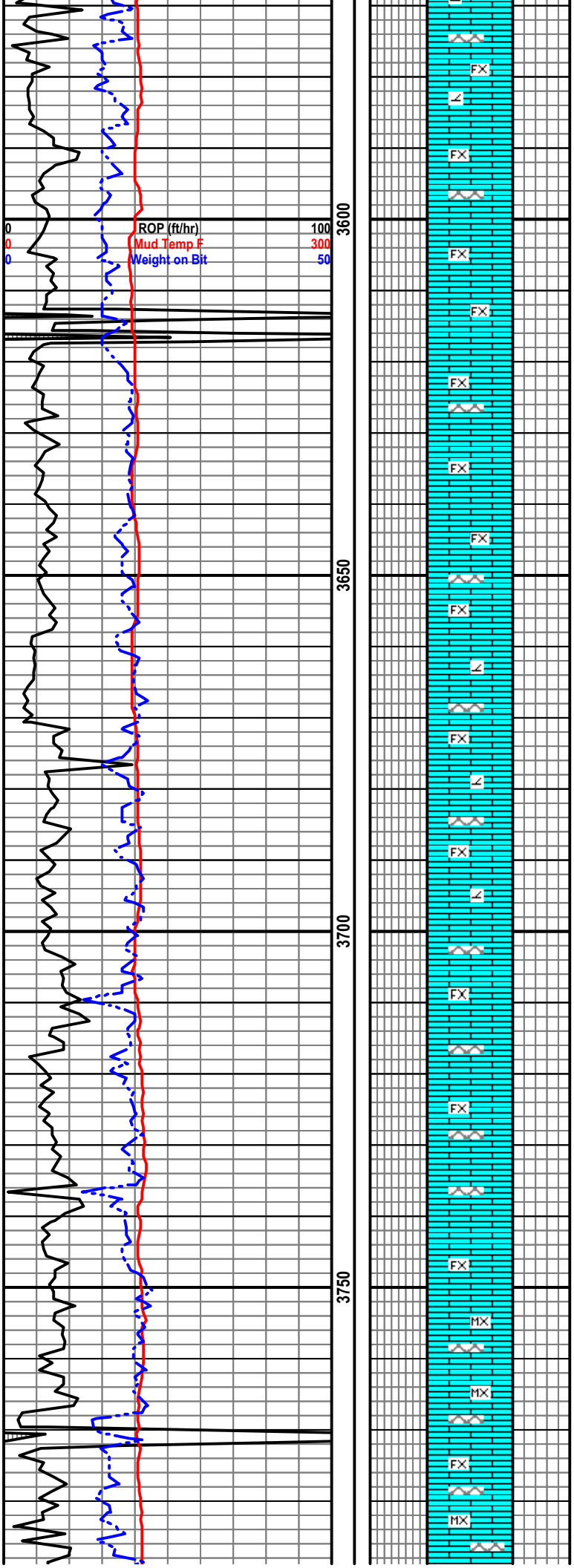
3480-3500 Limestone (100%): light blue grey, light grey, predominantly fine grained, blocky, angular, trace fracture porosity, tr dolomitic, tr clear quartz.

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

3520-3540 Limestone (95%): light grey to blue grey, fine grained to microcrystalline, blocky, angular, hetrogeneous 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, hetrogeneous 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



dolomitic; Quartz (5%): clear, frosted grey, angular, blocky, cryptocrystalline.

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

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

3620-3630 Limestone (95%): light to blue grey, minor dark blue grey, fine grained, blocky, angular, hetrogeneous 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, hetrogeneous coloring trace intercrystalline porosity, minor light grey/clear quartz.

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

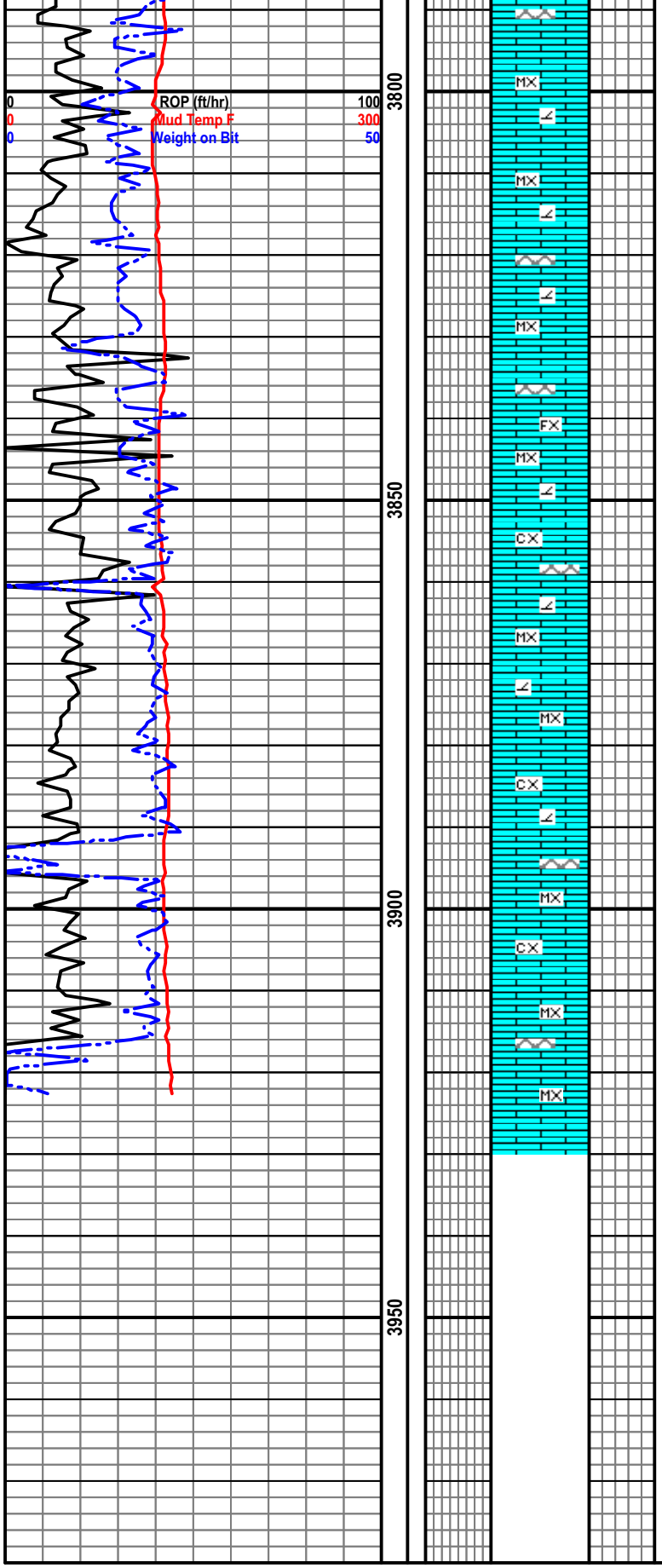
3700-3720 Limestone (100%): light to dark blue grey, light grey, fine grained, occ microcrystalline, blocky, angular, hetrogeneous coloring, trace intercrystalline porosity, minor frosted grey quartz.

3720-3740 Limestone (95%): light to dark blue grey, minor light grey, tr beige, fine grained, occ microcrystalline, blocky, angular, hetrogeneous 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, hetrogeneous 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, hetrogeneous 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.

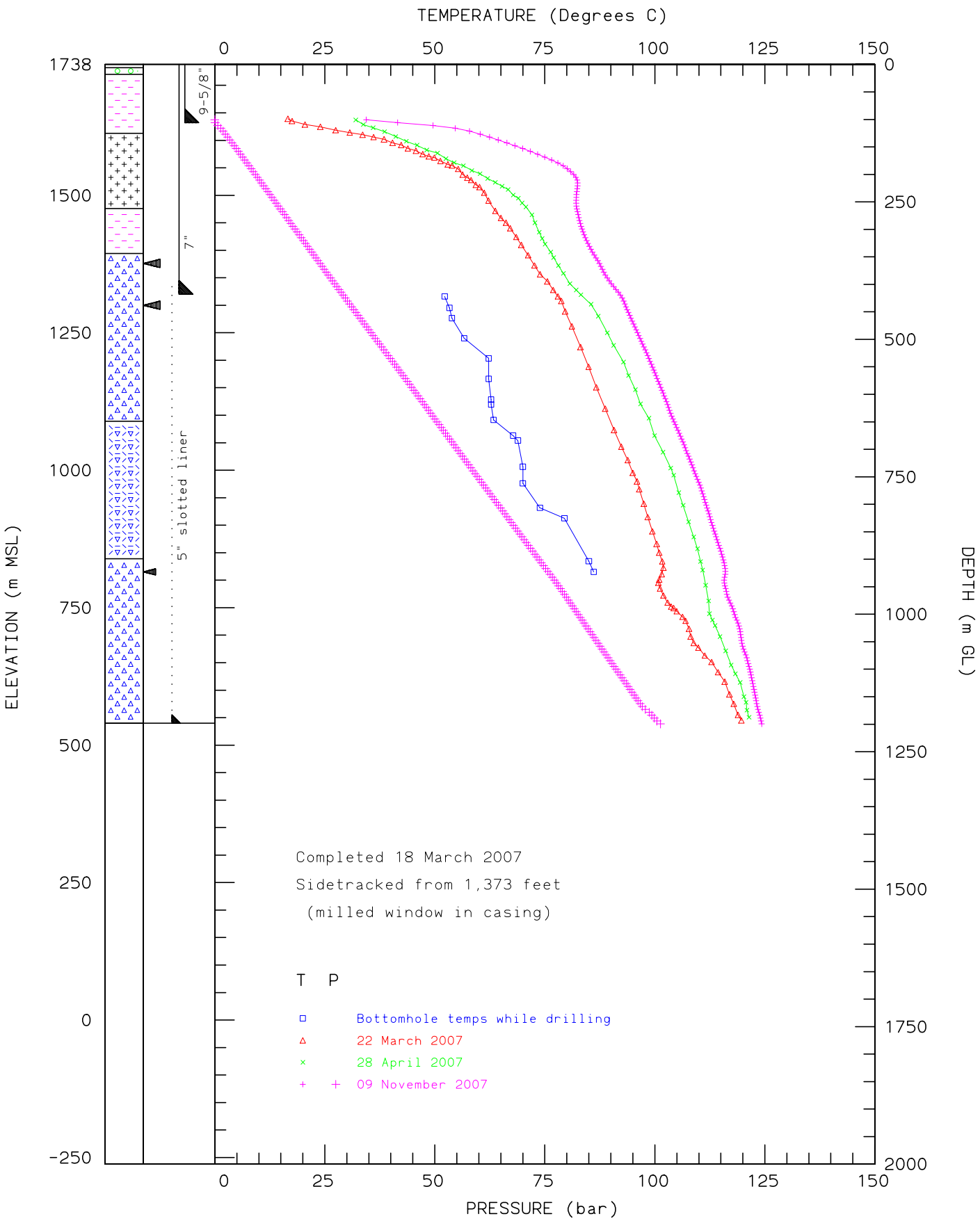
3890-3910 Limestone (100%): clear, white to very light grey, minor beige (sl earthy), trace blue grey, microcrystalline, blocky, angular, trace dolomitic, trace clear quartz.

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.N

TD: 3930 ft - March 17th, 2007 19:15

Appendix C: Temperature and Pressure Logs

Downhole Summary Plot - Reese River 56-4



GeothermEx, Inc. 2008

06-12-2008 TBOTM.CSV

Appendix D: Water Chemistry

THERMOCHEM

13172 (1-5) January 9, 2008

Kelly Franz
Sierra Geothermal

Report of Analysis

Lab Number: 13172 - 1

Descriptor: RRP SW 11-09-07 17:30

Analyte	mg/kg
Sodium	231
Potassium	35.0
Calcium	59.4
Magnesium	23.2
Lithium	0.986
Boron	0.944
Silica	28.6
Arsenic	0.0069
Cesium	0.202
Rubidium	0.164
Chloride	38.9
Fluoride	4.63
Sulfate	65.8
Carbonate Alkalinity (as CO3=)	<2.00
Bicarbonate Alkalinity (as HCO3-)	732
Ammonia	1.62
TDS (Calculated)	1220
Lab pH (units)	7.22

THERMOCHEM

13172 (1-5) January 9, 2008

Kelly Franz
Sierra Geothermal

Report of Analysis

Lab Number: 13172 - 2

Descriptor: RRP 56-4-A 11-11-07 13:00

Analyte	mg/kg
Sodium	284
Potassium	12.8
Calcium	10.9
Magnesium	1.53
Lithium	0.610
Boron	1.14
Silica	94.5
Arsenic	0.019
Cesium	0.103
Rubidium	<0.100
Chloride	54.8
Fluoride	8.50
Sulfate	81.8
Carbonate Alkalinity (as CO3=)	<2.00
Bicarbonate Alkalinity (as HCO3-)	548
Ammonia	5.32
TDS (Calculated)	1100
Lab pH (units)	8.88

THERMOCHEM

13172 (1-5) January 9, 2008

Kelly Franz
Sierra Geothermal

Report of Analysis

Lab Number: 13172 - 3

Descriptor: RRP 56-4-B 11-12-07 12:45

Analyte	mg/kg
Sodium	312
Potassium	10.4
Calcium	8.37
Magnesium	0.567
Lithium	0.660
Boron	1.11
Silica	101
Arsenic	0.028
Cesium	0.105
Rubidium	<0.100
Chloride	83.0
Fluoride	7.25
Sulfate	108
Carbonate Alkalinity (as CO3=)	<2.00
Bicarbonate Alkalinity (as HCO3-)	562
Ammonia	5.76
TDS (Calculated)	1200
Lab pH (units)	9.05

