January 4, 2012

To: Ms. Jonne Slemons
Petroleum Land Manager, Division of Oil & Gas
State of Alaska, Department of Natural Resources
550 West 7th Avenue, Suite 1100
Anchorage, Alaska 99501-3510
jonne.slemons@alaska.gov

Re: Mount Spurr Geothermal Leases ADL 391353-391368 – 2011 Resource Report

Dear Ms. Slemons,

Pursuant to provision 11 of the above geothermal leases, I am pleased to provide you with a comprehensive resource report detailing the exploration work done by Ormat on the above leases in 2011, and the geological findings and analysis of this work.

2011 was a year of significant activity by Ormat in Alaska, following a substantive year of exploration during 2010, with the drilling of the first deep geothermal test hole at Mount Spurr.

Please be advised that we are still analyzing portions of the data collected and expect to get more insight and additional interpretation of the data during 2012. However, we believe the report below provides a thorough account of the results of our activities and provides significant new information gleaned during the previous year. This report should be considered a companion to last year's report as the previous interpretations are not covered here.

Please also be aware that the data contained in the following pages of the attached report have been submitted in confidence pursuant to AS 38.05.035(a)(8) and 11 AAC 84.780, which collectively protect geological, geophysical, and engineering data from public disclosure. Ormat is requesting that DNR maintains the confidentiality of this data.

We welcome any comments DNR may have on this report and will be happy to try and provide additional information or clarification should DNR be interested.

Sincerely,

Patrick Walsh
Chief Geologist
Ormat Nevada, Inc.

Attachment

ORMAT NEVADA, INC.
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Mt. Spurr Geothermal Exploration – Resource Report for Year End 2011

Prepared by:

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Executive summary

Ormat Nevada, Inc. (Ormat), a wholly owned subsidiary of Ormat Technologies, Inc., won several geothermal leases on Mt. Spurr (Figures 1, 2, and 3) from the State of Alaska in 2008 and planned a multi-phased exploration approach in attempt to confirm or exclude the existence of a commercial scale geothermal resource at depth. If such a resource is confirmed, Ormat would then aim at developing a utility-scale geothermal power plant.

As required in the geothermal leases, Ormat provided a Plan of Exploration for 2010-2011 to the Alaska Department of Natural Resources (ADNR) on November 20, 2009. This plan was approved by DNR on January 20, 2010. Pursuant to provision 11 of the geothermal leases, this report summarizes the exploration work done in 2011 and the information acquired from it. An accompanying data drive includes all data available at this point. Ormat is still interpreting the results and building models from the combination of past geophysical, geochemical and drilling data with 2011 drilling results.

During the summer of 2011, Ormat completed the drilling of one deep Temperature Gradient (TG) hard-rock core-hole, targeting the Kid Fault in the eastern portion of the lease area (26-11; Figures 1, 2, and 3). While two deep core holes had been planned for 2011, mobilization delays and drilling issues cut the drilling program short. Furthermore, drilling difficulties and unexpected lithology with depth truncated the total depth of drilling of 26-11 to 3988 feet; original plans had called for drilling to at least 5000 feet. Rigging up occurred from May 30 through June 2, 2011; the hole was spudded on June 3. Drilling ended prematurely due to a twist-off of the drill pipe on August 11; the final demobilization and departure of all crews was completed on August 27, 2011.

The findings from drilling in 2011 have both confirmed and complicated the overall structural model of Mt. Spurr's southern flank. While the presence of the multiple-stranded, Kid Fault Zone was confirmed, discovery of approximately 3400 feet of coal-bearing West Foreland conglomerate was unexpected and confounding. While this conglomerate unit demonstrates significant normal (and likely right-lateral) movement along this major fault zone, it also presents a suboptimal geothermal reservoir unit. The projected basement rock in this area (a Cretaceous granitoid) was never intersected. Alteration assemblages (predominately propylitic in character) logged within the conglomerate increased (in pervasiveness and density of veining) with depth. However, equilibrated temperature gradient appeared conductive at 2F/100' (Figure 4).

Ormat recommends significant collaboration with Alaska State geologists from the DGGS, AVO and AOGCC towards construction of a refined structural/volcanogenic model of Mt. Spurr before additional drilling is considered. The data from all previous geochemical and geophysical surveys are now available to all interested parties as well as all core from both the 2010 and 2011 drilling programs. We have invited all interested parties to partake of and integrate these data into their current working models. While Ormat has conceived the structural/geophysical model that was drilled over the past two years, there are significant pieces of the geologic model now evolving with mapping efforts to the east of our leases (DGGS – primarily Bob Gillis) and in-lease mapping and petrologic age-dating (AVO – primarily Michelle Coombs). Furthermore, a geochemical/hydrological model is being developed by researchers at the Colorado School of Mines (primarily Laura Garchar – the Ormat MS Scholar for 2012).

