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INDEPENDENT TECHNICAL REPORT: RESOURCE EVALUATION OF THE NEWDALE GEOTHERMAL PROSPECT, MADISON AND FREMONT COUNTIES, IDAHO, USA

for

Standard Steam Trust LLC

Denver, Colorado

by

GeothermEx, Inc.

Richmond, California, USA

FEBRUARY 10, 2010

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APPENDIX A: METHODOLOGY FOR ESTIMATION OF AVAILABLE GEOTHERMAL ENERGY RESOURCES

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ILLUSTRATIONS

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SUMMARY

Standard Steam Trust LLC of Denver, Colorado (SST) holds a set of leases for exploration and development rights in the Newdale geothermal energy prospect, Madison and Fremont Counties, Idaho. Most of these leases are private (Fee), a few are State lands, and certain additional State and Federal (Bureau of Land Management) leases are being sought. The currently established leases total about 53.4 km^2 (13,197 acres or 20.6 square miles), covering 77% of what is considered to be the project area.

The area lies along the SE edge of the Eastern Snake River Plain, a region in which elevated crustal heat flow (creating gradients of 50°C to 70°C/km) has been well-established. A ~25 square km (~10 square mile) thermal anomaly containing hot water is present at depths of about 500 to 2,000 ft. Waters sampled at numerous highly productive irrigation wells drilled to depths of 500 to 1,000 ft have measured temperatures (at the wellhead) up to 52°C and chemical characteristics that indicate equilibration with surrounding rocks at about 110°~120°C and perhaps deeper at about 185°C. Two geothermal exploration holes were drilled in the early 1980s, to a maximum depth of about 3,000 ft. Neither hole was logged for temperature under stable conditions, but one (located near the edge of the thermal anomaly) found a temperature of 88°C (190°F) at 600 m (2,000 ft) depth that is probably accurate.

The existence of the Newdale anomaly appears to be a function of elevated permeability in the host rhyolites (silicic volcanic rocks) of the area. This elevated permeability may, in turn, be related to deep-seated intersections between several large-scale geologic structures (faults and buried volcanic centers or portions thereof). The distribution of permeability at depth is not yet well understood, but shallower permeability is so high that deep permeability may also be significant and possibly very heterogeneous. Meteoric water is heated by circulation to depth and rises into the shallow anomalous zone. The depths, temperature environments and rates of deeper circulation are poorly constrained, and temperatures at a target drilling depth of about 5,000 ft could be little more than about 120°C or equally could exceed 150°C.

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The target for further exploration of the prospect needs to be permeability at depths of about 5,000 ft and more, where conditions may be hot enough for a commercial geothermal project (roughly 150°C or higher). There is a good chance that the same tectonic conditions that have created high permeabilities in the shallow anomaly have created deeper permeability, but this remains to be proven.

If permeability at temperatures averaging 150°C to 175°C can be found by drilling and testing, and if this permeability is located more-or-less in equal extent to the area of the shallow anomaly or one third of it, then a probabilistic estimate of recoverable heat in place indicates that the resource may generate about 70 MW of electricity for 20 years. The utility of this estimate depends not only on finding permeability at depth, but also the temperatures anticipated and finding that the drilling costs incurred (dollars per MW generated) will be commercially acceptable. The permeability found must be both local (supporting individual wells) and also more general (creating adequate reservoir capacity).

The next stage of the project needs to comprise deeper drilling and testing than done thus-far, and one to three wells drilled to depths of 1.5 to 1.8 km (5,000 ft – 6,000 ft) are recommended. The first well should be drilled at about the center of the anomaly. Another (probably only if the first is successful) would be drilled SE of the Teton Dam site. A third might be considered, in the SW of the prospect, if one or more of the first two is successful or otherwise promising.

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1. INTRODUCTION

1.1 Terms of Reference

Standard Steam Trust LLC of Denver, Colorado (SST) has commissioned GeothermEx, Inc. of Richmond, California (GeothermEx), to prepare an independent technical report on the Newdale geothermal energy prospect in Madison and Fremont Counties, Idaho (Figure 1.1-1). SST holds geothermal exploration and development leases in the area which total about 63.4 km^2 (24.5 square miles), herein referred to as the prospect or project area[1].

Exploration for geothermal resources has been conducted in the Newdale area by other entities and SST has conducted additional exploration with the goal of development. This has comprised geologic assessments, shallow drilling, gravity and magnetic surveys to better confirm and define the commercial viability of the resource for electric power generation, with the immediate goal of selecting sites for deeper drilling.

1.2 Purpose

The present report is intended to describe the current status of the Newdale project, to provide an evaluation of the geothermal resource as permitted by available data, and to discuss the plans of SST for continued exploration and development work.

1.3 Sources

GeothermEx's description and evaluation of the Newdale project is based on published and unpublished data from several sources. This includes materials provided by SST, and

[1] The "project area" or "Newdale lease" on many of the maps herein is an informal boundary, drawn by SST, around most of the lands leased as of November 2009. The most recent leases (December) are presented and tabulated in Section 3.1.

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information obtained by GeothermEx from other sources, including GeothermEx's own data files. Major categories of information used for the report include:

- studies of regional heat flow and the geologic setting and history (including volcanic/magmatic activity) of the eastern Snake River Plain;
- locations, depths and temperature gradients in shallow boreholes drilled for temperature measurement;
- chemical and stable isotope analyses of warm spring and well waters, and chemical geothermometers computed from chemical analyses of groundwaters, and;
- gravity and magnetic surveys.

References to published data sources are provided in Section 15. Citations to these sources are provided below only where deemed important for specificity.

1.4 Scope

The scope of this evaluation is designed to meet the requirements of the Toronto Stock Exchange (TSX) for a technical report in 43-101 format and the report is organized to address the topic areas specified in those requirements. As noted above, the report has been prepared from existing information compiled from various sources; GeothermEx has not conducted any independent field work in support of the evaluation. The information used for this evaluation is believed to be accurate. GeothermEx has not independently verified its accuracy, but comments regarding uncertainties in the data are provided.

The evaluation of the geothermal resource includes the following principal components:

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- Assessment and synthesis of the project area's geologic setting, with a focus on aspects that are likely to have the most significant impact on the presence and character of geothermal resources (Sections 6 and 7).

- Analysis of indications of geothermal activity in the area, including indications from geology, geophysics, geochemistry and exploratory drilling (Sections 6 and 7).

- A preliminary conceptual model of the geothermal resource for the purpose of estimating the potential location, extent and characteristics of the resource (Section 7, renamed herein as Reservoir Type from the normal 43-101 format title Deposit Type/Mineralization).

- The estimated the size of the indicated geothermal resource in the project area (Section 11).

- Assessment of SST's current plans for further exploration and development of the project area, with recommendations for these activities (Sections 8 and 14).

Other sections of this report provide descriptions of the leases and conditions in the lease area (Sections 3 and 4); the history of prior exploration (Section 5); a summary of previous drilling in the area (Sections 6 and 9); consideration of adjacent properties (Section 10), and; other relevant data and information (Section 12).

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2. RELIANCE ON EXPERTS / DISCLAIMER

GeothermEx has relied on SST, its staff and consultants to provide certain supporting documentation, data, reports and information in preparation of this report. The conclusions and recommendations presented herein are based on information available at the time of this report, supplied by SST, its consultants and third party sources. GeothermEx has been aware of the need to detect any errors in or omissions from the data and information provided, but cannot be responsible for undetected errors or omissions that exist. Assumptions and parameters related to the resource evaluation are described in relevant sections of this report.