THERMOCHEM

13172 (1-5) January 9, 2008

Kelly Franz
Sierra Geothermal

Report of Analysis

Lab Number: 13172 - 4

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

Analyte	mg/kg
Sodium	286
Potassium	10.1
Calcium	15.6
Magnesium	2.07
Lithium	0.677
Boron	1.21
Silica	97.6
Arsenic	0.033
Cesium	<0.100
Rubidium	<0.100
Chloride	73.6
Fluoride	6.29
Sulfate	95.8
Carbonate Alkalinity (as CO3=)	<2.00
Bicarbonate Alkalinity (as HCO3-)	541
Ammonia	3.64
TDS (Calculated)	1130
Lab pH (units)	8.88

THERMOCHEM

13172 (1-5) January 9, 2008

Kelly Franz
Sierra Geothermal

Report of Analysis

Lab Number: 13172 - 5

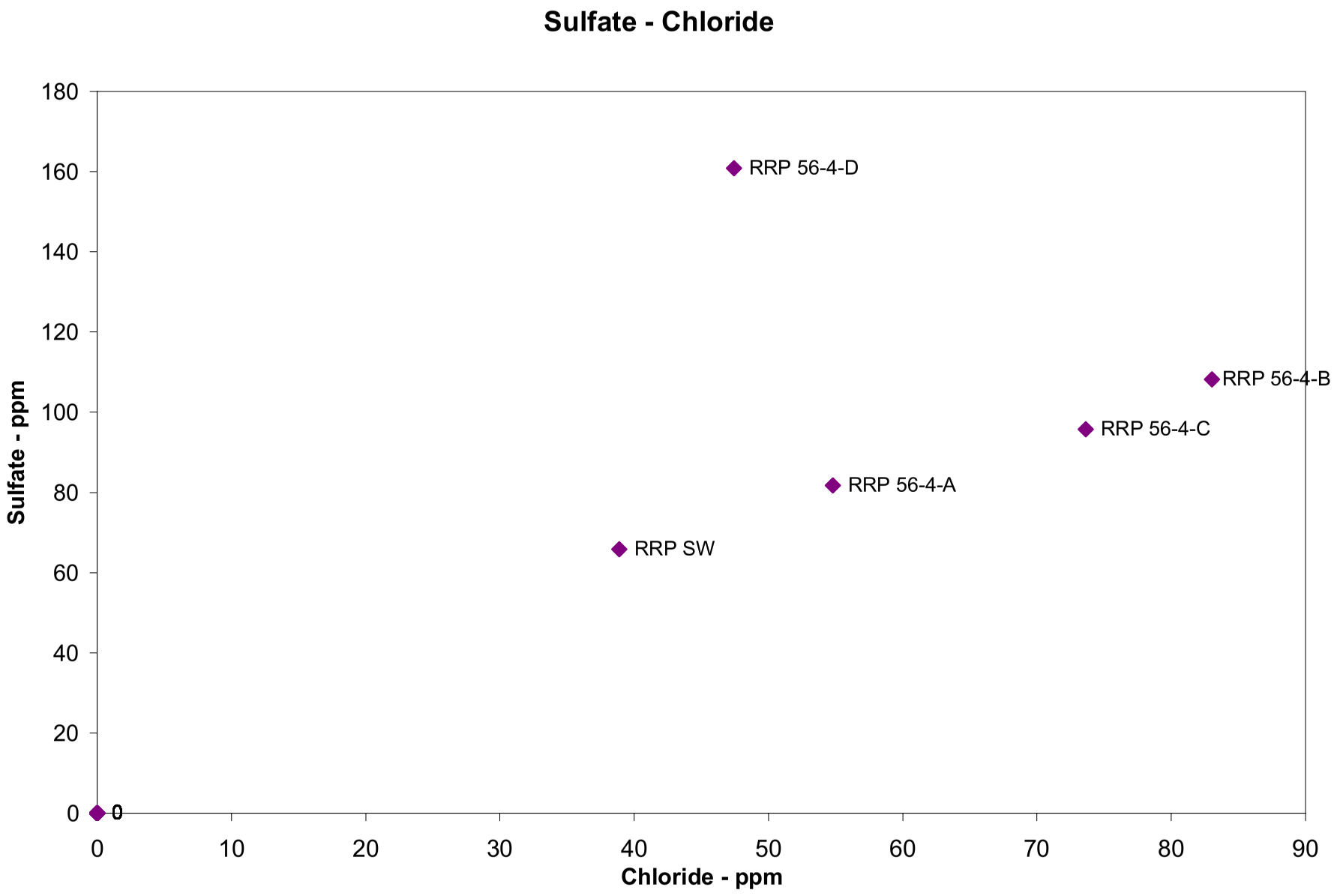
Descriptor: RRP 56-4-D 11-14-07 15:30

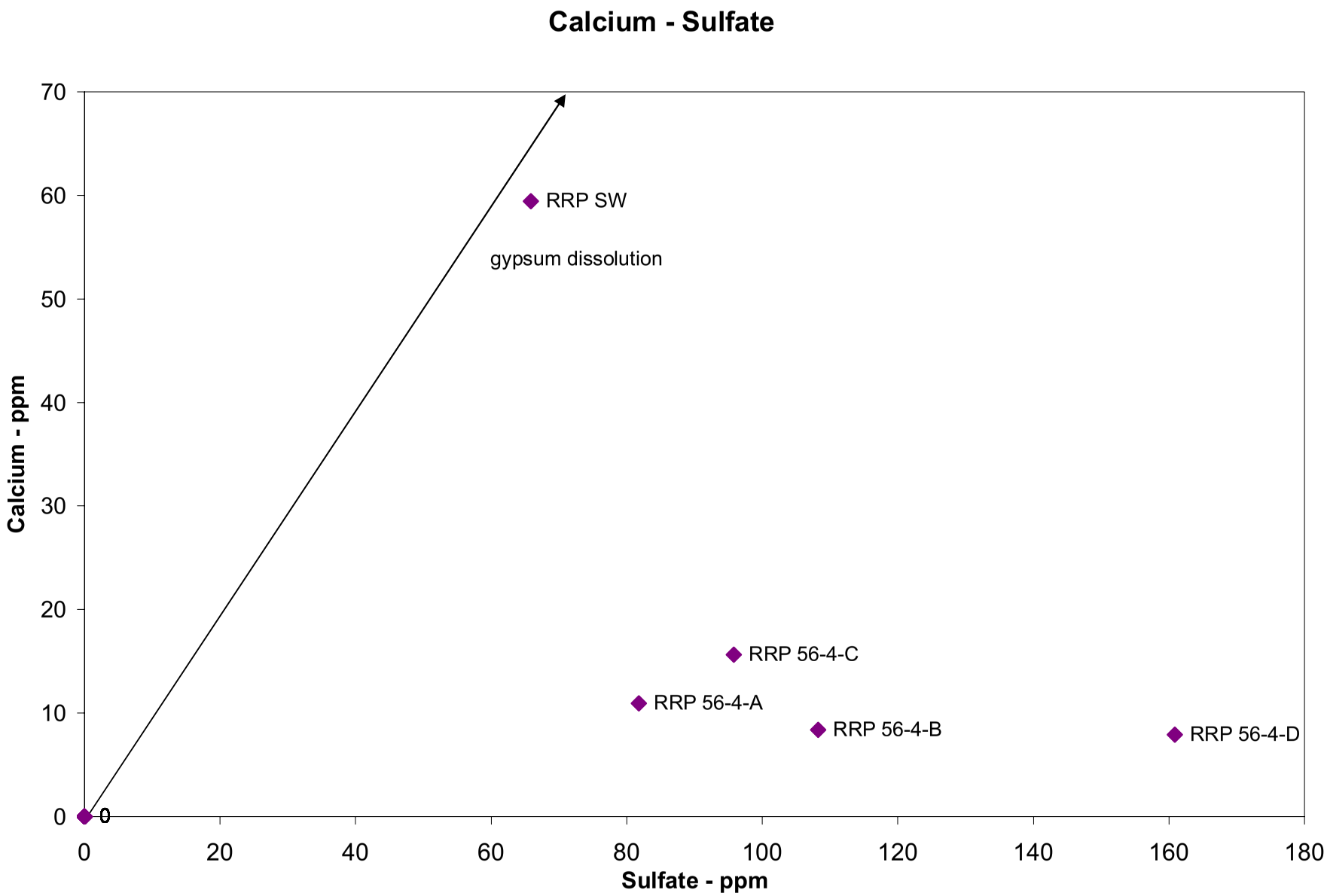
Analyte	mg/kg
Sodium	285
Potassium	8.04
Calcium	7.92
Magnesium	0.089
Lithium	0.645
Boron	0.977
Silica	103
Arsenic	0.036
Cesium	<0.100
Rubidium	<0.100
Chloride	47.4
Fluoride	3.16
Sulfate	161
Carbonate Alkalinity (as CO3=)	<2.00
Bicarbonate Alkalinity (as HCO3-)	500
Ammonia	3.77
TDS (Calculated)	1120
Lab pH (units)	9.01