Well 26-11

Mobilization of drilling activities for the 2011 season began in mid-May, while the mountain was still snow-covered. Brush was cleared from both site 26-11 and site 84-11, and surveys for possible bird nests in the area were completed. The drill pad was installed and the sump excavated for site 26-11. Rigging up of the drill rig at site 26-11 occurred from May 30 through June 2. Temperature gradient hole 26-11 was spudded on June 3, 2011. The first 452 feet of core was drilled with PQ drilling rod (outer diameter 4.5”). Initial drilling was slow, as expected, as the crews drilled through unconsolidated colluvium. Drillers intersected more competent rock at a depth of approximately 50 feet. From that depth down to 637.5 feet, the lithology encountered was a variably consolidated debris flow of subrounded to angular clasts of varied lithologies in a clay-rich matrix with ubiquitous pyrite (see full description below).

The debris flow is variably consolidated throughout its nearly 600 feet thickness. The sections which were poorly consolidated were cause for slow, difficult drilling. We had hoped to switch from PQ core rod to HQ core rod and cement in surface casing at a depth of a few hundred feet. However, the rock at those depths appeared to be insufficiently compacted to withstand the placement of surface casing. By approximately 450 feet deep, the debris flow had become more consolidated, and thus surface casing was set to a depth of 452 feet on June 8, 2011. Drilling continued on June 10, 2011 with HQ core rod (outer diameter 3.5”).

At a depth of 637.5 feet, there was a sharp contact between the overlying debris flow and an underlying sedimentary unit of conglomerate. We drilled through this conglomerate unit from 637.5 feet to the hole’s total depth of 3,988 feet. Intermediate casing was set to a depth of 3170 feet on July 11, 2011. Drilling proceeded with NQ core rod (outer diameter of 2.75”) on July 16, 2011. Drilling with NQ continued until the total depth of 3988 feet was reach on August 11, 2011.

The conglomerate unit shows variable alteration throughout the 3,330 feet section. In general, the unit becomes more altered with depth. The dominantly propylitic alteration included alteration to clay minerals which expand when they are moistened, leading to significant drilling challenges. Additionally, we drilled though a major fault zone, consisting of several significant faults, where the rock has brecciated and been altered to unconsolidated rubble, creating additional significant drilling challenges. As the drill bit encountered various fault zones, the bit naturally veered off along fault planes, incrementally increasing the inclination of the hole as depth increased. As the drilling depth increased, there were entire 12 hour shifts when crews drilled through fault zones, and were lucky to drill 10 feet in a single shift. As we approached a depth of 4,000 feet, the conglomerate was quite altered and very incompetent, and drilling was progressing slowly. The inclination of the hole at this depth was approximately 18°. These difficult drilling conditions led to the twist-off of the NQ drill pipe at a depth of 3,988 ft. The crews were able to “fish” out some of the pipe and the wireline left in the hole, but were unable to remove the final 778 feet of drill pipe at the bottom of the hole. On August 13, 2011, the decision was made to demobilize.

Challenging Alaska weather conditions were a constant problem throughout the 2011 summer season, and certainly had an adverse effect on drilling progress and operations at Spurr. Persistent thick fog and periodic high winds grounded the helicopter for substantial periods, sometimes for days on end, with only occasional breaks in the weather. Drill crews were often stranded at the rig site after their shifts were over, sometimes for over 36 hours, such that entire shifts were lost while crews rested in shelters at the site.

Lithology

Well 26-11 was spudded approximately 20 feet south of an outcrop of ancestral Spurr andesites (Qams on the geologic map of Figure 3). Nevertheless, no Spurr lavas were intersected in this drill hole.

Beneath the surficial colluvium deposits eroding from the cliffs of andesite lava flows above, the core was dominated by two main lithologies: 587.5 feet of volcanic debris flow, and 3,330.5 feet of pebble/cobble conglomerate.

The debris flow is matrix-supported, and is composed of angular to sub-rounded clasts of andesite lavas, granite, and fine-grained sedimentary rocks in a clay-rich matrix. The competency of the debris flow increases with depth. This deposit may represent the massive debris avalanche which likely occurred during a Holocene flank collapse of the southern rim of ancestral Mt. Spurr (Waythomas and Nye, 2002; Waythomas, 2006). There are higher percentages of non-volcanic clasts than would be expected within such a volcanic debris flow; however, it is possible that morainal deposits were chaotically interspersed with the volcanic material at this distal deposit location. Ubiquitous cubic pyrite dispersed throughout the matrix is suggestive of alteration within the volcano's flanks prior to collapse and deposition of the flow. Alaska Volcano Observatory researchers who have worked on similar deposits will be analyzing this section of core to determine if it is indeed coincident with the proposed flank collapse event.