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3. PROPERTY

3.1 Description and Location

The project area leases held or being sought by SST are described in detail by Table 3.1-1 by map Figures 3.1-1. This table and figure were supplied to GeothermEx by SST and have been re-formatted for presentation without any changes to content. They have been reviewed by GeothermEx for general compatibility, but complete compatibility and accuracy in all details has not been confirmed.

The total project area is defined as 26.7 sq. miles (6913.8 Ha or 69.14 sq. km), of which 13,197 acres (5340 Ha or 53.40 sq. km) is controlled by SST.

3.2 Nature and Extent of Title

The nature and extent of title to the lands in Table 3.1-1 and Figure 3.1-1 are as follows.

The Fee leases are the same for all lessors: 10-year leases which automatically renew after ten years if the lessee is producing geothermal products and then remain held by production until production ceases. There is no requirement for minimal work or performance. Surface rights of ingress and egress are generally included.

The State of Idaho leases are the standard lease for Idaho government lands.

Property boundaries are not located in the field, but defined by legal descriptions in Table 3.1-1.

The leases include rentals that will total $28,160.24 in 2010 and be similar thereafter, plus a royalty on the sale of electricity generated from geothermal production. The royalty structure is 1.75% of gross power sales for the first 10 years of production, and 3.5% of gross power sales for the remainder of the working life of the project.

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3.3 Location of Known Resources

There are no surface manifestations of hydrothermal activity within the project area, but a number of irrigation wells that produce thermal water, at a reported wellhead maximum of about 52°C (125°F). Shallow exploration drilling has found similar temperatures, and deeper exploration drilling (to about 3,000 ft depth) has found temperatures as high as 88°C (190°F).

See additional information in Section 6.

3.4 Environmental Issues and Permitting Requirements

There are no known environmental liabilities on any of the properties. The principal use of the property is for agriculture, with over 80% of the area being cultivated on an annual basis for wheat, potatoes, and barley.

Permits required to perform work on the properties include permits from the Idaho Department of Water Resources for production well drilling, which are expected to take 2-3 months to receive from the time of application, and ultimately further permits from the Idaho Department of Water Resources and Fremont and Madison Counties for Permits to Construct a geothermal power generating facility on the property. SST has already completed temperature gradient drilling on the property, for which it received permits from the Idaho Department of Water Resources.

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4. ACCESSIBILITY, CLIMATE, LOCAL RESOURCES AND PHYSIOGRAPHY

4.1 Accessibility

The project area is easily accessed by road. US Interstate 15 from Salt Lake City to the south passes through Idaho Falls. From Idaho Falls the distance to Newdale town is about 40 miles: via US Highway 20 leading NNE and passing through Rexburg and then via Idaho Highway 33 leading east. From Newdale town there are numerous local roads that lead into the leased area. The part of the leased area north of the Teton River is accessed by crossing a bridge about 3.5 miles (5 km) north of Newdale town.

4.2 Climate

The climate of the area is typical of the relatively dry and cool eastern Snake River Plain. Average daily temperatures are about 18°F (-8°C) in January and 65°F (18°C) in August. Mean annual air temperature is about 44°F (7°C; Idaho Falls). Total annual precipitation is about 11 inches (28 cm).

4.3 Infrastructure and Physiography

There is a 119KV transmission line that runs from northeast to south essentially through the middle of the leased area which, according to SST, has the capacity needed to take power generated on the property.

The leased area is almost entirely flat, irrigated farmland, except for the canyon of the Teton River (Figure 1.1-1), which is typically 250 to 300 ft (70 - 100 m) deep and 1000 to 2000 ft (300 - 600 m) wide.

The river canyon at about the center of the leased area was the site of the Teton Dam, an earth-fill structure built by the federal government that suffered a catastrophic failure on June 5, 1976 while being filled for the first time. The water depth at time of collapse was 240 ft.

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5. HISTORY

The geothermal setting of Newdale was discovered by shallow well drilling and has been subsequently investigated by government, academic and commercial interests.

Many shallow irrigation water wells in the anomaly area have intersected hot water in the 27-38°C (80-100°F) range down to 150 m (500 ft) depths, and 49-52°C (120-125°F) has been reported from three other irrigation wells that are 207 to 354 m (680 to 1,160 ft) deep.

The Bureau of Reclamation drilled dozens of holes in the vicinity of the proposed Teton Dam in the 1970s to assess the foundation characteristics of the proposed dam abutments. Several of the holes encountered hot water. Temperature data were not recorded but the Bureau did publish some of their findings on the geology and groundwater of the area.

Amax Geothermal Inc. acquired leases in the area in the mid-1970s and drilled twenty temperature gradient holes to various depths but did not follow up with deeper drilling. Limited data from the Amax holes are available in the public domain and considered herein.

Several government-sponsored studies of heat flow on the eastern Snake River plain (ESRP) including the Newdale area have been published, starting with Brott and others (1976) and most recently updated and summarized by Blackwell and others (1992). Geologic and ground-water geologic studies of the region have included Haskett (1972), Prostka (1977) and Smith (2004). Gravity and aeromagnetics of the area were surveyed by Mabey (1978). Other public data from the region include government file (irrigation) well drillers reports, chemical analyses of some of these cool to warm ground waters, and scattered records of water temperatures.

In 1980 and 1981 the geothermal division of Union Oil of California (Unocal) drilled and obtained downhole temperature data in the area. There are some inconsistencies in available data (see Section 6.3.2), but Blackwell and others (1992) list data from two holes that are

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presumed herein to be reliable (although not necessarily accurate). As many as four other Unocal holes may have been drilled (see Section 6.3.2).

More recently, during 2009 SST has:

- carried out detailed gravity and magnetic surveys of the prospect area and vicinity
- drilled 20 holes to depths of 500 ft (16 holes), 580 ft (one hole), 740 ft (one hole), 920 ft (one hole) and 1000 ft (one hole), logging the drill cuttings, obtaining water samples and measuring temperatures down-hole.

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6. GEOLOGIC SETTING

6.1 Regional and Local Geology, Hydrology and Heat Flow

Eastern Snake River Plain

Newdale is located in the Eastern Snake River Plain (ESRP) of south-eastern Idaho, an elongate, down-warped basin, trending SW-NE, that contains a thick sequence of volcanic rocks (Figure 6.1-1). The deepest of the volcanics are rhyolitic (silica-rich) in composition and about 4 to 10 million years old (Smith, 2004). Overlying these are basaltic (silica-poor) lavas dating from about 4 million years to locally less than 10,000 years which comprise a layer up to about 1 km thick.

The mountains that rise to the north-NW and to the south-SE of the ESRP comprise the northern-most extension of the Basin and Range geologic-physiographic province, most of which is in Nevada. By inference, the same rocks are expected to be present in the "pre-volcanic basement" of the ESRP, under the rhyolitic volcanics and probably greatly disrupted by intrusions, local melting and intense heating. In general, these are folded and thrust-faulted Paleozoic and Precambrian sedimentary rocks.

The existence of the ESRP is attributed to processes that occurred while this part of the North American tectonic plate migrated in a SW direction over the Yellowstone mantle plume or "hotspot"[2] at a historic rate of about 4.5 mm/year (Link, 2009). This hotspot now underlies the Yellowstone Plateau and is responsible for the young silicic volcanism and abundant geothermal features of that area, whereas the deep-seated rhyolites of the ESRP are analogous to those now at the surface of Yellowstone.

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[2] The mantle is the layer of the earth between crust and core. A hotspot is a source of intense heat and magma that remains more-or-less fixed in absolute position within the mantle while the crust, divided into various separate "plates," drifts over it.