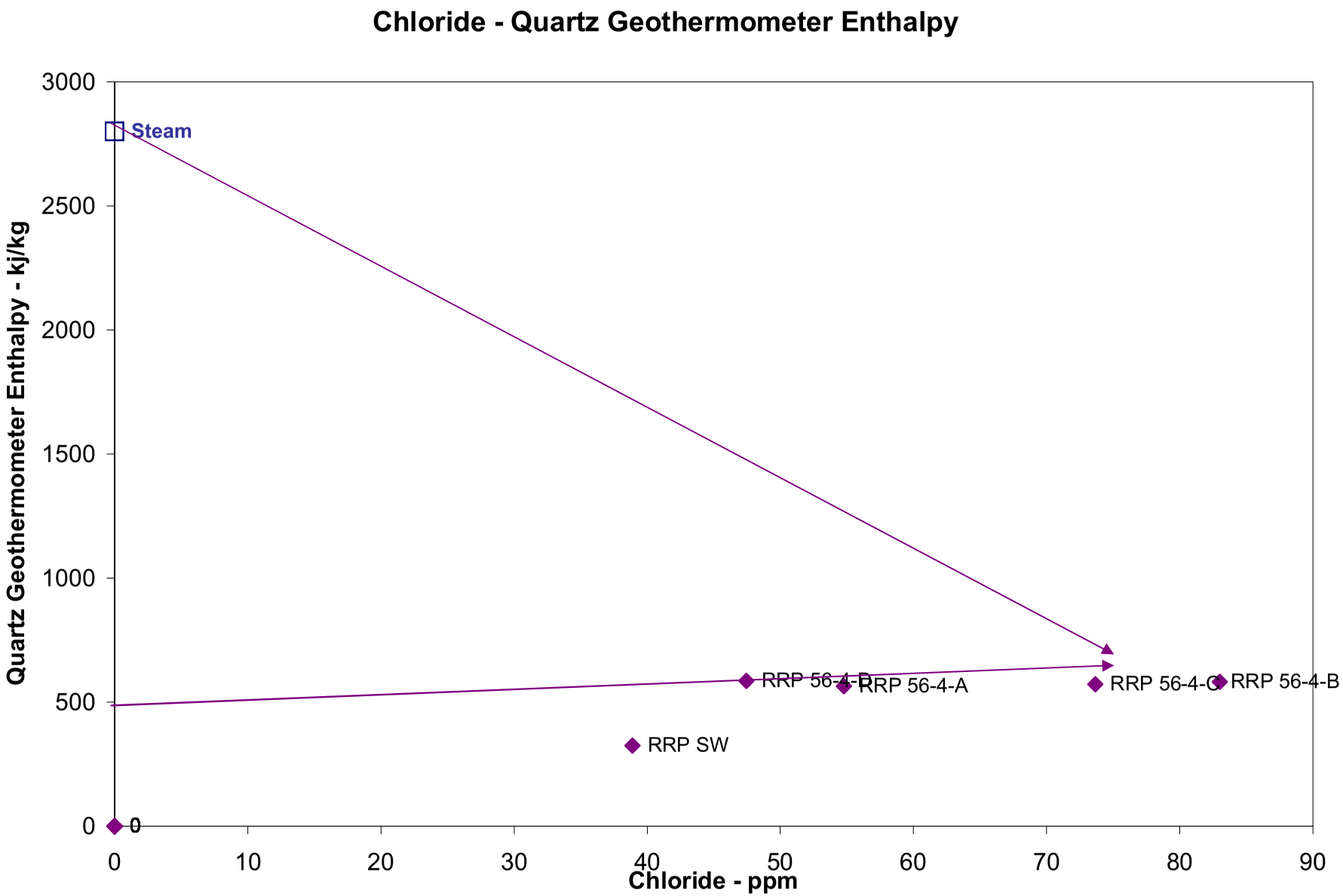
Geothermometers

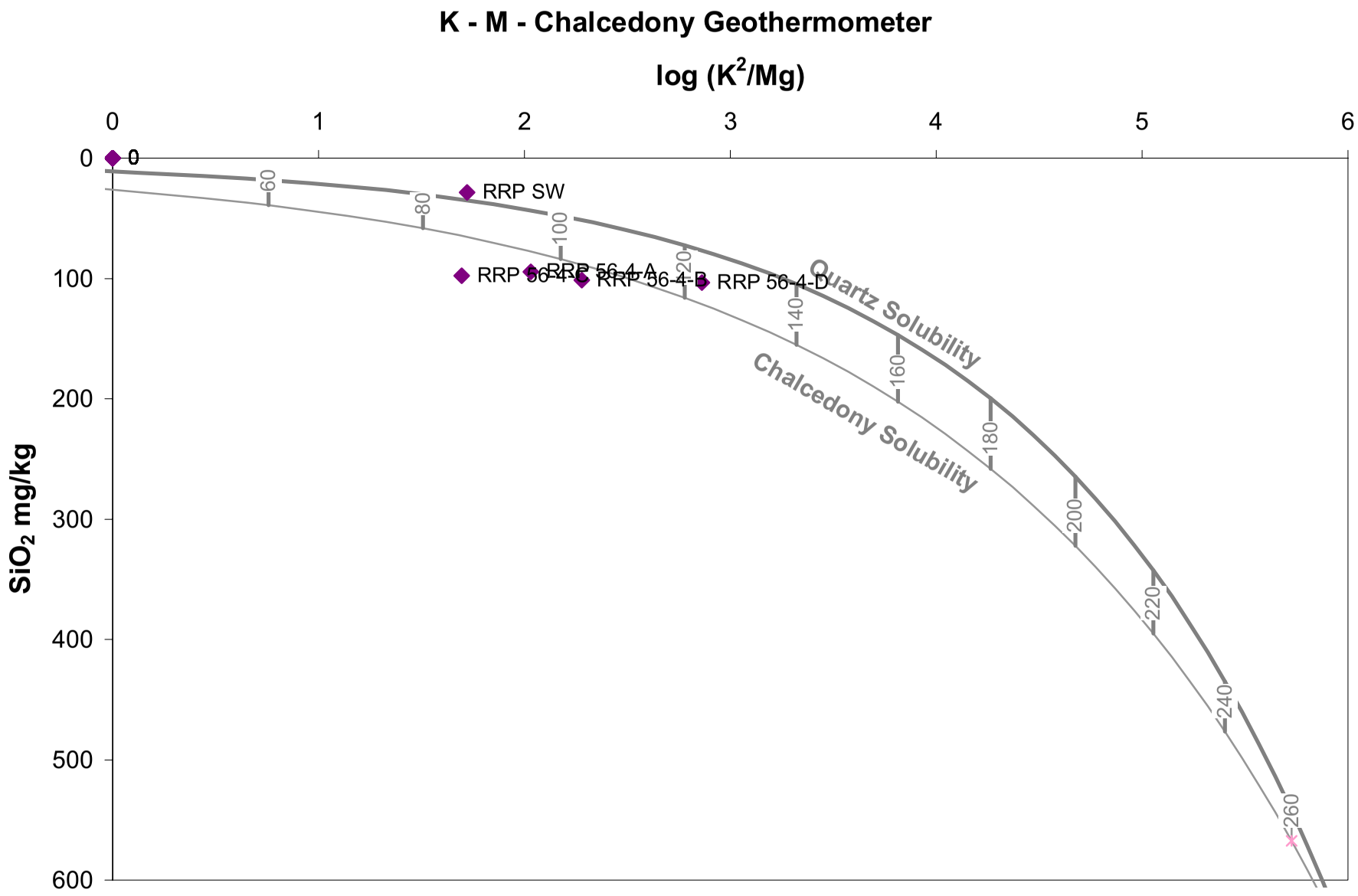
Sample Name	Source	Date	Temp C	pH	Amorphous Silica	Chalcedony cond	Quartz cond	Quartz max steam loss	Na-K-Ca	Na-K-Ca Mg corr	Na/K (Giggenbach)	K/Mg (Giggenbach)	Anhydrite
RRP SW	13172-1	11/9/07		7.22	NA	46	78	81	200	49	268	87	163
RRP 56-4-A	13172-2	11/11/07		8.88	NA	107	134	130	154	114	176	97	203
RRP 56-4-B	13172-3	11/12/07		9.05	NA	111	138	133	143	138	157	105	204
RRP 56-4-C	13172-4	11/13/07		8.88	NA	109	136	132	140	106	161	87	187
RRP 56-4-D	13172-5	11/14/07		9.01	NA	113	139	134	135	135	148	125	191

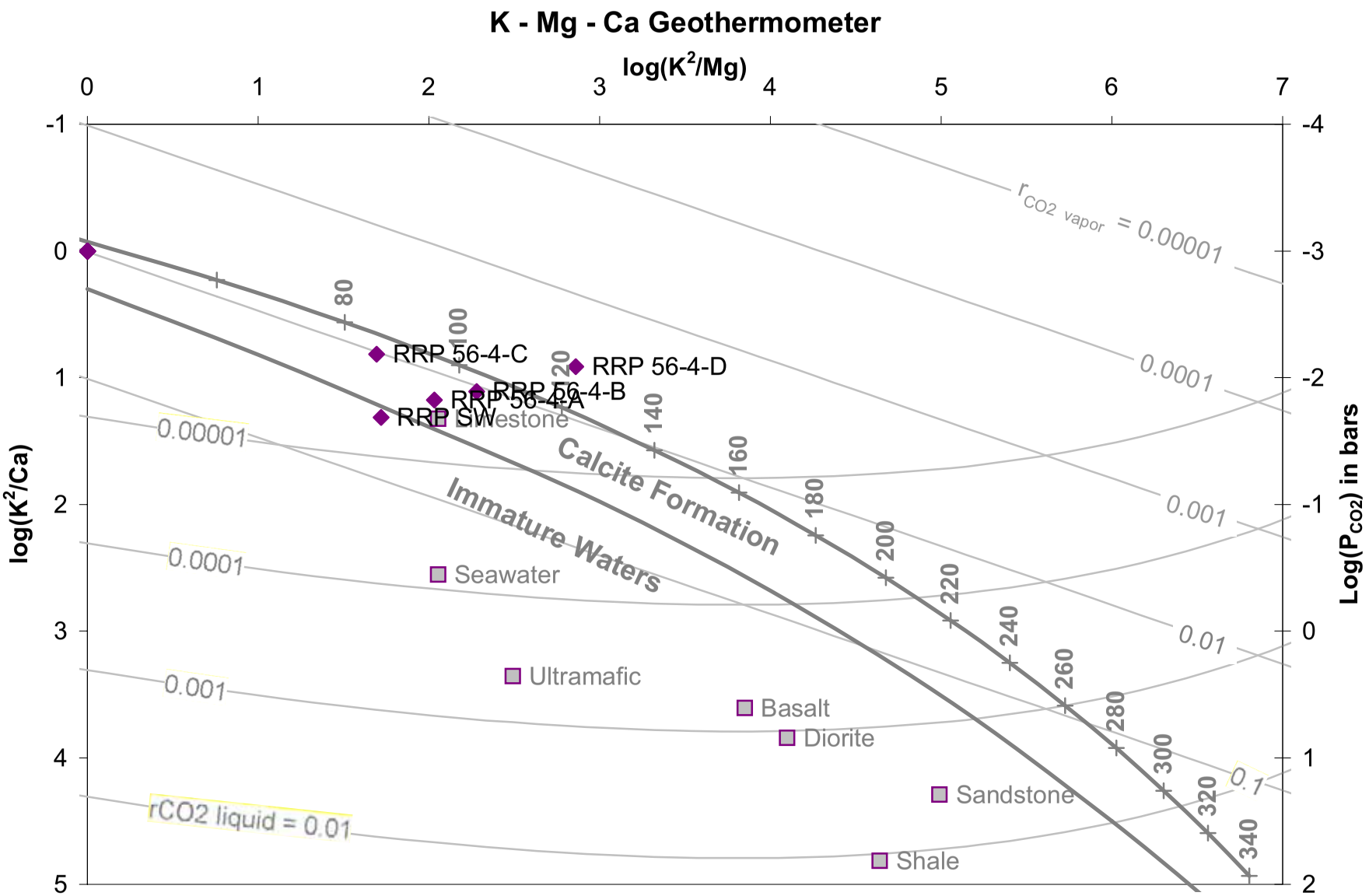
NA = Not Applicable

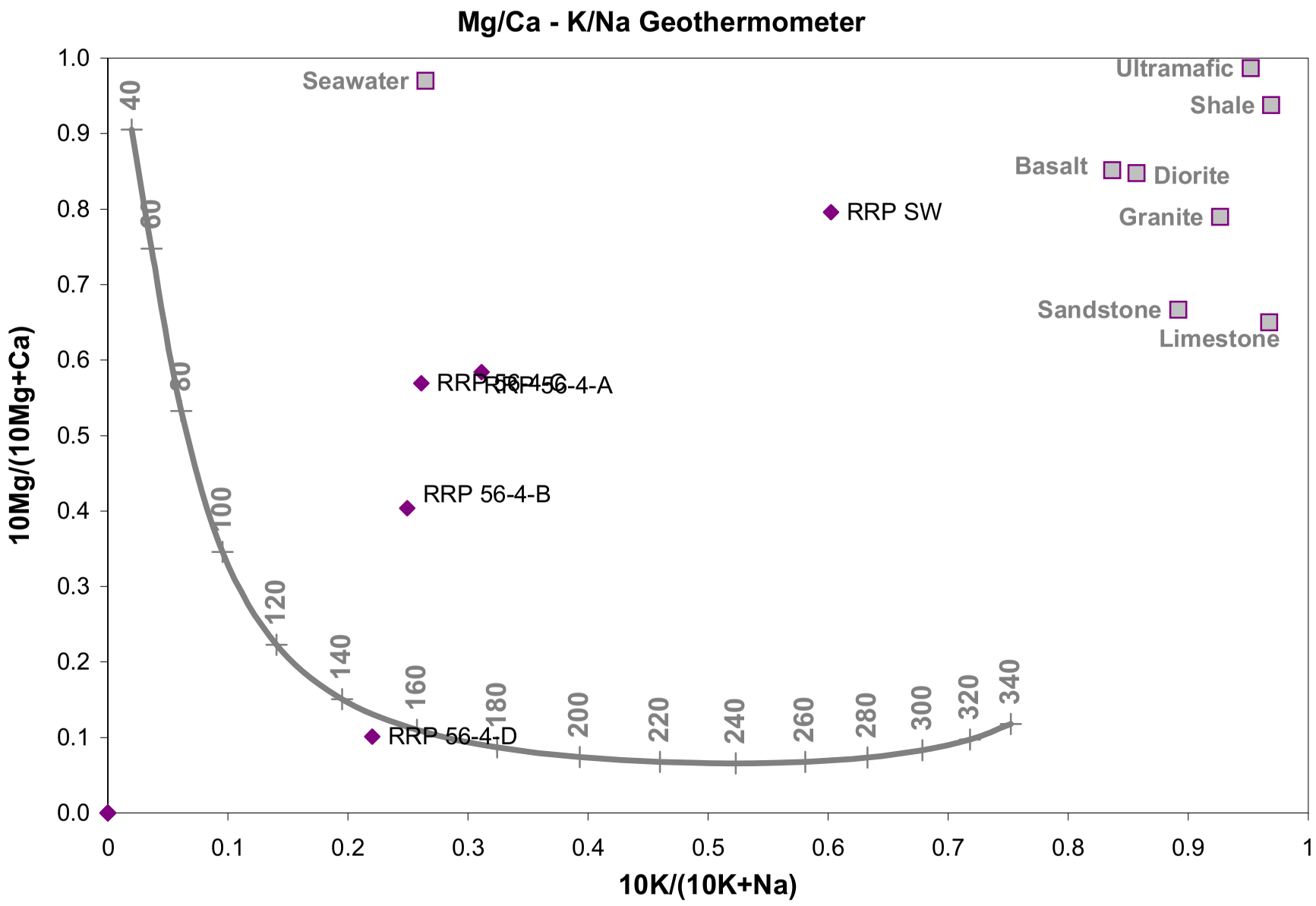

Sulfate - Chloride
Sulfate - ppm
Chloride - ppm
180
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
RRP 56-4-D
RRP 56-4-B
RRP 56-4-C
RRP 56-4-A
RRP SW
0

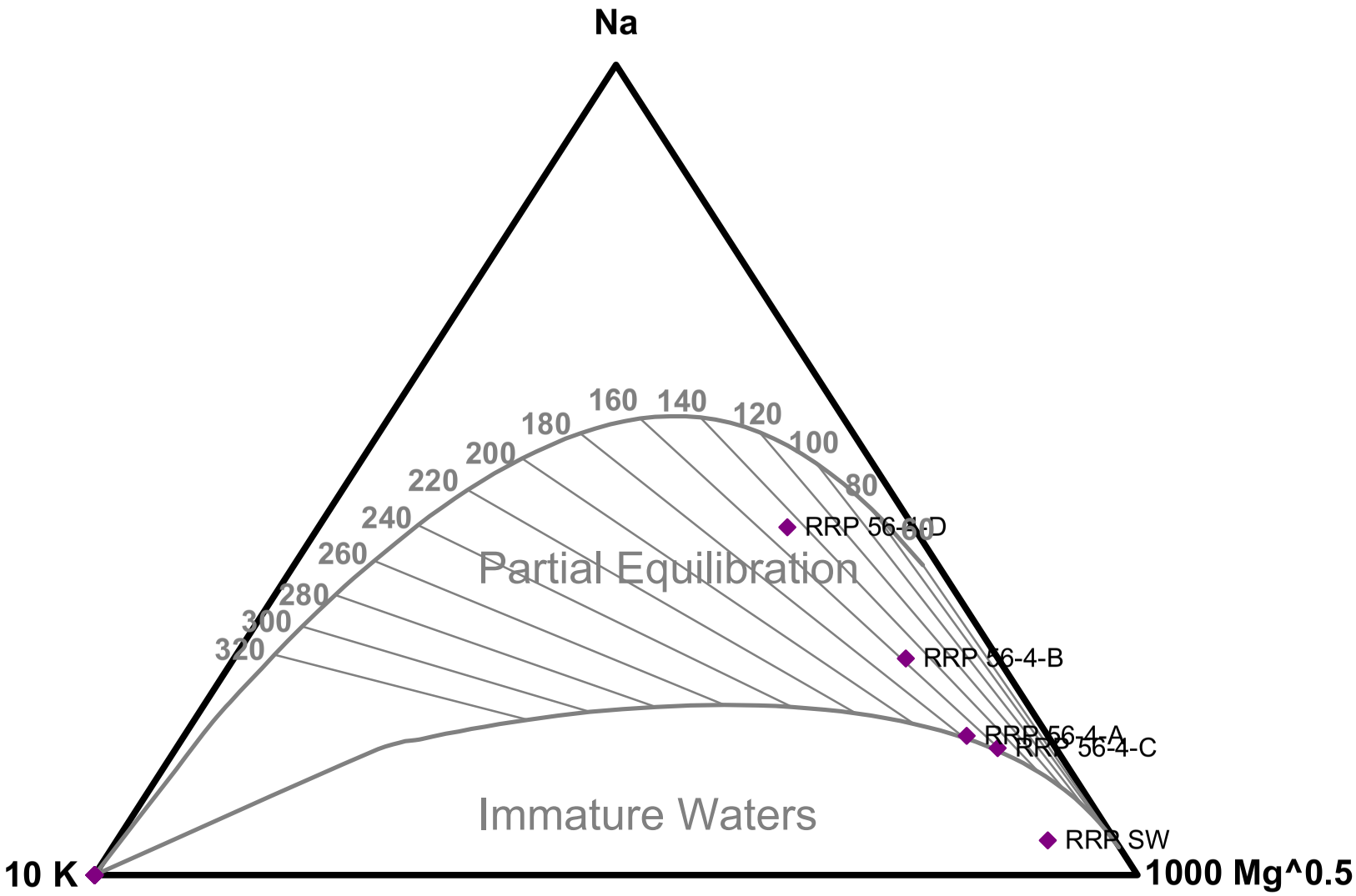

Calcium - Sulfate
Calcium - ppm
Sulfate - ppm
0
10
20
30
40
50
60
70
0
20
40
60
80
100
120
140
160
180
RRP SW
gypsum dissolution
RRP 56-4-C
RRP 56-4-A
RRP 56-4-B
RRP 56-4-D
0