The conglomerate unit consists of rounded pebbles and cobbles of varied lithologies in a matrix of immature lithic sandstone, and contains lenses of finer-grained sediments, including sandstone and claystone (see full description below). Clast lithology dominantly includes andesite lavas, granitoids, shales and chert. Conglomerate is dominantly clast-supported, occasionally matrix supported. Conglomerate is generally well lithified, except where rubbly and clay-rich along fault zones. There are occasional shows of trace to minor solid residual hydrocarbon, likely anthracite coal, throughout the unit. The hydrocarbons most often appear in small "blebs" less than 1 cm across, and are generally found within the lenses of sandstone and claystone that are interspersed throughout the conglomerate. The largest bleb of hydrocarbon is 6 cm thick, located within a fault zone at 1880 ft.

The conglomerate is believed to represent the regional coal-bearing West Foreland unit which has been thoroughly studied by economic geologists for decades. State geologists from the DNR and DGGS, as well as AOGCC geologists, will be analyzing core from the conglomerate unit to determine if it does indeed represent West Foreland deposits.

Alteration

Iron oxides are present within the colluvium and throughout the less consolidated portions of the volcanic debris flow. Ubiquitous pyrite throughout the debris flow is likely a result of alteration within the flank of Ancestral Spurr prior to collapse, and is not likely indicative of any modern hydrothermal activity.

Alteration within the conglomerate unit steadily increases with depth, from 637.5 to 3988 feet, and is concentrated along fault zones. Low-level chloritization is present throughout almost the entire conglomerate deposit (Figure 5). Distinctive platy chlorite crystals are concentrated along fault zones, appearing quite fresh along deeper faults (2580-2590 ft; 3216-3224 ft). Clay alteration is also widespread throughout the conglomerate, and concentrated along faults (Figure 5). Minor quartz and calcite veining appear occasionally throughout core. Iron oxide is also present in low levels throughout the majority of the conglomerate, and coatings of hematite are observed in the deeper sections of core.

Interestingly, the inception of alteration within the core coincided quite well with the upper boundary of the MT-defined conductor. This correlation indicates that in this environment, the less resistive rock is indeed a function of hydrothermal alteration.

Structure

We successfully intersected multiple strands of the so-called Kid Fault Zone (Figures 4 and 6). While the core was unorientated, the relative dip of the fault zone was predominately high angle (≥60°). As previously noted, the fault zones were mineralized with clays and platy chlorites (increasing in pervasiveness and 'freshness' with depth). Each of the intersected faults (of which four were ultimately delineated) displayed some level of slickenline development. Movement on this fault zone is thought to be predominately dip-slip to the southeast, however there are indicators (regionally and locally) highlighting oblique movement with a component of right-lateral transform.

A population of lower dips was also observed (~10-25°); these are thought to be bedding planes within the conglomerate unit rather than fault structures. These bedding planes were likely a significant reason that coring deviated to such a high degree with depth (observed angles at TD were 18°).

While confirmation of the Kid Fault Zone was a key goal, the presence of ~3000 feet of conglomerate was unexpected and has introduced more questions than it has answered. Previous researchers in the area have indicated a maximum conglomerate thickness of approximately 1000 meters; a thickness we approached. Drilling through the conglomerate into basement (presumably Cretaceous granitoids seen outcropping just ~1.5 km to the south of 26-11) would have allowed not only better temperature gradient measurements, but also a better handle on overall throw of the Kid Fault Zone. Such information is crucial in understanding the local Spurr structural regime which ultimately allows us to create a better model of potential permeability for development of a geothermal reservoir.

At least one of the intersected fault strands appeared to produce a small amount of fluid (the chemistry of which is discussed in the next section), however no extensive flow was observed at-surface and thus our understanding of permeability at depth remains incomplete.

Chemistry

Crater creek and other springs issued along the northwest end of crater fault (Figure 3) represent a genuine geothermal signature indicated by (1) elevated silica and sampling temperatures, (2) enriched d18O and dD stable isotopes indicative of interaction with magmatic fluids or excessive boiling of reservoir (Figure 7), (3) magmatic d13C signatures in dissolved bicarbonate, and (4) elevated boron and chloride in fluids. Multiple fluids sampled in the proximity of the Crater creek fault illustrate this signature. Fluids issuing from Kid canyon seeps along Kid fault also indicate a possible upflow of deep seated geothermal fluids indicated by (1) elevated silica and sampling temperatures and (2) enriched lithium and boron (figure 8). Corehole 67-34 may contain deep seated geothermal potential, however, the fluids sampled are largely overprinted by oxidized meteoric water mixing with a paleo-mineralization in a carbon-rich clastic bedrock. Other spring and seeps in the study area did not exhibit promising geothermal indicators.

Geochemical assessment indicates that geothermal potential at exploitable depths are focused along the intersection of N-NE structures with Crater Fault and possibly along the N-NE trending Kid fault, each focused south of Crater Lake along the Crater Fault (Figure 3).