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The hot spot produces extremely hot, dense, silica-poor, mantle-derived magma that gets emplaced into the generally lighter (less dense) overlying crust, melting a part of it. This produces a less dense, silica-rich magma that rises, some to the surface as rhyolite. After the rhyolite source is depleted a residual silica-poor magma (part mantle, part melted crust) erupts as basalt, locally inter-layering with and then covering the rhyolite, and the subsidence of the whole package is caused by isostatic adjustment (sinking of the now-heavy ESRP crust) with simultaneous contraction due to cooling.

The subsidence continues today, while the upper mantle beneath retains relatively high temperatures and is a continuing source of basaltic magma in (now) small amounts.

These processes occur in a regional context of NE-SW extension that has formed the Basin and Range province, stretching the ESRP in a NE-SW direction (parallel to its length). Within the ESRP the extension is accommodated by intrusion of NW-trending basalt dykes (some extending to the surface), whereas to the north and south the extension is accommodated by movement on north- to NW-trending normal faults.

The silicic volcanism of the ESRP is also described as a succession of volcanic fields and associated collapse calderas[3] which are progressively younger and (now) shallower, moving from SW to NE. The youngest caldera is at Yellowstone and very well-defined. The oldest fields and calderas are now buried under younger volcanic products and can only be inferred indirectly from data collected at the surface and by drilling. The Newdale area is considered to have been part of the Heise Volcanic Field (6 to 4 million years old), within which one or more local (now buried) calderas developed (see below). On some maps Newdale lies with the Yellowstone

[3] A volcanic field is a broad area of multiple volcanoes and/or other eruptive centers that were active during some specific period of time. A collapse caldera is a large, more-or-less circular topographic depression in a volcanic landscape (or field), many times wider than the volcanic vents that it includes, that has formed in response to withdrawal of magma at depth.

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Plateau because the area is mantled by fragmental volcanics (tuffs) that erupted from the Yellowstone area to the northeast.

Groundwater Aquifer(s)

The 1 km-thick package of ESRP basalts comprises thousands of relatively small, thin, partially overlapping, highly porous and permeable basalt flows that erupted at multiple locations, with inter-layers of rhyolite tuff (local and occasional) and alluvial, lacustrine and eolian clastic (fragmental) sediments that eroded from the surrounding mountains.

These lavas host an immense aquifer of ground-water, up to about 400 m thick, that generally flows to the SW from the Yellowstone Plateau at the NE end of the Plain, at an average rate of about 1 km per year (Smith, 2004). Local horizontal flow rates range from about one to several meters per day (Blackwell and others, 1992). The vadose (unsaturated) zone directly above the aquifer ranges in thickness from about 60 to more than 300 m. The bottom of the aquifer is generally associated with an increase in the alteration of the basalts due to low grade metamorphism is association with age or burial depth (Blackwell and others, 1992).

Newdale is located near the southern edge of the ESRP its eastern end and here generally the basalts, resting on a rhyolite surface that rises to the east and SE, are locally absent. However, basalts are present in the far SW of the project area and along its southern fringe (see Figures 6.1-2 and 6.1-3). At the general basalt-rhyolite interface there are inter-layers of the basalts and rhyolites and lenses of clastic sediments.

Throughout the ESRP the highest porosity and permeability in the basalts occurs at flow boundaries and interfaces whereas the central parts of flow units tend to be massive. Vertical permeability can be extremely high in one area, and very restricted in another, leading to the formation of perched water zones within the vadose zone. The overall effect of NE-SW extension in the ESRP (see above) is considered to hamper southwestward flow of groundwater and to abet northwestward and southeastward flow in fractures that are dilated by the extension.

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Dykes emplaced in NW-SE-trending rift zones also tend to be less permeable than surrounding basalts, and to divert the otherwise SW-trending regional flow.

Permeability distribution in the underlying rhyolites is less well understood, but also can be very heterogeneous. According to Haskett (1972), the rhyolite aquifer in the Newdale area produces greater volumes of water than are usually obtained from wells drilled into rhyolites elsewhere about the Plain. The wells in the rhyolites can indeed be very productive, yielding as much as 2,000 gpm. Brott and others (1976) noted that the down hole temperture gradients of wells that had been drilled into the rhyolite did not show water disturbances and instead indicated conductive heat flow. This could indicate that, in the rhyolites, horizontal permeability tends to exceed vertical.

Deeper in the rhyolites there is evidence of permeable zones in the temperature logs of the two Unocal holes (see below), and by drilling data from Madison County Geothermal Well #1 (MCG-1), a 3,933 ft hole drilled at Rexburg (10 miles SW of Newdale, elevation 4,860 ft asl) in 1980 (Kunze and Marlor, 1982). The deepest basalt in this hole was at 940 - 970 ft. All materials recovered below this were rhyolitic, but there were numerous zones of lost circulation and zones drilled with out recoveries. The thickest single zone drilled with complete recovery was 600 ft. There were eight intervals drilled without recovery, from 30 ft to several hundred ft, and the entire zone from 3,140 ft to bottom at 3,933 ft. (Reliable temperature data were never obtained from MCG-1 as it was plagued by a severe downflow of cold water from the vicinity of the casing show, that could not be resolved.)

The water table elevation near the Teton Dam site under the project area lies at about 4,900 ft and from there rises to about 5,200 ft in the ESE. During the 1960s there was a general rise of the water table due to increased precipitation (Haskett, 1972).

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Heat Flow and General Temperature Distribution

It is believed that the highest upper mantle temperatures beneath the ESRP underlie the NE-trending axis of the plain, which passes north of Newdale. Most volcanic activity (especially recent) has occurred in this Axial Volcanic Zone and along associated NW-trending rift zones that occur west and SW of Newdale (Figure 6.1-1).

Conductive heat flow from the crust beneath the ESRP aquifer is at levels matching high levels elsewhere on the continent: about 110 mWm^{-2} with associated temperature gradients being 50° to 80°C/km (Blackwell and others, 1992). According to Blackwell and others (1992) "regional temperatures are about 175±25°C at a depth of 3 km all over the Snake River Plain" whereas the background temperature in the adjacent Basin and Range (where heat flow is about 80 mWm^{-2}) is about 100±25°C at the same depth.

The cold, rapidly flowing groundwater of the ESRP aquifer consumes a lot of this heat, and the heat flow at the surface of the ESRP is very low (<20 mWm^{-2}). The temperature profiles of wells that completely pass through the aquifer often show an abrupt transition from convective, nearly isothermal conditions in the aquifer to linear conductive conditions beneath, and it is reported that this inflection often marks the top of hydrothermal alteration in the basalts.

The high heat flow into the ESRP aquifer causes a general level of warming: recharge water enters the system at high elevations in the NE, at about 5 to 7°C and is heated to about 16°C at the far SW end of the Plain. As described by Smith (2004), there also are "local areas of anomalously warm water and others with anomalously cold water. The warm zones represent either areas of low permeability in which water moves slowly and is heated by heat transfer from below or areas of vigorous geothermal input that overwhelms the cold aquifer waters above."

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Local Geology

Gravity maps of the ESRP and greater Rexburg area show distinctly the western and southern outline of what appears to be a large buried collapse caldera or caldera-like structure (Figure 6.1-4). The northeast rim of this structure is not shown by gravity, but its trace can be projected from the west and south and the Newdale thermal anomaly lies just inside it (see also Section 6.4).