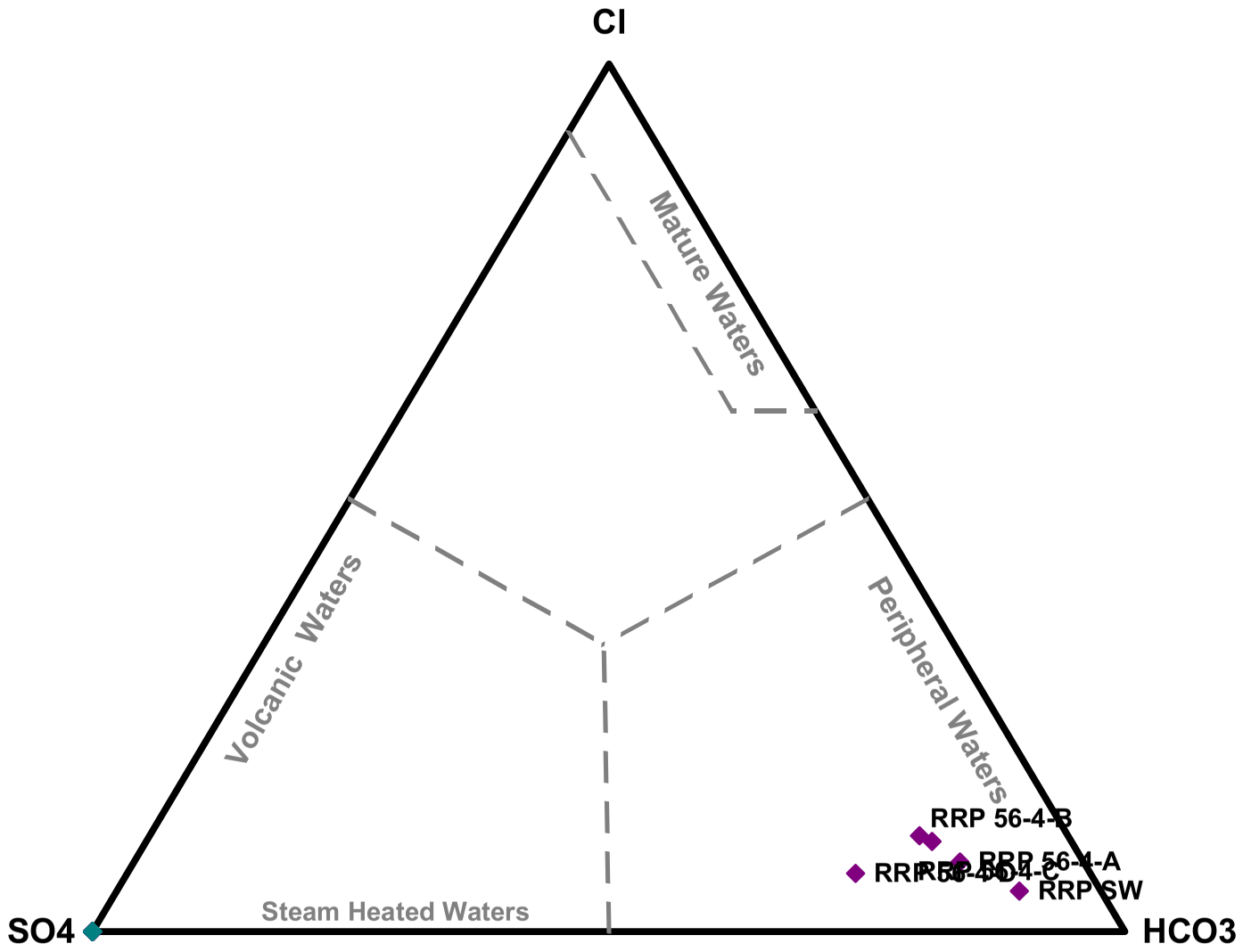

Chloride - Quartz Geothermometer Enthalpy
Quartz Geothermometer Enthalpy - kj/kg
Chloride - ppm
3000
2500
2000
1500
1000
500
0
0
10
20
30
40
50
60
70
80
90
Steam
RRP 56-4-D
RRP 56-4-A
RRP 56-4-C
RRP 56-4-B
RRP SW
0

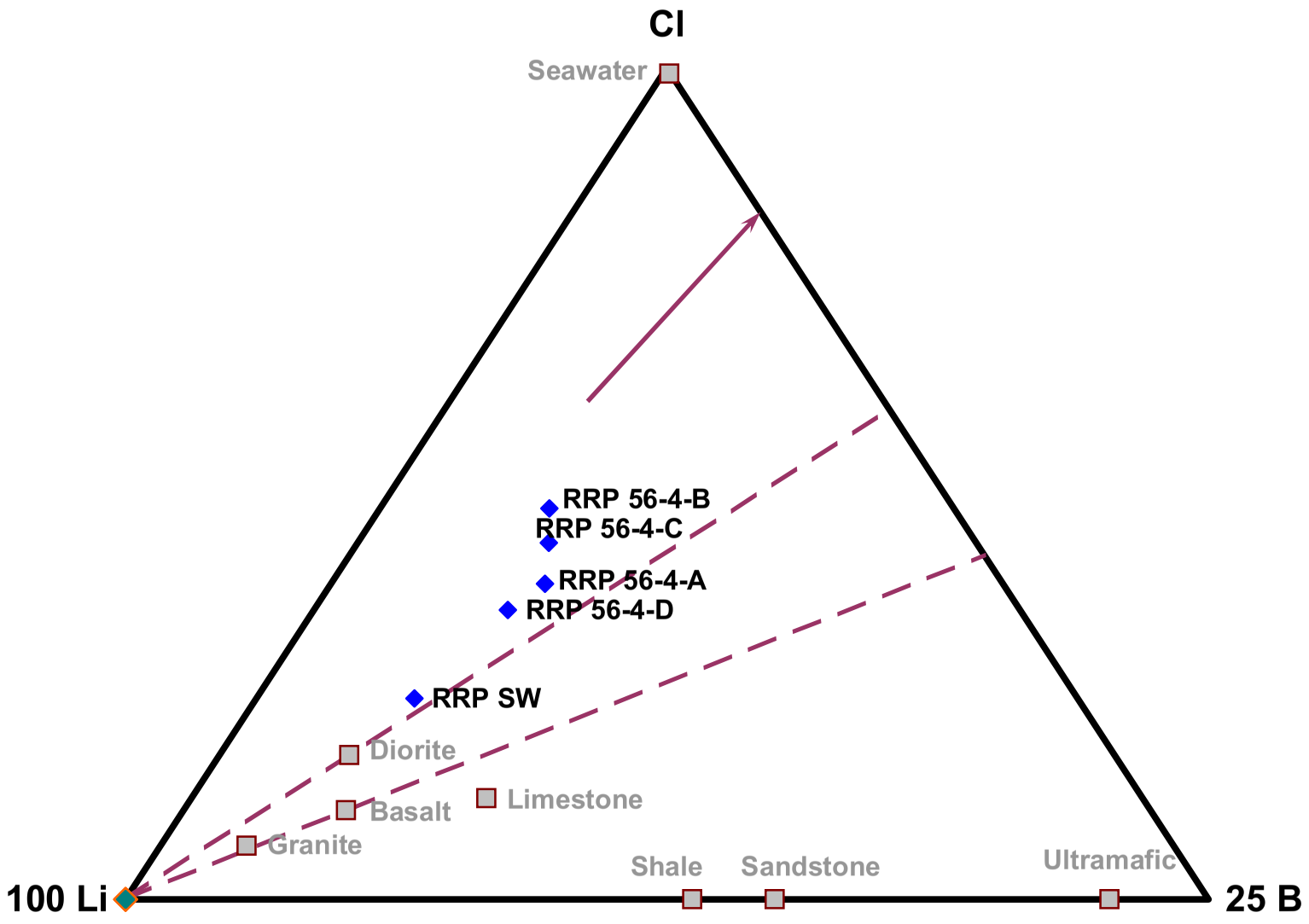

K - M - Chalcedony Geothermometer
log (K2/Mg)
0
1
2
3
4
5
6
SiO2 mg/kg
0
100
200
300
400
500
600
0
RRP SW
RRP 56-4-C
RRP 56-4-A
RRP 56-4-B
RRP 56-4-D
60
80
100
120
140
160
180
200
220
240
260
Quartz Solubility
Chalcedony Solubility

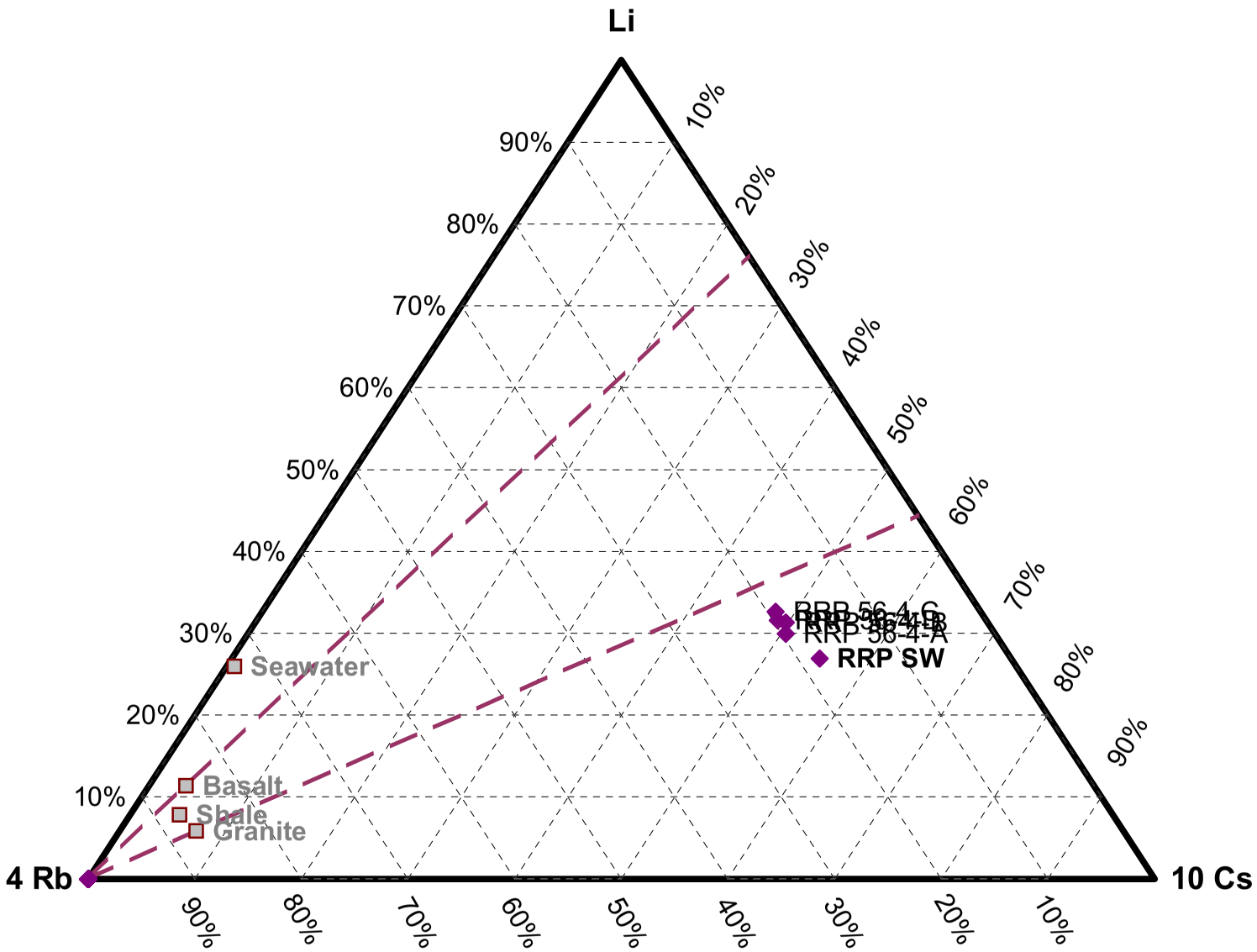

K - Mg - Ca Geothermometer
log(K²/Mg)
log(K²/Ca)
Log(P_CO2) in bars
r_CO2 vapor = 0.00001
0.0001
0.001
0.01
0.1
0.00001
0.0001
0.001
rCO2 liquid = 0.01
Calcite Formation
Immature Waters
RRP 56-4-C
RRP 56-4-D
RRP 56-4-B
RRP 56-4-A
RRP SW
Limestone
Seawater
Ultramafic
Basalt
Diorite
Sandstone
Shale
80
100
120
140
160
180
200
220
240
260
280
300
320
340