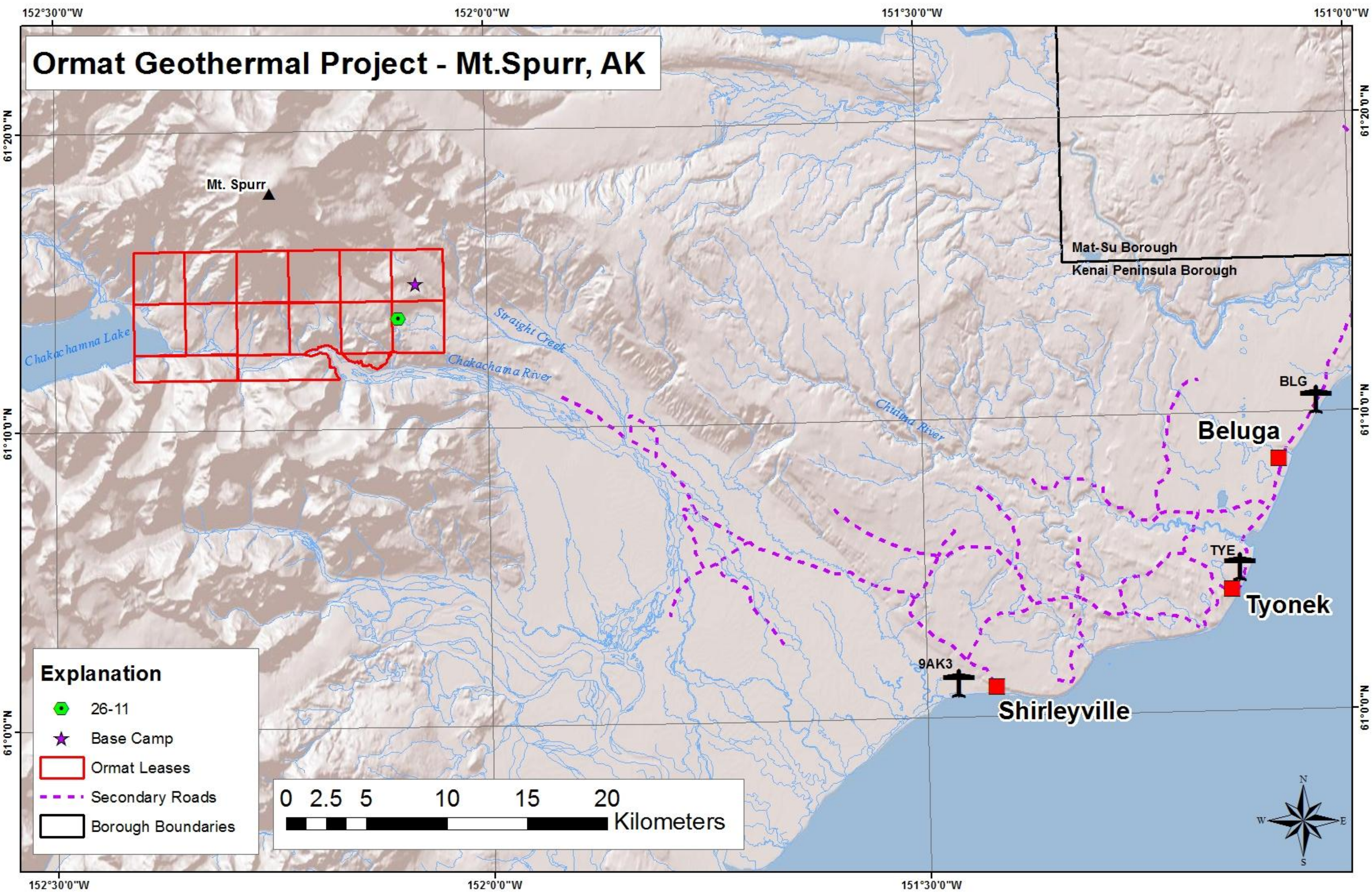

Figure 1: Regional area map

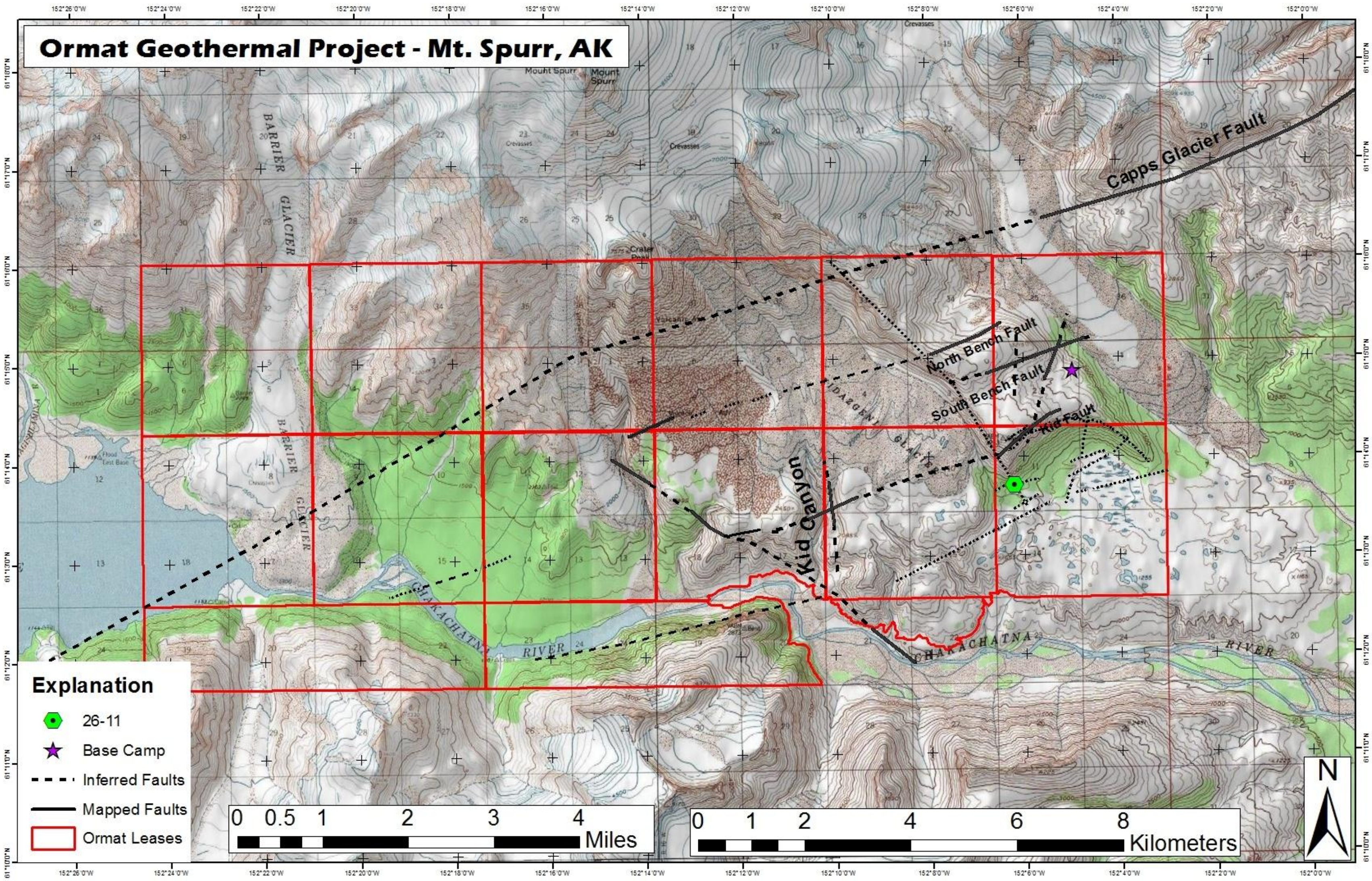

Figure 2: Project location map with base camp, core-hole location and mapped structural features