Using additional, preliminary evidence from surface geology and (often minor) variations in topography, Prostka and Embree (1978) tentatively subdivided the area of this gravity anomaly into a cluster of smaller, overlapping and nested Pliocene calderas, which they named the Rexburg caldera complex (about 2 to 5 million years old). The project area lies within three of these smaller calderas but whether they are accurately identified remains uncertain.

The youngest rhyolite of the project area is the Huckleberry Ridge Tuff (Figure 6.1-2), which mantles most of it under thin soil. This Tuff is not part of the postulated caldera complex but instead represents distinct eruptions (ash flows) about 2 million years ago from the Island Park and Yellowstone calderas to the north and NE[4] (Brott, 1976). The Tuff is underlain by basalts, unconsolidated sediments and other rhyolites (see key to Figure 6.1-2), and outside the prospect the Tuff is locally overlain by similar materials.

The failed Teton Dam was constructed into exposures of the Huckleberry Ridge Tuff along the Teton River and so the Tuff has been extensively studied in connection with the failure. Drill holes that penetrate the Tuff find a total thickness of about 120 m to 200 m (400 to 650 ft) and where it is exposed there is locally extensive deformation (faulting, tilting and folding).

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[4] The western half of the topographic rim of Island Park caldera is easily identified north of Newdale on Figure 1.1-1.

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Considering the thickness of the Huckleberry Ridge Tuff and the presence of lake sediments below, Protska and Embree (1978) suggested that a Pliocene caldera existed in the area. The same authors suggested a model for the deformation of the Tuff that has since been elaborated by Embree and Hoggan (1999). According to this model, the original thickness of the Huckleberry Ridge Tuff was about 130 m but the underlying lake sediments responded to pressure loading by forming a WNW-ESE-trending diapir (uplift) at what is now called Hog Hollow, partly overlapping the NE corner of the prospect area (Figures 6.1-2 and 6.1-2)[5]. The Hog Hollow uplift split the overlying Tuff (along with at least 30 m of underlying alluvial gravel, basalt and tuffaceous lacustrine sediments), large areas of which slid on gently sloped surfaces to the NE and to the SW from the two sides of the uplift. On the SW side the total horizontal displacement (slide) of the Tuff was about 1 km or more, producing the observed folding and tilting.

The deepest record of local stratigraphy is provided by the mud logs of hole UNST-08 (original and deepening; see Section 6.3.2):

Interval (m)	*Interval (ft)*	Lithology
0 - 37	*0 - 120*	"Huckleberry Ridge (ash flow) Tuff"
37 - 49	*120 - 160*	no returns
49 - 232	*160 - 760*	rhyolite ash flow tuff
232 - 299	*760 - 980*	top to bottom: clay > sand > basalt > boulders
299 - 351	*980 - 1150*	tuff, ash
351 - 524	*1150 - 1720*	rhyolite lava
524 - 543	*1720 - 1780*	tuff
543 - 610	*1780 - 2000*	page of mud log is missing
610 - 1,033	*2000 - 3389 (TD)*	rhyolite volcanics (with a single 3 m interbed of clay)

[5] Proska and Embree (1978) had earlier noted the slightly N-facing arcuate shape of Hog Hollow (see Figure 6.1-2), suggesting that it might be the southern moat zone of a small caldera that is younger than (and mostly lies NE of) the Rexburg caldera complex. The diaper model in Embree and Hoggan (1999) replaces that idea.

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Considering Embree and Hoggan (1999), it can be assumed that all of the tuff down to 232 m is Huckleberry Ridge Tuff.

Local Structure

Aside from the shallow deformation of the Huckleberry Ridge Tuff, described above, the immediate project area does not display a significant number of large-scale structures such as faults and folds exposed at the surface. There are, however, a number of lineaments that trend either NE or NW on surface topography (maps), photos and/or satellite images.

NE-trending structures are associated regionally with the SE boundary of the ESRP. The smaller of these are lineaments but not clearly faults. The larger of these are mostly NE-trending "normal" faults that steeply dip to the NW and are downthrown in that direction, with associated warps and tilts. Some "antithetic" faults generally parallel to these but dipping and downthrown to the SE are also present.

The best example of such an antithetic fault (down to the SE) is the Teton (Dam) fault (Figure 6.1.3), which trends NE passing close to the north abutment of the Teton Dam site. According to Protska and Embree (1978), this fault is not clearly identified at the surface, but inferred from well data, some evidence for displacement NE of the damsite, and geophysical (resistivity) data. According to SST (internal memorandum, December 11, 2007), the fault offsets rhyolites and alluvial deposits on opposite sides of the Teton Dam site, suggesting recent movement.

The Basin and Range south of the ESRP is dominated by NW-trending horsts and grabens most of which are tilted to the NE. The structural relief of these diminishes NW-ward almost to zero near the edge of the Plain, but on the Plain there are minor NW-trending normal faults, NW-trending open fissures and rift zones, and other lineaments.

Protska and Embree (1978) noted that many of the (tentative) overlapping and nested calderas of the Rexburg caldera complex appear to be located at intersections of major NW- and NE-

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trending faults, and that younger basalts (not in the exact project area) have erupted through the complex along NW-trending zones. This is reasonably a result of magmas tending to rise along zones of extension. The greater area of the caldera complex also contains warps, domes and tilts that these authors have associated with differential subsidence after the period of magmatic activity, and with differential responses to the regional subsidence and extension of the ESRP.

As noted by Protska and Embree (1978), in the environment of relatively high heat flow beneath the ESRP and adjacent Basin and Range, these various structures at depth may be promoting the evolution and maintenance of geothermal systems, "channel(ing) groundwater flow downward along fault zones where it may be heated and stored in closed-basin reservoirs related to caldera subsidence and/or Basin-Range type structure," with continuing tectonic extension at a high rate that reactivates old faults and maintains permeability. The Newdale thermal anomaly in particular is considered by Protska and Embree (1978) to be "roughly coincident with an area circumscribed by the overlap of ...(two)... calderas and the NE-trending Teton Dam fault."

6.2 Location of Thermal Features

There are no natural thermal features at land surface in the project area.

6.3 Bore Holes

6.3.1 Shallow

Figure 6.3-1 shows the locations of holes that have been drilled in the area, along with well depth and the maximum temperature reported from the hole or at the wellhead. Most of the irrigation well temperatures (from a table compiled by SST) probably represent the wellhead during pumped flow. Temperatures at the SST holes are bottom-hole, measured by SST (more below). Temperatures at the AMAX and Other holes are also bottom hole, from SMU(2009). Most of the Other holes represent drilling by the U.S. Bureau of Reclamation, done to evaluate subsurface conditions for the Teton Dam.

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Down hole temperature profiles (Figures 6.3-2 and -3) are available for: (a) a hole at 7N-42E-19DC (center of lease area just NW of Teton Dam site) drilled by the USBR and reported by Blackwell and others (1992); (b) the SST temperature gradient holes (series NDX09-1 to -20) and; (c) two deeper holes drilled by Unocal (see next section)[6].

USBR hole 7N-42E-19DC exhibits a linear gradient with an inflection about 100 ft above bottom that can be attributed to a change of lithology.

The SST holes (NDX09-series) were drilled rapidly (typically 2 to 3 days for 500 ft) using an air hammer and then closer to bottom a tri-cone bit (after the water flows encountered created too much pressure for the air hammer). Most of the holes made water (a few gpm to over 50 gpm from near bottom) but a few were drilled without returns (for example, NDX09-3 had no returns below 90 ft). The temperature profile of each hole was measured only one day after drilling and then the hole was abandoned.