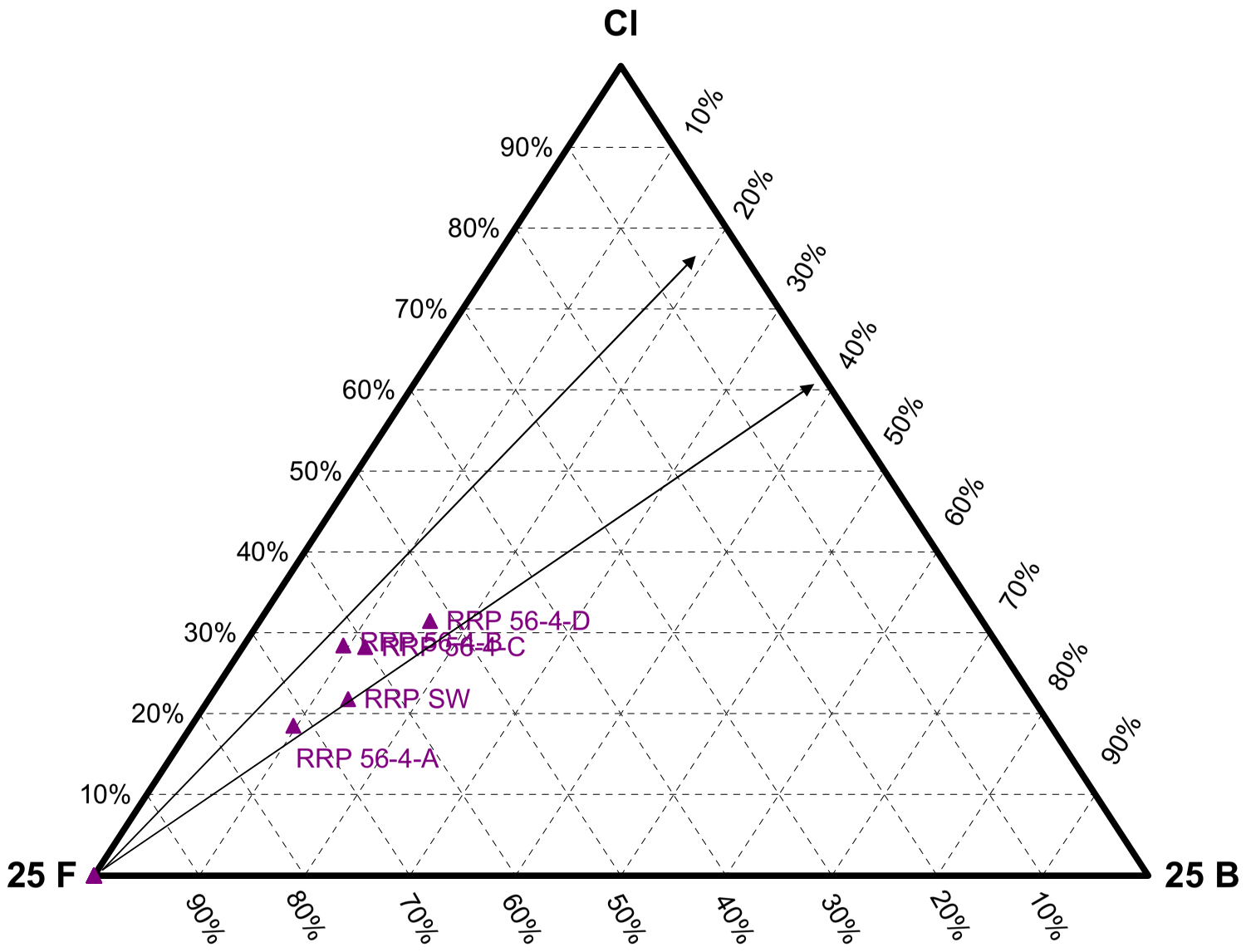

Mg/Ca - K/Na Geothermometer
10Mg/(10Mg+Ca)
10K/(10K+Na)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
Seawater
Ultramafic
Shale
Basalt
Diorite
Granite
Sandstone
Limestone
RRP SW
RRP 56-4-C
RRP 56-4-A
RRP 56-4-B
RRP 56-4-D


Na
10 K
1000 Mg^0.5
160
140
120
100
80
180
200
220
240
260
280
300
320
Partial Equilibration
Immature Waters
RRP 56-5-D
RRP 56-4-B
RRP 56-4-A
RRP 56-4-C
RRP SW


Cl
Mature Waters
Volcanic Waters
Peripheral Waters
Steam Heated Waters
SO4
HCO3
RRP 56-4-B
RRP 56-4-A
RRP 56-4-C
RRP SW


Cl
Seawater
RRP 56-4-B
RRP 56-4-C
RRP 56-4-A
RRP 56-4-D
RRP SW
Diorite
Basalt
Limestone
Granite
Shale
Sandstone
Ultramafic
100 Li
25 B


Li
4 Rb
10 Cs
90%
80%
70%
60%
50%
40%
30%
20%
10%
Seawater
Basalt
Shale
Granite
RRP 56-4-C
RRP 56-4-B
RRP 56-4-A
RRP SW


Cl
25 F
25 B
10%
20%
30%
40%
50%
60%
70%
80%
90%
RRP 56-4-D
RRP 56-4-B
RRP 56-4-C
RRP SW
RRP 56-4-A

STABLE ISOTOPE RESULTS

RAFTER GNS SCIENCE

Attention: Kelly Franz
Company: Sierra Geothermal Power Corp
Suite 500, 666 Burrard Street
Vancouver, BC
Canada V6C 3P6

SIL Order No.:	4159
Client Ref.:	
Date Received:	3/12/07
Date Measured:	5/12/07 δ^2H
Approved By:	V.Claymore
Date Reported:	14/12/07

National Isotope Centre
30 Gracefield Road
Lower Hutt 5010
PO Box 31 312
Lower Hutt 5040
New Zealand
T +64-4-570 1444
F +64-4-570 4657
www.gns.cri.nz

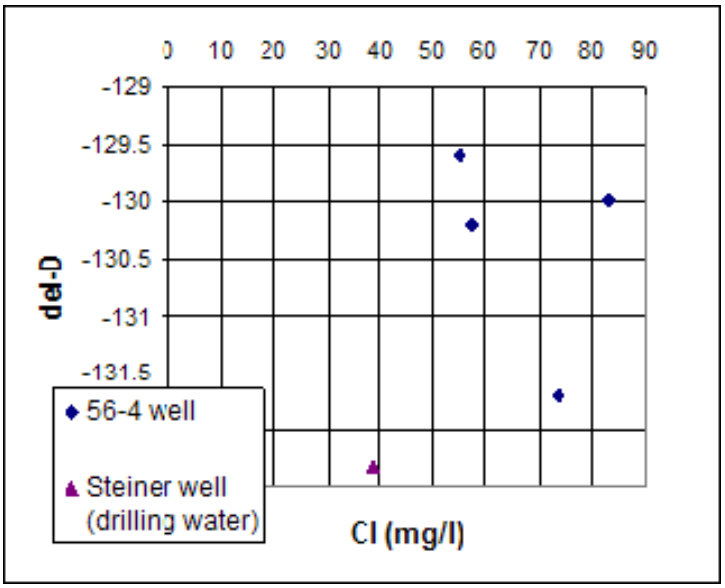
Sample Type: Water Isotopes for δ^{18}O and δ^2H - preliminary

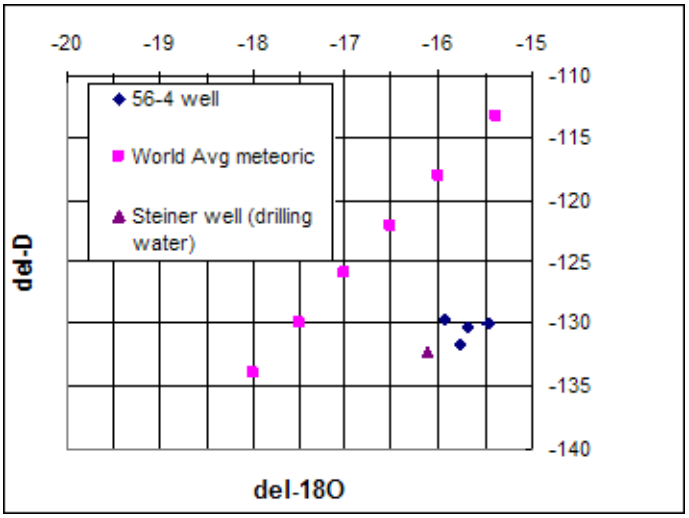
SIL ID	External ID	δ^{18}O	std dev	δD	std dev
54034	RRP-Nov09-07-SW	prepared		-132.3	0.3
54035	RRP-Nov11-07-56-4-A	prepared		-129.6	0.3
54036	RRP-Nov12-07-56-4-B	prepared		-130.0	0.4
54037	RRP-Nov13-07-56-4-C	prepared		-131.7	0.1
54038	RRP-Nov14-07-56-4-D	prepared		-130.3	0.2

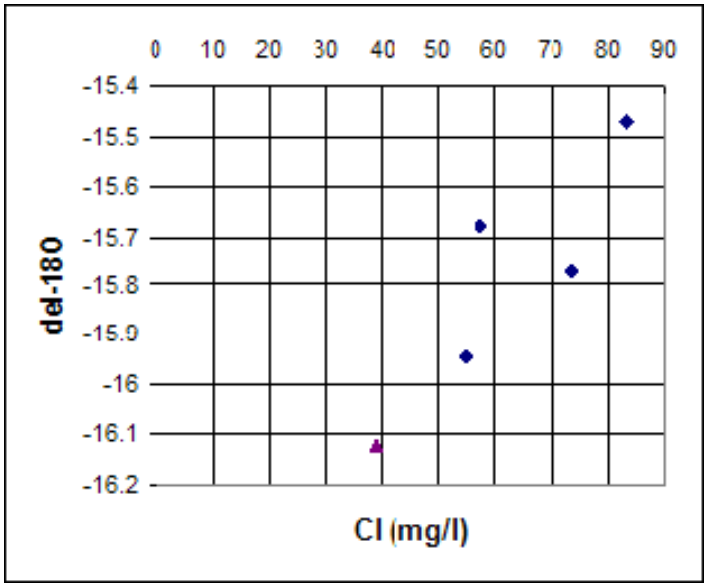
All results are reported with respect to VSMOW, normalized to our internal standards: INS9 with reported values of -17.4‰ for δ^{18}O, -131.0‰ for δ^2H, and INS11 with reported values of -0.4‰ for δ^{18}O, -4.6‰ for δ^2H. Samples were run in duplicate with the standard deviation provided for each sample. The analytical precision for this instrument is 0.1‰ for δ^{18}O and 1.0‰ for δ^2H.

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

Depth (ft)	3926.0
Depth of test (ft)	3030.0
Initial Fluid Depth (ft)	320
Initial Surface Pressure (PSI)	100
Calculated Initial BHP - before pumping (PSI)	1562.0
Calculated Initial BHP - Initial Pumping(PSI)	1800.6
Highest Temperature Recorded	251.3

Time	Pump Rate (GPM)	Surface Pressure (PSI)	Calculated BHP (PSI)	Calculated BHP@ 3030 ft (PSI)	Recorded Pressure (PSIG)	Recorded Temperature (F)
10:50	**100**	160.0	1860.6	1472.5	1162.252	211.638
11:00	100	180.0	1880.6	1492.5	1307.554	214.126
11:10	100	180.0	1880.6	1492.5	1330.799	206.402
11:20	100	180.0	1880.6	1492.5	1345.433	197.569
11:30	100	180.0	1880.6	1492.5	1355.452	186.859
11:40	100	180.0	1880.6	1492.5	1362.850	170.281
11:50	100	180.0	1880.6	1492.5	1369.251	157.427
12:00	100	180.0	1880.6	1492.5	1374.746	150.185
12:10	100	180.0	1880.6	1492.5	1379.233	146.175
12:20	**200**	320.0	2020.6	1632.5	1411.460	140.977
12:30	200	200.0	1900.6	1512.5	1438.097	130.856
12:40	200	220.0	1920.6	1532.5	1447.439	122.046
12:50	200	230.0	1930.6	1542.5	1454.418	117.254
13:00	200	240.0	1940.6	1552.5	1460.094	116.543
13:10	200	250.0	1950.6	1562.5	1464.225	117.114
13:20	200	250.0	1950.6	1562.5	1470.371	117.411
13:30	200	260.0	1960.6	1572.5	1474.270	115.786
13:40	200	260.0	1960.6	1572.5	1478.362	115.916
13:50	200	260.0	1960.6	1572.5	1405.204	119.838
14:00	200	260.0	1960.6	1572.5	1456.777	122.072
14:10	200	250.0	1950.6	1562.5	1474.375	117.600
14:20	**300**	260.0	1960.6	1572.5	1475.976	114.080
14:30	300	360.0	2060.6	1672.5	1502.391	115.009
14:40	300	360.0	2060.6	1672.5	1528.850	111.346
14:50	300	380.0	2080.6	1692.5	1539.622	110.279
15:00	300	380.0	2080.6	1692.5	1544.400	111.600
15:10	300	380.0	2080.6	1692.5	1552.574	108.744
15:20	300	380.0	2080.6	1692.5	1558.194	99.033
15:30	300	360.0	2060.6	1672.5	1515.000	102.193
15:35	300	500.0	2200.6	1812.5	1542.636	96.377
15:40	300	340.0	2040.6	1652.5	1551.483	94.762
15:44	300	450.0	2150.6	1762.5	1491.351	97.124