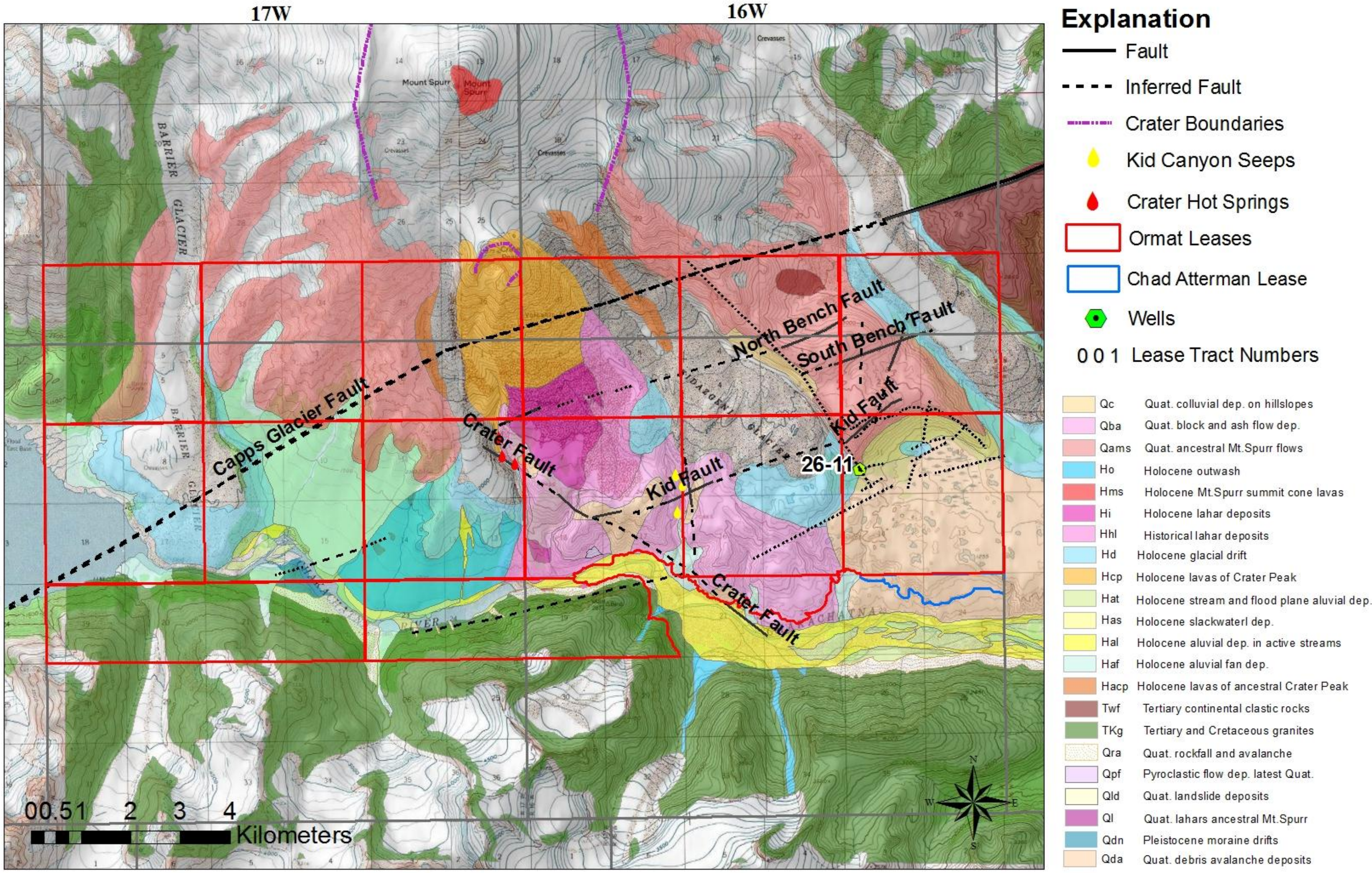

Figure 3. Geologic map compiled from Nye and Waythomas, 2000 and in-house Ormat mapping from 2008-2011.