This certainly means that the SST hole temperature profiles are not stabilized. Many or most of the profiles show a linear or approximately linear gradient below about 5,000 ft elevation. (This is a depth of about 200 to 350 ft, which is about the average level of static water measured after drilling.) The slopes of these linear profile segments are fairly similar to the gradients in the USBR and Unocal holes, so a number of them may be fairly accurate. Closer to bottom, however, nearly all of the SST profiles show a roll-over to convective (vertical profile) or near-convective conditions and it is uncertain whether the measured bottom-hole temperatures are actually representative of surrounding rock temperatures. For example, a down flow of cooler

[6] Bottom-hole temperatures, depths and "uniform temperature gradients" of the AMAX gradient holes are reported by SMU(2009), but the actual temperature profiles of the holes are not available. GeothermEx inquired about these at SMU (see SMU, 2009), where AMAX data were placed in the public domain, and was told that the records only include bottom hole temperatures and gradient values interpreted by AMAX.

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water from above almost certainly has cooled the profile of NDX09-10 which reaches a maximum of about 28°C (83°F) on bottom: the wellhead temperature of water produced by the hole during drilling was occasionally recorded, and the temperature reported while drilling near bottom was 46°C (114°F) (see data points labeled "NDX09-10 wh drlng" on Figure 6.3-2).

The pattern of near-bottom convective roll-over seen in the SST profiles is not shown by USBR 7N-42D-19DC, UNST-07 and UNST-08, and this raises concern that all of the SST bottom-hole temperatures are artificially low as a result of down flow. Another possible cause of the observed pattern would be up-flow from the hole bottom during or after drilling, with the up-flowing water exiting the hole at the static water table. Therefore, all of the SST profiles are fairly uncertain, even if comparisons between them do show a range of possible temperatures at depth. An interpretation of the temperature data is offered in Section 6.3.3.

6.3.2 Deep

There are two wells drilled by Unocal for which data are available. As listed herein these are:

- UNST-07[7]: at Center SE Sec.7 (7DCB), T7N, R42E. Blackwell and others (1992) illustrate a temperature log dated 15 December 1981, reaching 88°C (190°F) on bottom (Figure 6.3-3); collar elevation 1,609 m (5,279 ft); depth 890 m (2,920 ft); other data have not been found.

- UNST-08[8]: at NE NE Sec.8 (8AA), T7N, R42E (Lat. 43° 57.225', Long. 111° 31.275'). Blackwell and others (1992) illustrate a temperature log dated 17 November

[7] According to SMU (2009), this is "Union State 2591-07-79-1, also designated 22-GB-8"

[8] The mud log lists State 2591-08-79-1, also designated as 22-GR-3. SMU (2009) lists "Union State 2591-08-79-1; also designated 22-GB-3" (*sic*)

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1981, reaching 83°C (181°F) on bottom (Figure 6.3-3). The mud log is available (lithologies are described in Section 6.1) and shows:

- Ground elevation 1,637 m (5370 ft)
- Original total depth 619 m (2,030 ft) completed 19 July 1980
- 7" casing (inside 9-5/8" and 13-3/8") to 276 m (907 ft)
- Deepened and completed to 1,033 m (3,389 ft) on 26 October 1981
- 2-7/8" pipe was emplaced from the surface to 608 m (1,996 ft), pulled for deepening, and then re-set to 1,025 m (3,363 ft) on 11 November 1981.

Interpretations of the temperature data available from these holes are included on Figure 6.3-3 and in Section 6.3.3.

Unocal may have drilled as many as four other holes in the Newdale area, but further data have not been found.[9]

[9] SST has obtained a copy of a letter from Union Oil of California, written 27 May 1981 and with a log-in stamp of the Department of Water Resources, 1 June 1981, that lists "Newdale area" wells: (a) Windy Ridge Farms No. 1 (22-GR-2); (b) State 2591-35-79-1 (22-GR-4); (c) State 2591-18-79-1 (22-GR-5), and; (d) Briggs No.1 (22-GR-6). The letter says that the first two of these wells were drilled in 1980. It then seems to say (but is not clear) that the second two were intended for drilling in 1981. Data from the wells are not included.

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6.3.3 Temperature Distribution

Shallower Temperatures

Figure 6.3-4 is a map of temperatures at 4,700 ft asl prepared by:

- Projecting down to 4,700 ft the linear portions of temperature profiles from the SST holes on Figure 6.3-2. These projections assume that the temperature roll-overs near the bottoms of these holes are due to downflow (see Section 6.3.1 and more below).
- Adding bottom-hole temperatures from other holes on Figure 6.3-1, in cases where the bottom hole elevation is close to (typically within 100 ft of) 4,700 ft.
- Projecting down to 4,700 ft the bottom-hole temperatures in Amax temperature gradient holes, using the uniform temperature gradients reported by SMU (2009). These projections cross vertical distances of about 100 ft to 300 ft.

Down-ward temperature projections were not done for the southwestern SST holes NDX-18, -19 and -20 because the profiles of -18 and -19 show evidence of inverting at the bottom and the profile of -20 is similar in character. The pattern of these three holes suggests that warm water to the NE has a component of outflow to the SW, crossing under the Teton River and passing through where they are located. If all three of these hole are instead affected by downflow, then temperatures at 4,700 ft asl in the area SE of the Teton River where they are located should be some 20° to 30°F higher than shown on Figure 6.3-4.

Given uncertainties about the profiles on Figure 6.3-2 (see above and Section 6.3.1), the temperatures shown on Figure 6.3-4 are not at all precise but allow drawing the approximate contours that are shown. These contours are intended to show the general shape of the temperature anomaly and therefore don't obey various outliers which, if included, would make

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the contours needlessly (and probably unrealistically) complex. The outer edge of the entire anomaly is somewhat uncertain due to a lack of control especially on the east side.

The data clearly indicate the presence of anomalous conditions in a NE-trending linear zone between the Teton Fault and the fault about 1.5 miles further NW that is parallel to the Teton Fault. There is a large lobe of the anomaly that projects to the SE side of the Teton Fault and a large SE-central area of depressed temperatures, that straddles the Teton fault and probably is a result of cool water downflow (perhaps along the fault itself). The possibility of downflow in this depression is supported by a very high level of permeability. According to SST, three farmers in the area (Zirker, Schwendiman, and Crapo) all tell the same story: when the Teton Dam was built, and the reservoir starting filling behind the dam, all of their irrigation wells went cold. Their wells are located 1-2 miles north of the reservoir. When the dam failed and the reservoir drained, all of their wells warmed up again to previous (and current) temperatures.

It may be that the temperatures on Figure 6.3-4 tend to under-estimate conditions at or near 4,700 ft asl more (or more often) than over-estimate. Two lines of evidence suggest this.

- First, one of the data points illustrated is the John Zirker 207 m (680 ft) deep well at T7N-R42-Section 19B (NW ¼ Sec.19), reported by SST. The bottom hole elevation of this well is within 10 ft or so of 4,700 ft asl. It is considered to have a static water temperature of 35°C (95°F), but this rises to 51°C (124°F) when the well is pumped continuously for 2 days at ~2,000 gpm (see Table 6.5.1 water sample 25). This information suggests the well is drawing hotter water from below in the cone of depression created by that pumping rate. Alternatively, the hole is cooled by down flow under "static" conditions, whereas pumping overcomes the down flow effect and produces hotter water that is actually representative of the zone(s) near bottom.
- Second, the stabilized profile of USBR 7N-42E-19DC shows an increase of gradient below 4,800 ft asl, apparently due to a change of lithology, whereas the projections of

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temperatures in the SST holes downwards to 4,700 ft assume the continuations of gradients between about 5,000 ft and 4,800 ft asl.