Sierra Geothermal, 56-4, Injectivity Test

15:45	300	400.0	2100.6	1712.5	1472.306	99.712
15:45	0	240.0	1940.6	1552.5	1469.793	100.056
16:10	0	50.0	1750.6	1362.5	1344.872	134.032
16:12	0	45.0	1745.6	1357.5	1341.595	135.089
16:14	0	45.0	1745.6	1357.5	1338.641	136.593
16:16	0	40.0	1740.6	1352.5	1336.125	138.185
16:18	0	32.0	1732.6	1344.5	1334.383	139.166
16:20	0	27.0	1727.6	1339.5	1332.608	139.273
16:22	0	25.0	1725.6	1337.5	1330.453	139.785
16:24	0	23.0	1723.6	1335.5	1328.407	140.850
16:26	0	23.0	1723.6	1335.5	1326.608	142.122
16:28	0	23.0	1723.6	1335.5	1325.051	143.380
16:30	0	20.0	1720.6	1332.5	1323.978	143.722
16:32	0	17.0	1717.6	1329.5	1322.757	143.670
16:34	0	12.0	1712.6	1324.5	1321.104	144.080
16:36	0	8.0	1708.6	1320.5	1319.539	144.900
16:38	0	4.0	1704.6	1316.5	1318.135	145.911
16:40	0	0.0	1700.6	1312.5	1316.885	146.896

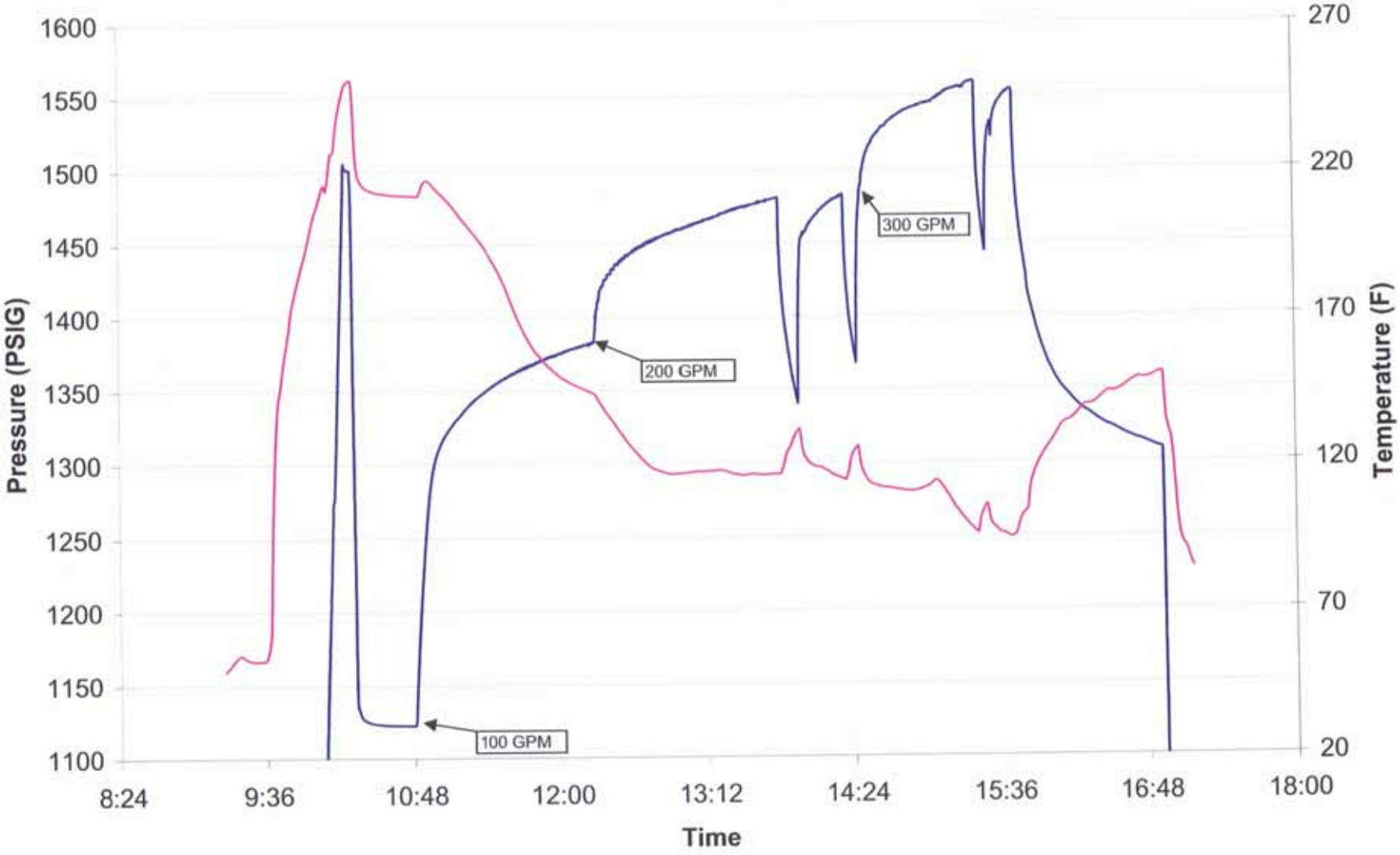
pressure dropped to 180 after initial spike

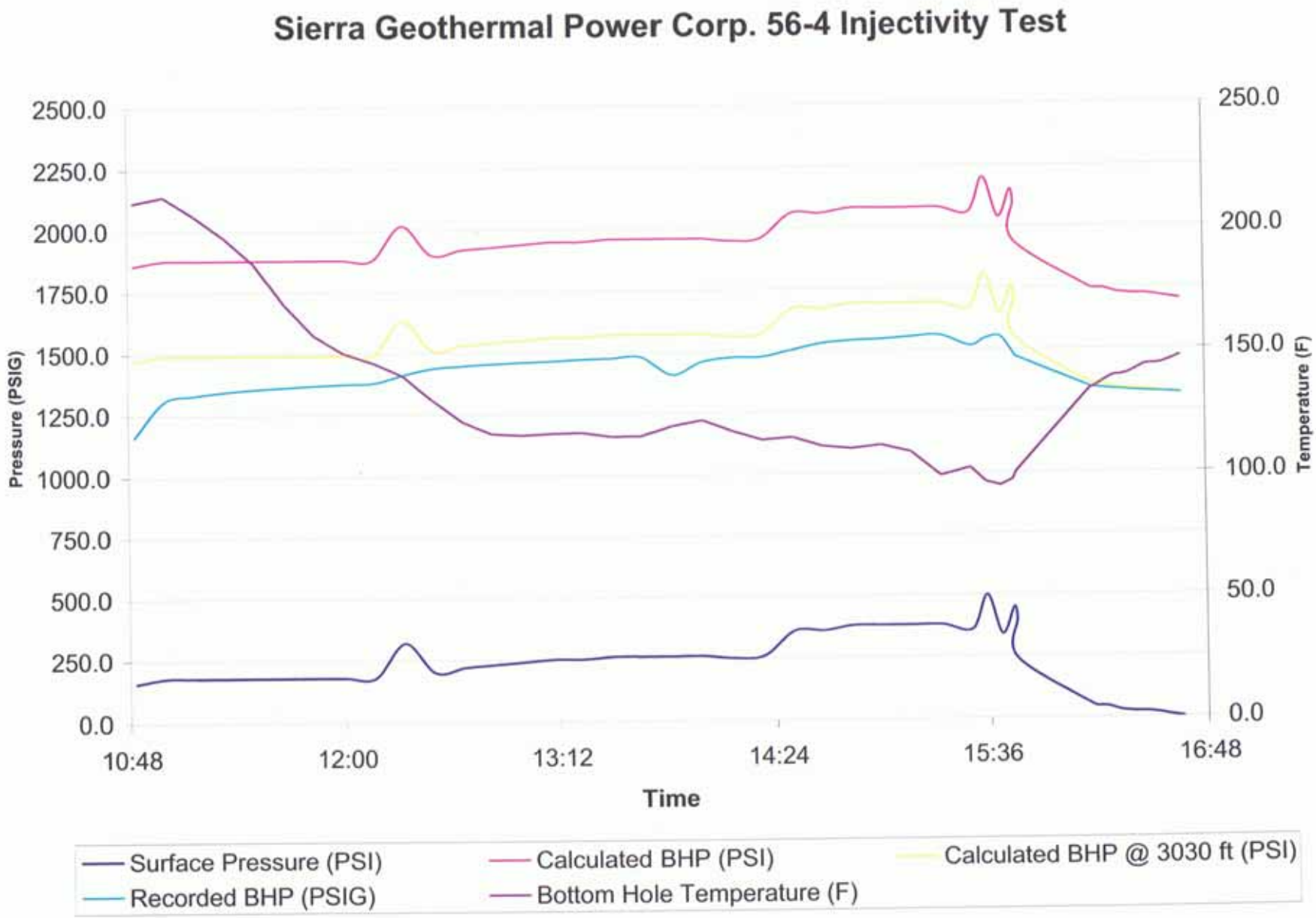
leak on pump line/shut down to repair; surface pressure at shutdown 50

leak on pump line/shut down to repair; surface pressure at shutdown 51

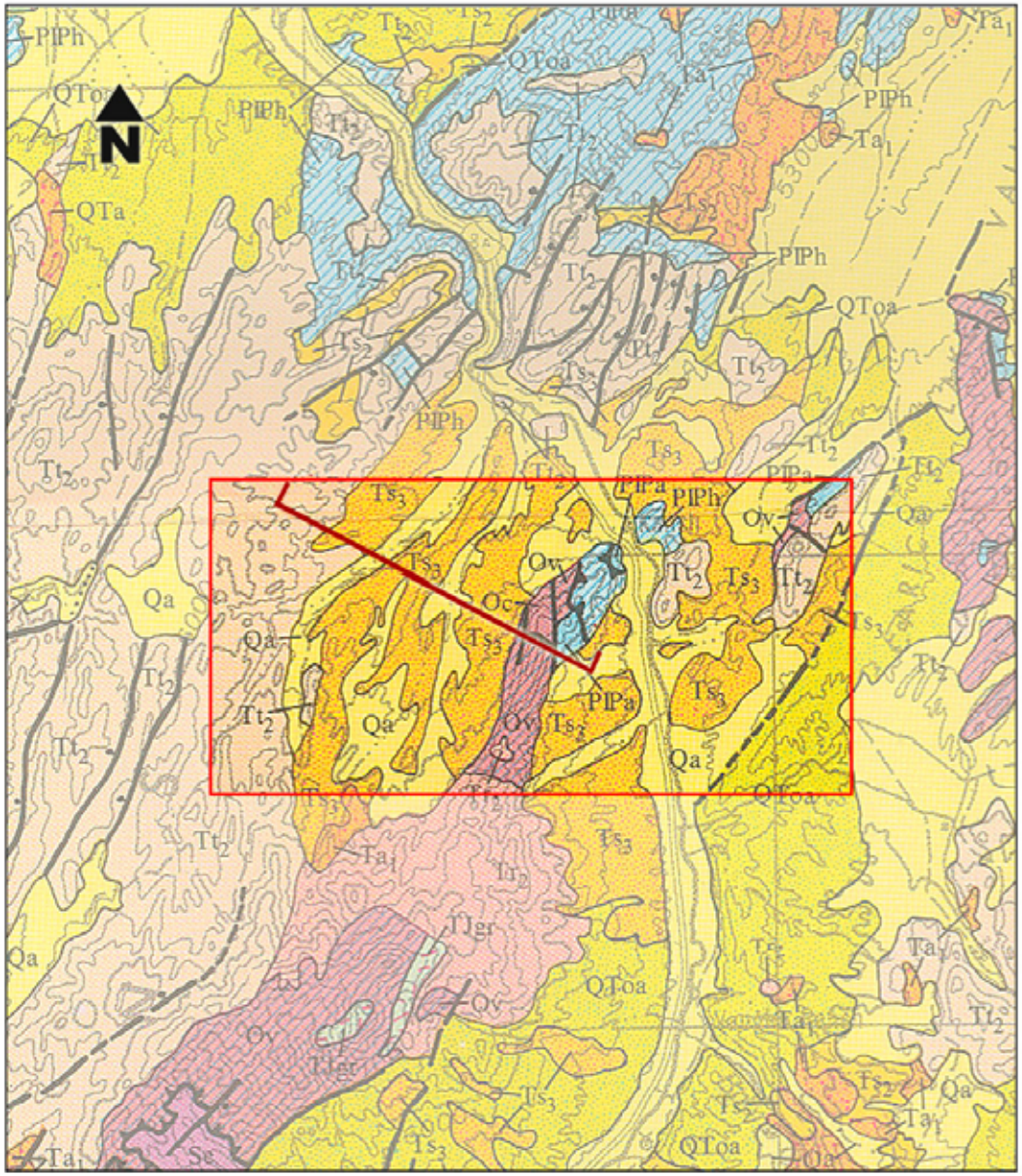
Instantaneous pressure spikes

Sierra Geothermal Power Corp. 56-4 Injectivity Test




Sierra Geothermal Power Corp. 56-4 Injectivity Test
2500.0
2250.0
2000.0
1750.0
1500.0
1250.0
1000.0
750.0
500.0
250.0
0.0
Pressure (PSIG)
250.0
200.0
150.0
100.0
50.0
0.0
Temperature (F)
10:48
12:00
13:12
14:24
15:36
16:48
Time
Surface Pressure (PSI)
Calculated BHP (PSI)
Calculated BHP @ 3030 ft (PSI)
Recorded BHP (PSIG)
Bottom Hole Temperature (F)

Appendix F: Geology



Source: Geologic Map of North-Central Nevada, 1976, Stewart, John H. & Carlson, John E., Nevada Bureau of Mines & Geology, prepared in cooperation with the U. S. Geological Survey, 1:250,000.