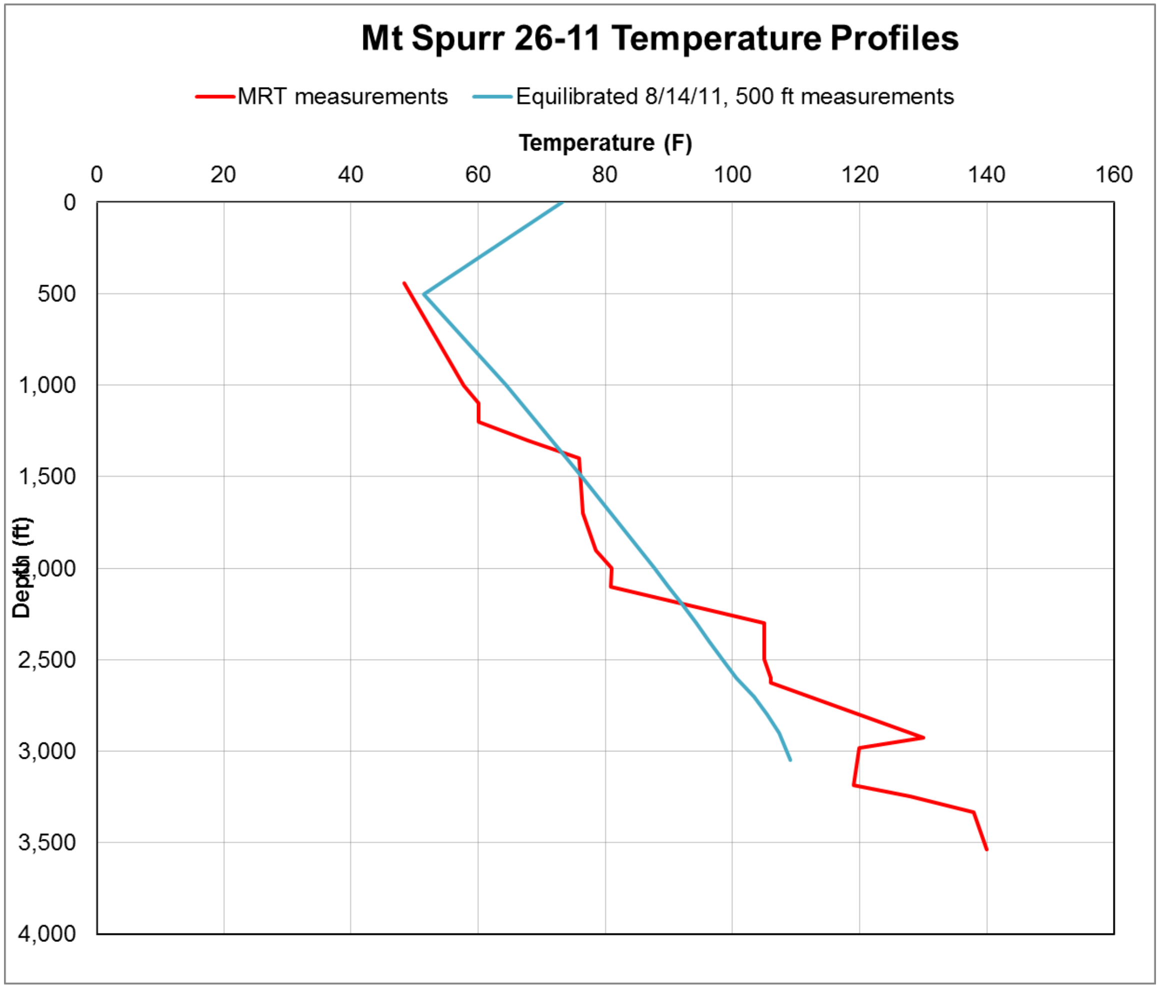

Figure 4. Temperature gradient of core hole 26-11, both equilibrated and unequilibrated from MRT.

Figure 5. Left: Clay alteration and high angle fracturing within core at 3238 ft. Right: Intense chloritization of core between 3522 and 3532 feet