Deeper Temperatures

Temperature conditions below 4,700 ft asl are indicated only by the flowing conditions while drilling of NDX09-10 and by the two Unocal holes. Figure 6.3-3 provides some interpretative considerations of the Unocal data.

- The profile of UNST-07 was clearly obtained immediately after drilling. It may be somewhat accurate down to about 4,400 ft asl, below which all temperatures probably represent various amounts of cooling by the drilling fluid.

- The profile of UNST-08 was obtained 6 days after the hole was deepened from 2,030 ft to about 3,300 ft and a 2-7/8 inch pipe installed. There is fairly good evidence (from Unocal mud log data and notes) that the ~82°C (182°F) temperature at ~2,030 ft (3,300 ft asl) is accurate and represents a relatively high level of formation permeability. Temperatures above this level (almost certainly) have been affected by drilling activity and/or other wellbore processes. Temperatures below this level are less certain. An inversion or near-convective conditions may actually exist, but it is also likely that drilling caused disturbance. The deepening of UNST-08 found permeable zones (partial lost circulation) at scattered locations, all the way down.

Figure 6.3-3 further shows two possible interpretations of large-scale, deeper temperature trends with depth.

- The first alternative (A) is shown by the possible forms of the stabilized profiles of the two Unocal wells down to ~3,300 ft asl. These are concave downwards (the temperature gradient decreases with depth) as a result of convection that lifts warm waters upwards. The continuations of these temperature profiles below about 3,300 ft

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asl are highly uncertain, but deep gradients could fall within the range of 50°~80°C/km that has been suggested as background over the ESRP (Blackwell and others (1992), see Section 6.1).

- The second alternative (B) is shown by minimum and maximum gradient bounding lines that are drawn around the envelopes of temperature - depth data from the two Unocal wells (except the higher temperatures in UNST-07 above about 4,300 ft asl, which would be due to local convection.) This alternative suggests gradients, below ~3,300 ft asl at least, that are much higher than apparent regional background.

We are inclined to favor, but cannot absolutely support, alternative (A) for temperature conditions above about 3,300 ft asl. Conditions below this level are poorly constrained. The mere existence of the Newdale anomaly suggests that deep temperatures in the area (below ~3,000 ft asl) are likely to be higher than in the surrounding region.

6.4 Geophysical Surveys

Regional gravity surveys compiled by the USGS have identified a semi-circular area centered on Rexburg, Idaho within the ESRP that has been interpreted as an extinct caldera or volcanic center (Figure 6.1-4 top). More detailed gravity data collected in the immediate vicinity of Rexburg have placed better definition on this caldera and its margins (Figure 6.1-4 bottom). Hot springs occur in the greater area, and the gravity data show these hot springs are located along the well-defined caldera margin.

The thermal anomaly at Newdale lies adjacent to (and inside) the northeastern edge of the caldera, in an area where the gravity definition of the caldera is weak, and where the gravity low associated with the caldera is crossed by a stronger, northeasterly trending gravity low (Figure 6.1-4 bottom, south of Newdale Thermal Anomaly) that is interpreted to be a structural depression within the Snake River Plain, possibly caused by the overlap of two calderas (Protska and Embree, 1978).

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In early 2009, Standard Steam Trust contracted a detailed gravity survey over the prospect area in order to get better definition on sub-surface features that may be associated with the hot water present in shallow drill holes. The results (Figure 6.4-1) show in general the NW edge of the gravity depression to the SE that is seen on Figure 6.1-4 bottom. The edge of the depression coincides approximately with the Teton (Dam) Fault (copied to Figure 6.4-1 from Figure 6.1-3).

Disrupting the NW edge of the gravity depression is a NW-trending horst-like structure of higher gravity that crosses the Teton fault in the SW sector of the project area. The gravity station density in the vicinity of and beneath parts of this structure is somewhat low, but it may be an expression of buried fault displacements on the Basin-and-Range trend described in Section 6.1. Its northwestern part in Section 25 notably follows the northwestern trend of the Teton River downstream (west) of the Teton Dam site, and the northeastern edge of shallow basalts (Figure 6.1-3). This structure also appears, to some degree, as very high TMI in the magnetic data of Figure 6.4-2 (see below), but the magnetic high also extends NE along the Teton River Fault and SST has suggested that may be an expression of the deep source or feeder of shallow basalt flow(s) that lie to the south and SW (see below).

A NE-trending spur off of the SE end of the gravity feature, in turn, cradles a small semi-circular gravity low that: (a) coincides with the bifurcation of the Teton Fault and the location of Teton Dam, (b) lies near the heart of the resource area, and (c) coincides strikingly with the temperature "hole" within the Newdale anomaly of Figure 6.3-4 The exact cause of this gravity low is uncertain, but typically such a feature is due to rocks of lower density than in the surrounding area. The cause of this lower density area could be either a local thicker accumulation of sediments or clastic fill (as in a discrete volcanic vent area), or an area of hydrothermal alteration at depth which has reduced the natural rock density. Its coincidence with the temperature depression at 4,700 ft asl may be a result of structural instability, fracturing and groundwater downflow.

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SST has also contracted an aeromagnetic survey of the prospect area (Figure 6.4-2) and an interpretation of the results. The areas of very low TMI (darkest blue) along the southern fringe and in the SW corner of the leasehold show characteristics that coincide with the presence of shallow basalts, overlying rhyolites in the NDX09-series drillholes of the area. The inferred northern boundary of the basalts is shown on Figures 6.1-2 and 6.1-3. Drilled thicknesses of basalt are: NDX09-20 (130 ft), NDX09-19 (110 ft), NDX09-18 (280 ft) and NDX09-16 (50 ft). Other NDX09-series holes didn't find basalt.

6.5 Fluids Chemistry and Chemical Geothermometry

Table 6.5.1 lists chemical and (stable) isotope analyses of well waters from throughout the Newdale area, compiled from various sources that are listed therein. These include samples obtained by SST from the temperature gradient holes drilled in 2009, and samples from two warm springs (Green Canyon and Ashton) that are outside the project area. Most of the sample locations are shown by Figure 6.5-1, although there are some samples from cool wells in township 8N to the NW of the map area. The UTM locations in Table 6.5.1 are not precise, some having been translated from latitude and longitude, others having been estimated from township-range-section locations.

Among the data set wells: (a) depths range from about 15 m (50 ft) to 300 m (1000 ft); (b) water temperatures range from 4° to 51°C (40° to 124°F); (c) salinity ranges from about 200 to 520 mg/l, and; (d) water type ranges from mixed cation – bicarbonate to sodium – bicarbonate, as described below.

6.5.1 Stable Isotopes

Isotope compositions in the dataset closely follow the meteoric water line (Figure 6.5.2), with a range of deuterium that represents the effects of precipitation at different temperatures. Higher deuterium values correspond to warmer conditions (typically, precipitation at lower elevations). Lower values correspond to cooler conditions (typically, precipitation at higher elevations). The

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data set further shows a bimodal distribution that corresponds to the two water bodies described in the next section. The warmest samples in the data set also tend to have the lowest isotope values, perhaps signifying recharge at higher elevations in mountains to the SE of the project area, followed by deep circulation with heating.

The range of δ-^{18}O among the samples of both water bodies shows a small positive shift at constant δ-D such as tends to develop as a result of water-rock isotope exchange. This exchange (and the resulting oxygen isotope shift) tends to be strongest at highest temperatures. The shifts on Figure 6.5.2 are relatively small and suggests that none of the waters has cooled from significantly higher (>>100°C) temperatures at much greater depth, although there exist thermal waters that do show a minimal isotope shift because the water-rock ratio is high or the aquifer rocks previously depleted in heavier isotopes.