0 5 10 15 Kilometers

0 5 10 Miles

EXPLANATION

Qa ALLUVIAL DEPOSITS

QToa OLDER ALLUVIAL DEPOSITS

VOLCANIC AND SHALLOW INTRUSIVE ROCKS

Tt_2 WELDED AND NONWELDED SILICIC ASH-FLOW TUFFS – Locally includes thin units of air-fall tuff and sedimentary rock

Tr_2 RHYOLITIC FLOWS AND SHALLOW INTRUSIVE ROCKS

Tr_1 ANDESITE FLOWS AND BRECCIAS, AND FLOWS OF INTERMEDIATE COMPOSITION

SEDIMENTARY ROCKS

Ts_3 TUFFACEOUS SEDIMENTARY ROCKS – Locally includes minor amounts of tuff

Ts_2 TUFFACEOUS SEDIMENTARY ROCKS – Locally includes minor amounts of tuff

PLUTONIC ROCKS

TJgr GRANITIC ROCKS – Mostly quartz monzonite and granodiorite. Inconclusively dated or not dated radiometrically

INTRUSIVE ROCKS
JURASSIC AND TRIASSIC ROCKS

Jv VOLCANIC SANDSTONE, FELSIC ASH-FLOW TUFFS, RHYOLITE, AND RHYODACITE FLOWS – Pony Trail Group of Cortez Mountains, Eureka County (Upper? Jurassic)

JTRs SHALE, MUDSTONE, SILTSTONE, SANDSTONE, AND CARBONATE ROCK; SPARSE VOLCANIC ROCKS – Includes Auld Lang Syne Group

TRc LIMESTONE, MINOR AMOUNTS OF DOLOMITE, SHALE, AND SANDSTONE; LOCALLY THICK CONGLOMERATE UNITS (LOWER, MIDDLE, AND UPPER TRIASSIC) – Includes Tobin, Dixie Valley, Favret, Augusta Mountain, and Cane Spring Formations, the Star Peak Group, and related rocks.

TRk KOIPATO GROUP AND RELATED ROCKS (LOWER TRIASSIC) – Altered andesitic flows, rhyolitic tuffs and flows, and clastic rocks. Includes Tallman Fanglomerate (Permian?) in Humboldt County

TRtgr LEUCOGRANITE AND RHYOLITE PORPHYRY

SILICEOUS AND VOLCANIC ASSEMBLAGE (UPPER PALEOZOIC)

Eugeosynclinal rocks originally deposited west of Antler orogenic belt. In most places, allochthonous and thrust eastward as upper plate of Golconda thrust

PIPh HAVALLAH SEQUENCE OF SILBERLING AND ROBERTS (1962) – Chert, argillite, shale, greenstone, and minor amounts of siltstone, sandstone, conglomerate, and limestone. Includes Havallah, Pumpernickel, and Farrel Canyon Formations

CONGLOMERATE, SILTSTONE, AND LIMESTONE SEQUENCES WITHIN ANTLER OROGENIC BELT

Rest unconformably on folded Paleozoic rocks

PIPa ANTLER SEQUENCE OF SILBERLING AND ROBERTS (1962) – Conglomerate, sandy to conglomeratic limestone, limestone, sandstone, and calcareous shale. Thin detrital and carbonate sequence within main part of Antler orogenic belt. Includes such units as Battle Formation, Antler Peak Limestone, and Edna Mountain Formation

SILICEOUS (WESTERN) ASSEMBLAGE (LOWER PALEOZOIC)

Eugeosynclinal rocks. Mainly allochthonous rocks in upper plate of Roberts Mountains thrust. Includes Comus Formation that probably is para-autochthonous and in lower plate of Roberts Mountains thrust

Ov VALMY FORMATION – Chert, shale, quartzite, greenstone, and minor amounts of limestone

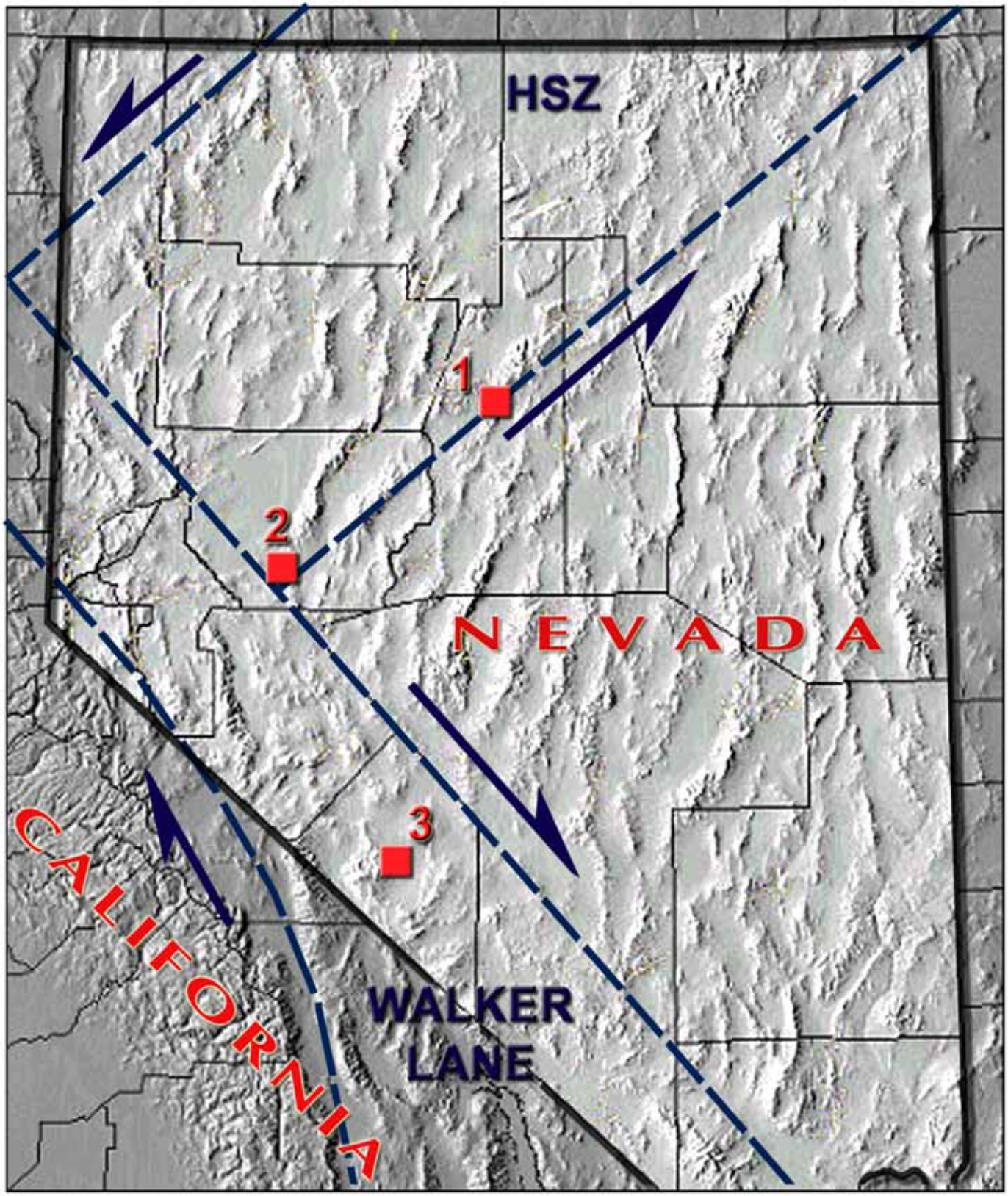
Ovi VININI FORMATION – Shale, chert, and minor amounts of quartzite, greenstone, and limestone

Oco COMUS FORMATION – Shale, siltstone, dolomite, limestone, and chert

Contact

High-angle fault – Bar and ball on downthrown side. Dashed where approximately located or uncertain; dotted where concealed

Low-angle fault – Sawteeth on upper plate



WGP PROSPECT AREAS:

1 - Reese River

2 - Salt Wells

3 - Silver Peak

N

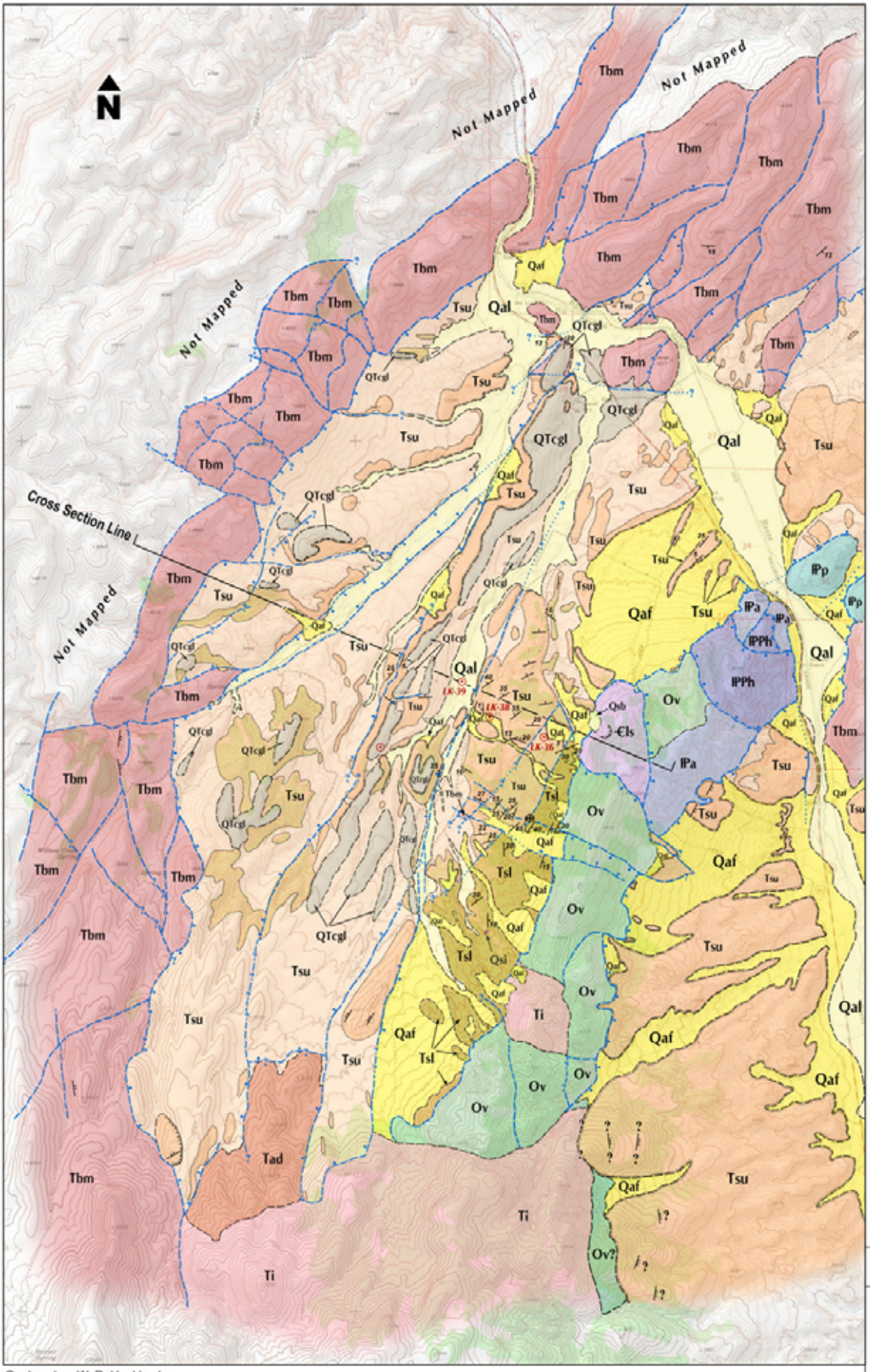
KILOMETERS

0 100

0 60

MILES

Prospect Location Map



Geology by: W. R. Henkle, Jr.