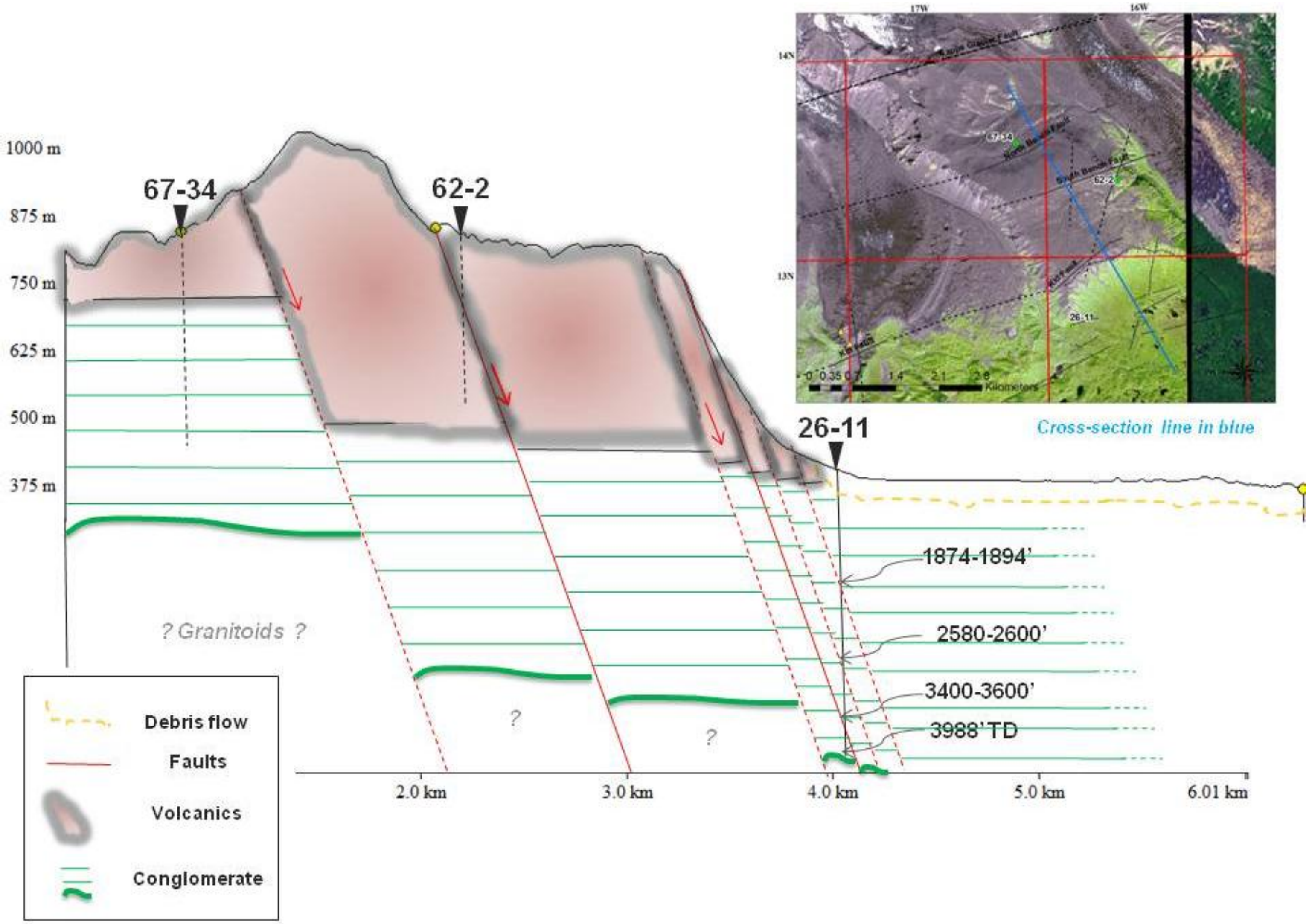

Figure 6. Simple cross section from the NW to the SE through the 'Bench' on the southern flank of Mt.Spurr. Core hole 26-11 shown intersecting the main Kid Fault Zone at multiple depths.