Among the rhyolite group waters (but not the basalt waters) there is a weakly developed tendency for the oxygen shift to be highest at lowest Mg (see inset on Figure 6.5.2). This is consistent with the mixing model that is developed (based on Mg limits) in the next section, although for the mixing model to be most ideal there would be less variation of deuterium among the samples of the data set than is observed (*i.e. the rhyolite group isotopes would themselves define a mixing line)* .

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6.5.2 Dissolved Solids

Various representations of the water chemistry data set are given by Figures 6.5.3 – 6.5.6. Conclusions that can be drawn from these graphs and the isotope data (Section 6.5.1) include the following.

1. There are two different bodies of ground water in the area, with distinct locations, isotope compositions, chemical compositions and temperature ranges.

2. One body can be loosely defined as a Ca-HCO3 (calcium bicarbonate) water, although there are subordinate levels of Mg (magnesium) and Na+K (sodiuim + potassium) and small, variable, nearly equal amounts of Cl (chloride) and SO4 (sulfate). In this group the fraction (Na+K) among all cations is always less than 0.4. The samples of this body are herein called the "Basalt" group, because basalts tend to be somewhat enriched in Ca and Mg relative to Na and K, and it may well be that these waters in general have been influenced by residence in basalts that lie to the N and NW of the project area (the Basalt group waters inside the project area actually come from rhyolites). There are variations in the overall salinity among samples of this group, but for the most part these salinity variations occur at relatively constant ion ratios. This implies that the salinity variations result from mixing with extremely dilute meteoric waters, which have little effect on composition other than causing dilution. Waters of the Basalt Group have heavier isotope signatures (δ-D > -140 ‰; Figure 6.5-2). These waters occur in the northern half of the project area (see map inset to Figure 6.5-4) and to the NW of the project area, and probably circulate into the project area from the north, NW or NE on the ESRP. In the far south there is a subset of three Basalt group samples with lighter isotopes (one sample at δ-D -141 ‰); this almost certainly is a distinct water body from the Basalt group in the north and NW.

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3. The second water body comprises a mixing trend between somewhat more dilute mixed-cation – HCO3 water and somewhat more concentrated Na-HCO3 water. In this group the fraction (Na+K) among all cations is always greater than 0.4. The samples of this body are herein called the "Rhyolite" group, because rhyolites are more enriched in Na and K relative to Ca and Mg than are basalts, so it is probable that these waters in general are influenced by residence in rhyolites. This water body has lighter isotope signatures (corresponding to precipitation at higher elevations) and is located in the southern half of the project area and outside to the SW (see map inset to Figure 6.5-2). It probably enters the area from the south, SE or SW and/or from below. The wells producing samples of this group are drilled to about the same elevations as Basalt group wells (see inset of bottom hole elevation versus fraction (Na+K) on Figure 6.5-3) and they tend just barely to be warmer (see inset of temperature versus fraction (Na+K) on Figure 6.5-3 and of temperature versus Na on Figure 6.5-4). To some degree the Rhyolite group may be associated with the gravity low (basin?) in that lies along and to the SE of the Teton Fault.

4. The mixed-cation end member of the Rhyolite group trend could be a Basalt group water, but only from a narrow range of the Basalt group data field.

5. The Na-HCO3 end-member of the Rhyolite group is totally distinct from the Basalt group water. It has higher Cl than the mixed-cation end member and this can be ascribed to a small Na-Cl component, but there is ample evidence that both Basalt group and Rhyolite group waters also contain a Ca-Cl component. In any case, the highest Cl in the data set is only about 55 mg/l, compared to HCO3 reaching about 240 mg/l.

6. The sampled Na-HCO3 end-member of the Rhyolite group is not necessarily the true thermal mixing component, because it could be a mixture itself. Figure 6.5-5 shows a visual solution to the (hypothetical) limiting end-member of mixing, which would have little to no Mg. Thermal waters loose Mg as a result of heating (the element gets

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captured into alteration minerals). Waters at very high temperatures (say above 200°C) may have Mg below detection. The model here uses 0.5 mg/l of Mg but the results would not be significantly different were Mg set to 0.

a. This model yields the following estimate for limiting thermal end-member of the Rhyolite group (which is represented by the bold cross symbol plotted on the various x-y graphs on Figure 6.5-5): Na 120 mg/l, K 14.6 mg/l, Ca 18.5 mg/l, Mg 0.5 mg/l, SiO2 105 mg/l, Cl 35 mg/l, HCO3 260 mg/l and SO4 ~25 mg/l.

b. Assuming that Na+K expressed as Na in the cool end-member is 35 mg/l, the mixtures with maximum Na sampled are about 70% thermal plus 30% cool.

c. Further assuming that the temperature of the cool component is about 20°C (68°F), which is quite uncertain, and that the temperature of the 70% mixture is 51°C (124°F), the estimated temperature of the thermal component at time of mixing is 64°C (148°F). (Sensitivity to the temperature of the cool component is low: if 10°C (50°F) the thermal component is 69°C (156°F).)

7. Sample 23 (from NDX09-15) is anomalous, having the highest Cl in the data set (55 mg/l) and loosely falling into the Rhyolite group but not on the main trend (note diamond graph on Figure 6.5-4)[10]. This water is relatively hot (43°C/109°F), but along with the high Cl it has a relatively low level of K (Na/K is about 12.5 compared to 7.5 in other samples). This indicates that the high Cl is probably not contributed by a high-temperature thermal component, but is instead of low temperature origin.

[10] The lab was asked to confirm the analysis of sample 23 (NDX09-15) and did so without finding a need to change any of the results.

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6.5.3 Geothermometers

Chemical geothermometry is a method of using water composition to estimate the temperature at which the water last equilibrated (fully or in part) with surrounding rocks. There are various different geothermometers, based on different water-rock reactions or combinations of reactions, and some of these have more than one available calibration. The different geothermometers can respond at different rates to processes such as mixing and cooling, so the results from different forms are not necessarily same and must be interpreted in light of the reactions and processes that are or may be involved. The set of geothermometers considered herein is well-established in geothermal studies and widely in use.

In the Newdale data set, the water samples most-likely to give meaningful results are those that represent the high-Na, low-Mg, high-SiO_2 end-member composition of the Rhyolite group (see Mg versus Fraction (Na+K) graph in Figure 6.5-5): numbers 25, 41, 50-52 and 54. Mg is suppressed by heating and most-likely to be lowest in the waters that have become hottest, and SiO_2 is likely to be highest in waters that have become the hottest. These samples have a range of reported temperatures (22° to 51°C) but all come from a fairly restricted area, in the middle of the leasehold and at the north end of the field of Rhyolite group samples (see map inset on Figure 6.5-4 and temperature contours on Figure 6.3-4). It is therefore: (a) probable that the sample temperatures below 51°C represent cooling, either in shallow aquifer zone(s) and/or during production and before temperature measurement and (b) possible that the sample at 51°C has also cooled. Also considered for geothermometry is the limiting end-member of the Rhyolite group, estimated by the mixing model at item 6 of Section 6.5.2.