EXPLANATION

QUATERNARY

- **Qal** Alluvium
- **Qsb** Slump block
- **Qsi** Sinter
- **Qaf** Fanglomerates
- **QTcgl** Gravels

TERTIARY

- **Tsu** Sedimentary lake beds; fine-grained upper unit
  - Outcrop
  - Covered
- **Tsl** Sedimentary beds; coarser-grained lower unit
- **Ti** Rhyolite intrusive - age uncertain
- **Tbm** Bates Mountain Tuff
- **Tad** Andesite or dacite flows and intrusives

PERMIAN PENNSYLVANIAN

- **IPPh** Halvallah Formation
- **IPp** Pumpernickel Formation
- **IPa** Antler Sequence

ORDOVICIAN

- **Ov** Valmy Formation

CAMBRIAN

- **Cls** Undifferentiated limestones

- Formational contacts
- Outcrop; unit Tsu only
- Dip & strike of bedding; measured
- Dip & strike of bedding; air photos interpretation, hachures indicate relative degree of dip
  - Shallowest dip
  - Steepest dip
- Drill hole (LK-36)
- Faults
  - Thrust fault; barbs on upper plate
  - Normal fault; ball on downthrown side (where known); dotted where concealed

0 .5 1 Mile

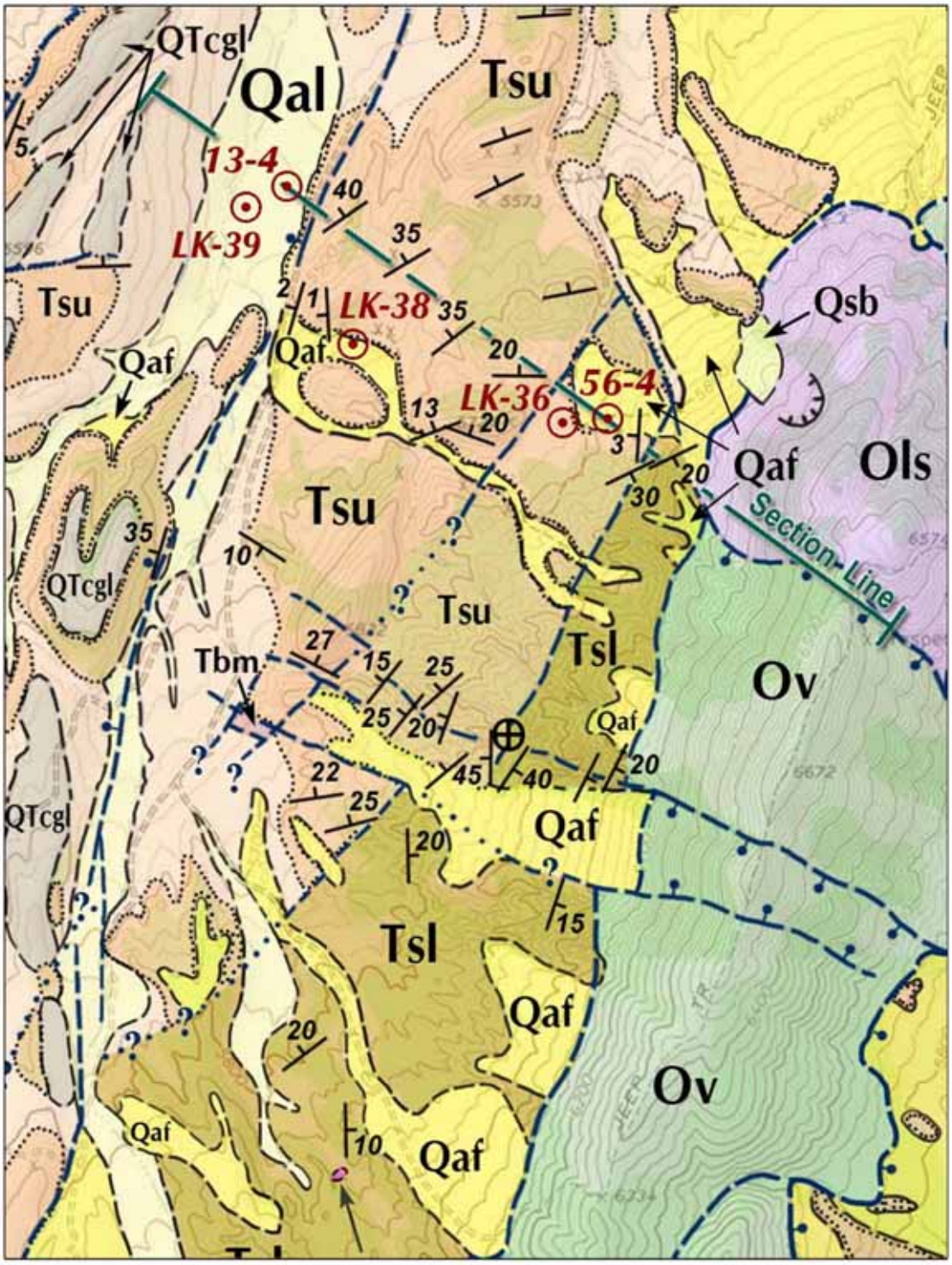
0 .5 1 Kilometer

WESTERN GEOTHERMAL PARTNERS, LLC

Preliminary Geologic Map

REESE RIVER GEOTHERMAL PROSPECT

LANDER COUNTY, NEVADA, USA



EXPLANATION

QUATERNARY

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- Qsi — Sinter
- Qaf — Fanglomerates
- QTcgl — Gravels

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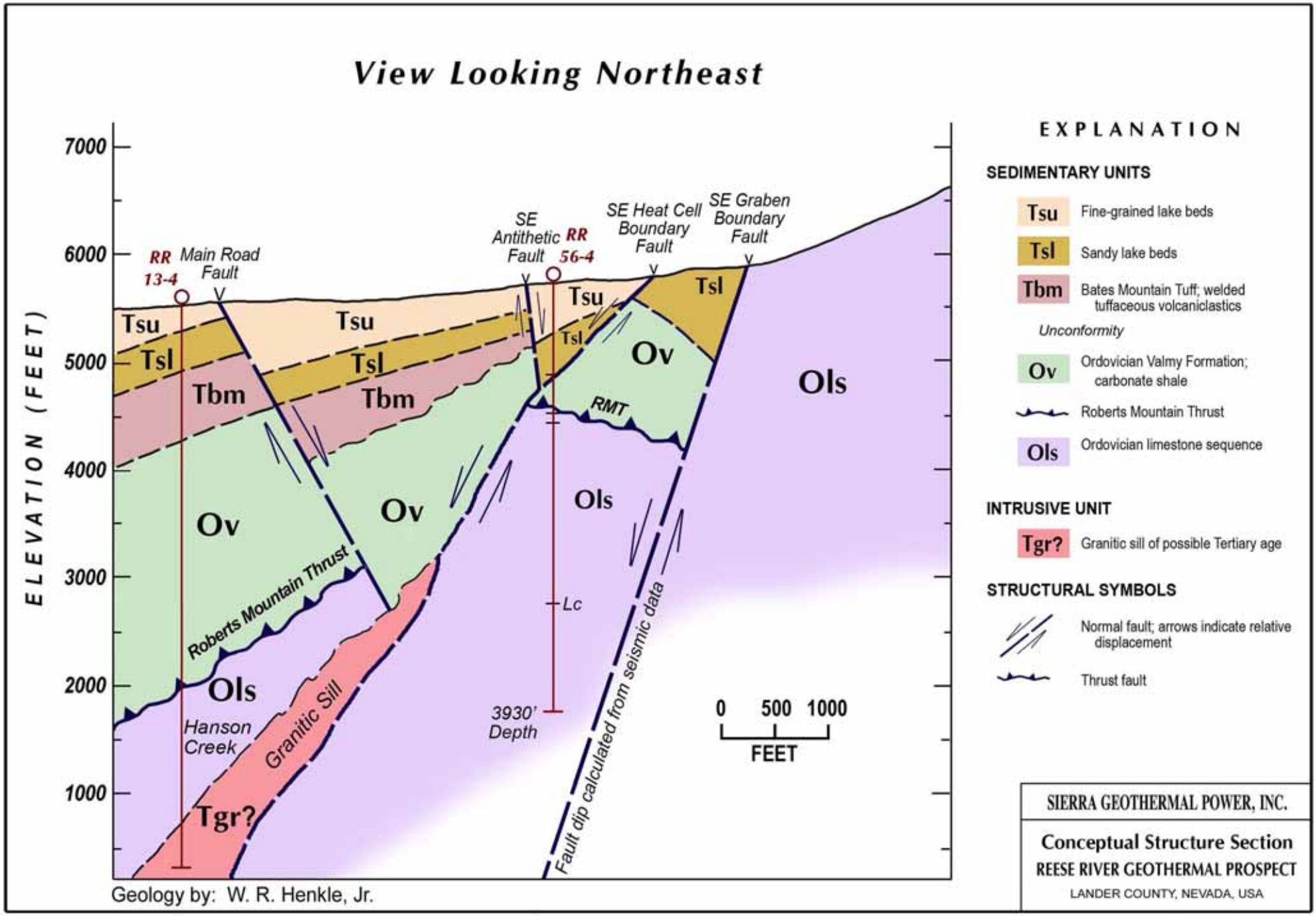
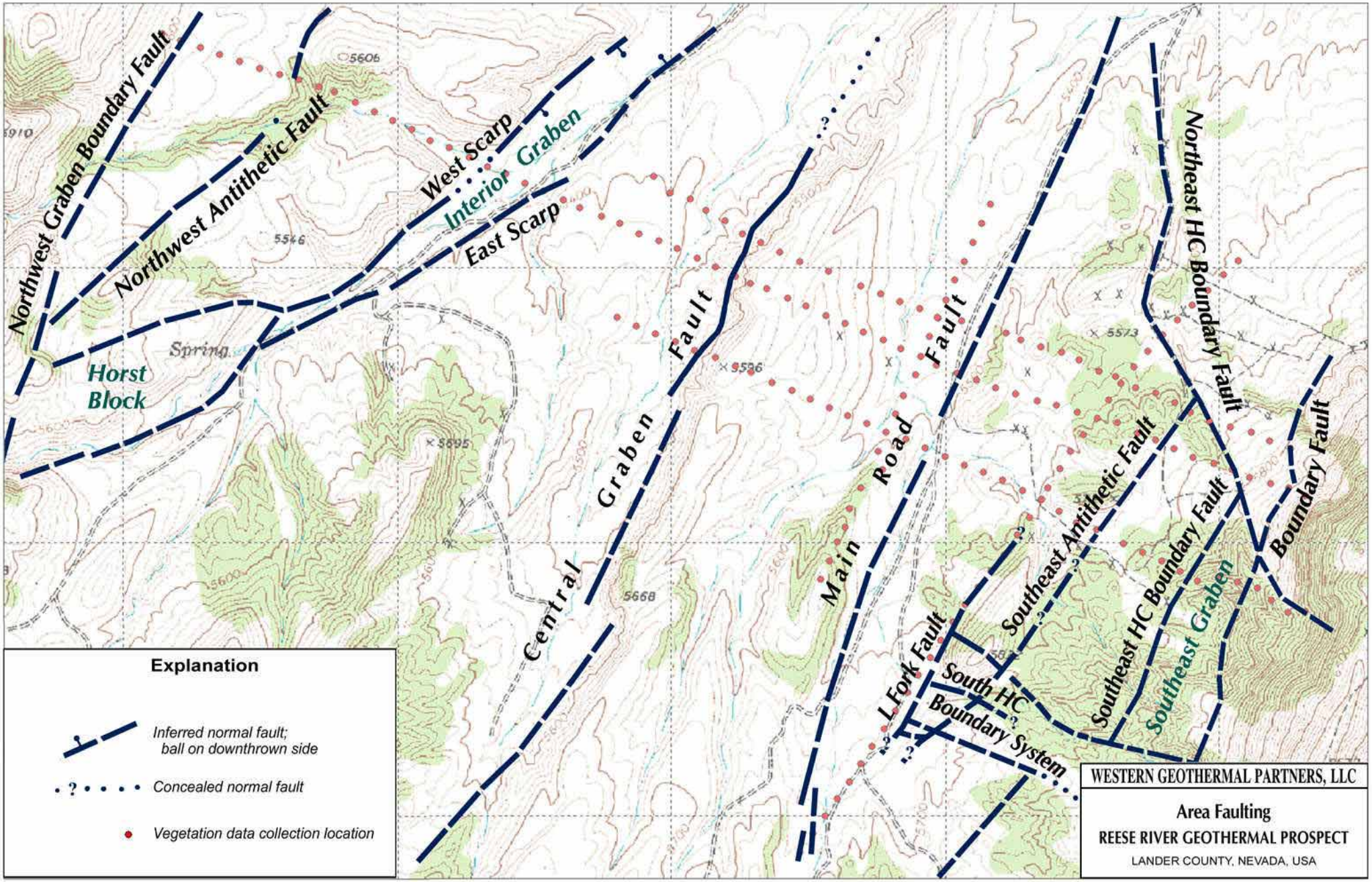
SIERRA GEOTHERMAL POWER, INC.

Preliminary Geologic Map

REESE RIVER GEOTHERMAL PROSPECT

LANDER COUNTY, NEVADA, USA


View Looking Northeast
ELEVATION (FEET)
7000
6000
5000
4000
3000
2000
1000
RR 13-4
Main Road Fault
SE Antithetic Fault
RR 56-4
SE Heat Cell Boundary Fault
SE Graben Boundary Fault
Tsu
Tsl
Tbm
Ov
Ols
Tgr?
RMT
Roberts Mountain Thrust
Hanson Creek
Granitic Sill
Lc
3930' Depth
Fault dip calculated from seismic data
0 500 1000
FEET
EXPLANATION
SEDIMENTARY UNITS
Tsu Fine-grained lake beds
Tsl Sandy lake beds
Tbm Bates Mountain Tuff; welded tuffaceous volcaniclastics
Unconformity
Ov Ordovician Valmy Formation; carbonate shale
Roberts Mountain Thrust
Ols Ordovician limestone sequence
INTRUSIVE UNIT
Tgr? Granitic sill of possible Tertiary age
STRUCTURAL SYMBOLS
Normal fault; arrows indicate relative displacement
Thrust fault
Geology by: W. R. Henkle, Jr.
SIERRA GEOTHERMAL POWER, INC.
Conceptual Structure Section
REESE RIVER GEOTHERMAL PROSPECT
LANDER COUNTY, NEVADA, USA


Northwest Graben Boundary Fault
Northwest Antithetic Fault
West Scarp
Interior Graben
East Scarp
Horst Block
Spring
Central Graben Fault
Main Road Fault
L Fork Fault
South HC Boundary System
Southeast Antithetic Fault
Southeast HC Boundary Fault
Southeast Graben
Northeast HC Boundary Fault
Boundary Fault
5606
5546
5596
5573
5695
5668
Explanation
Inferred normal fault; ball on downthrown side
Concealed normal fault
Vegetation data collection location
WESTERN GEOTHERMAL PARTNERS, LLC
Area Faulting
REESE RIVER GEOTHERMAL PROSPECT
LANDER COUNTY, NEVADA, USA