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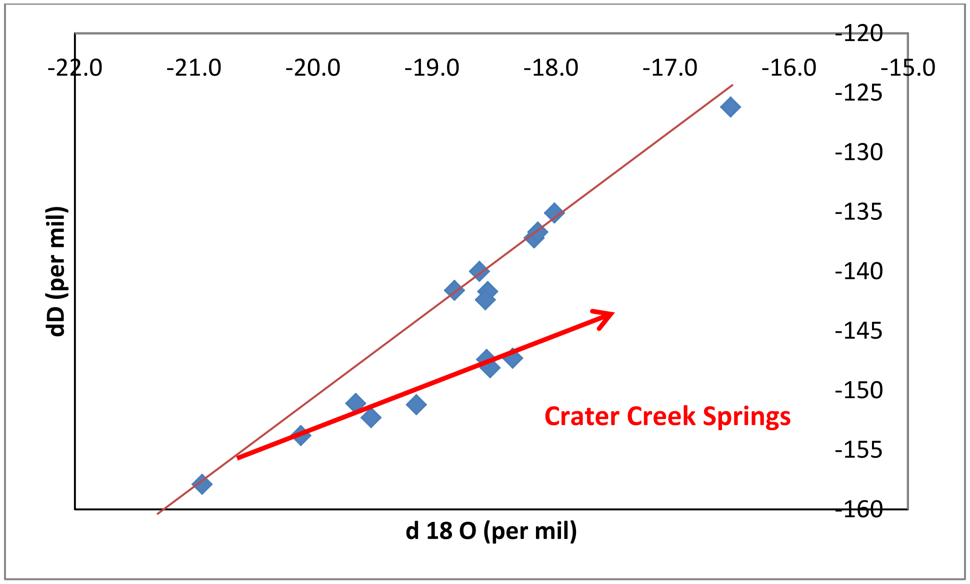

Figure 7. Stable oxygen and deuterium values from Mt Spurr fluids. Enriched values depart from meteoric water line following trend of mixing with Andesitic magmatic fluids and/or continuous boiling of a geothermal reservoir.

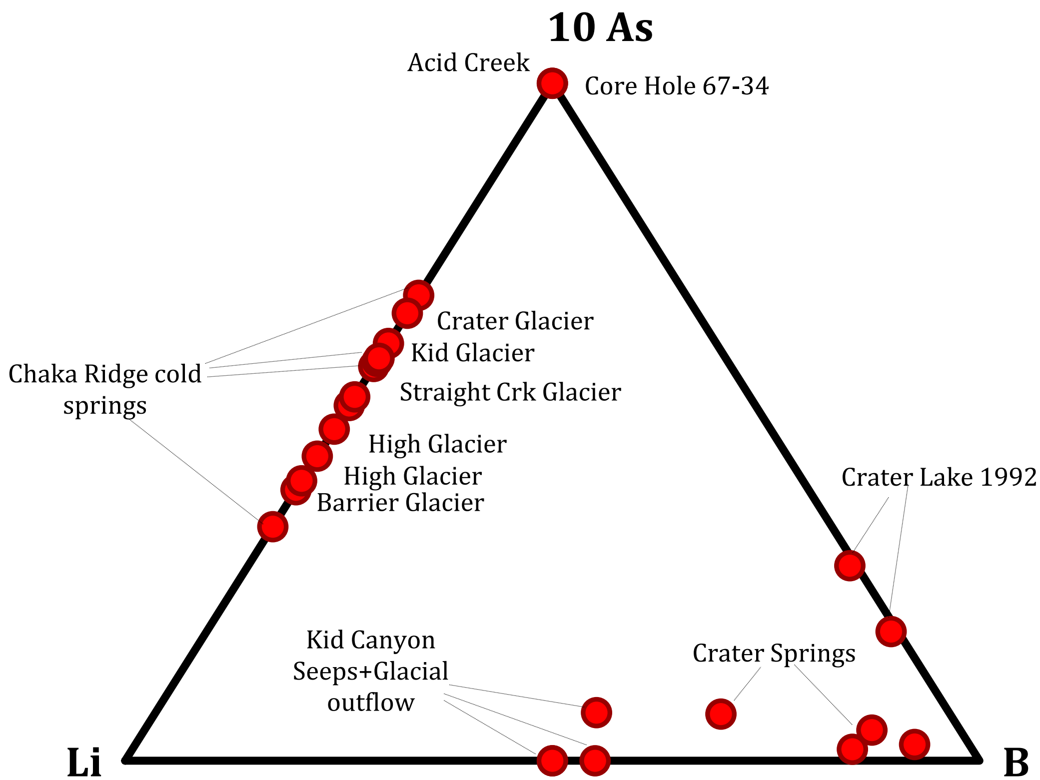

Figure 8. Ternary plot of lithium, boron and arsenic concentrations for all cold seeps, warm springs and glacial fluids.