Geothermometers of these samples (rounded to the nearest 5°) are:

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Sample (well)	Measured °C (°F)	Na-K-Ca °C (°F)	Na-K-Ca-Mg °C (°F)	K-Mg (Fourn.) °C (°F)	Silica - Chalcedony[11] °C (°F)
25 (NDX09-Zirker)	51° (124°)	170° (340°) or 100° (210°)	70° (155°)	45° (115°)	110° (230°)
41 (NDX09-17)	25° (77°)	95° (205°) or 180° (350°)	85° (180°)	50° (120°)	105° (220°)
50 (NDX09-19)	39° (102°)	185° (360°) or 105° (215°)	110° (230°)	65° (150°)	105° (220°)
51 (Wayne Larson)	22° (72°)	185° (365°) or 105°C (220°)	110° (230°)	65° (150°)	105° (220°)
52 (Donald Trupp)	32° (90°)	185° (365°) or 100° (210°)	75° (135°)	60° (145°)	95° (200°)
54 (NDX09-20)	41° (105°)	175° (350°) or 100° (210°)	85° (185°)	55° (125°)	100° (210°)
Rhyolite group limiting end-member (at Mg 0.5 mg/l)	Est. 63° (146°)	185° (365°) (alternate is 120° (250°))	180° (355°) (alternate is 115° (240°))	115° (240°) (increases to 135° (275°) if Mg = 0.1 mg/l)	115° (240°)

Under certain circumstances the Na-K-Ca geothermometer can be ambiguous, and this data set presents an example. Two Na-K-Ca estimates are listed for each sample because the geothermometer produces two possible results and then chooses one or the other in relation to a 100°C break point. However 100°C is an artifact of the geothermometer calibration and as a break point it is not at all precise. Therefore, among the real well samples the higher estimates

[11] At the temperatures of the waters considered herein the silica - quartz geothermometer is likely to over-estimate. So it is not listed.

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(about 180°C) and lower estimates (about 100°~105°C) are equally valid. The mixing model end-member produces the only case of (more or less) clearly choosing the higher estimate and even in this case there is some uncertainty, because the standard deviation of an Na-K-Ca estimate (relative to the calibration data used) is about 15°C (*i.e.* there is about a 35% chance that the alternate 120°C should instead be 105°C or lower and effectively at the break point).

The other three geothermometers all yield estimates of about 50°C to 115°C, which is not surprising because these forms tend to adjust to prevailing aquifer conditions (50° to ~65°C and probably hotter not much deeper) more rapidly than does the Na-K-Ca version.

In conclusion, the thermal end-member of the Rhyolite group waters has partly-to-mostly equilibrated to prevailing local aquifer conditions. There is good evidence that it has cooled from temperatures at least as high as 110°~120°C, and weaker evidence (with perhaps 65% probability) that it has cooled from temperatures as high as 185°C (365°F).

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7. RESERVOIR TYPE (CONCEPTUAL MODEL)

Although the elevated regional heat flow of the Eastern Snake River Plain is believed to be a residual effect of magmatic activity beneath the area, there is nothing to suggest that the thermal anomaly at Newdale is a result of specific, local magmatic heat. Instead, the temperature of the anomaly appears to be a result of the regionally high heat flow combined with some process that has moved excess heat into the area (or upwards within the area) beneath it. This process probably involves heating of meteoric water by deep circulation, and buoyant circulation of the heated water from deeper to shallower levels, made possible locally by some yet-poorly-understood distribution of permeable structures and stratigraphic horizons in the buried rhyolites of the area.

Structures that may be significant to the anomaly include: (a) the NE-trending Teton fault, (b) the fault that lies parallel to the Teton fault and to the NW, (c) NW-trending faults on the Basin and Range trend, (d) the gravity low that is centered on the site of the Teton Dam, (e) the location of the anomaly along (just inside) the rim of an inferred, very large buried caldera and (f) possible association of the anomaly with the intersections of as many as three smaller buried calderas.. The gravity low could be an expression of a buried volcanic center or caldera intersections, and in either case it may be an expression of some thickness of sediments buried at depths of more than several thousand feet below overlying rhyolites but providing a somewhat unstable foundation that has yielded excess fracturing of the rhyolites in response to tectonic stresses, and perhaps also providing some amount of thermal insulation that allows anomalously high temperatures beneath.

Stable isotope compositions and chemical geothermometers indicate that the thermal waters sampled from depths of 500 ~ 1,000 ft (elevations of 4,400 ~4,900 ft asl) in the Newdale thermal anomaly are meteoric precipitation that has been heated by conduction to no more than 110°~120°C but perhaps ~185°C.

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The sampled waters may come from the 80°~85°C zone at about 3,300 ft asl (2,000 ft below surface) that appears in the temperature profile of hole UNST-08. This permeable zone could be a dipping fracture or fault that feeds shallower permeability but it also could be a horizontal aquifer that exists also and is somewhat hotter (about 100°C?) in UNST-07 to the SW of UNST-08 (Figure 6.3-3), and perhaps 120°C at the center of the anomaly.

Rock temperatures and thermal waters exceeding 85°~120°C must be present at greater depths, given the level of heat flow and average deep gradients of the area, but the horizontal and vertical distributions of deeper heat flow and temperature are uncertain.

It is possible that the shallow anomaly is a simple result of water being heated to ~120°C at a depth of about 1.6 km (5,000 ft) and from there rising buoyantly to higher levels. This is merely the circulation depth required to reach 120°C along a background gradient of 70°C/km from a mean annual air temperature of 10°C. In a simple convection model such as this there is a very high temperature gradient (degrees per unit depth) at shallow depth. This rolls over progressively to a very low gradient (near isothermal conditions) as the depth approaches maximum circulation. Then below maximum circulation the regional background (conductive) gradient takes over.

However, the available data do not constrain the Newdale anomaly to these conditions or such a simple model. For example, the local background gradient may be higher than 70°C/km as a result of hydrothermal circulation to depths far below 5,000 ft. If in the heart of the anomaly the temperature at about 2,000 ft depth (3,300 ft asl) is about 100°C (212°F) and if this temperature is projected downwards at 70°C/km (4°F/100 ft) then ~165°C (330°F) conditions would be found at a depth of 1.5 km (5,000 ft) and ~185°C (370°F) conditions would be found at a depth of 6,000 ft. These conditions can be considered to be a reasonable commercial drilling target, but it is realized that they are hypothesized at this time because the gradient below 2,000 ft depth is unknown: it depends upon the depth to which vertical permeability extends, and the depth at which the temperature gradient adjusts to regional background heat flow.

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SST has speculated that thermal fluids enter the permeable zones seen by drilling thus far by migrating upwards within the Teton Fault zone, then spreading from the fault to the NW (mostly) and SE (locally). This is possible but uncertain given the apparent shallow cool downflow that is centered on the area of the Teton Dam site. It is also possible that hot water is entering the vicinity by migrating from the region of the gravity low (a probable basin environment) to the SE of the Teton fault. This basin may be a zone of higher deep temperature gradients, due to a thicker accumulation of insulating rocks of lower density, and therefore somewhat shallower deep drilling targets.

SST has speculated also that thermal fluid flow at greater depth into the Teton Fault zone is fed by a deep-seated, permeable, west-dipping detachment surface along which Tertiary rocks overlie much older metamorphic rocks and within which thermal water migrates upwards from west to east. There is a hole at T7N-R43E-32BC (about 6 miles east of the SE corner of the project area) which (according to SST) intercepts such a detachment surface. The idea of this detachment surface is reasonable but it may well be off-set by buried but major NW-SE-trending displacements of the Basin and Range type such as are suggested by the gravity structure of the area (Figure 6.4-1).

The essential issues for geothermal exploration of the prospect are therefore: (a) whether the same factors that have created permeability at depths to about 3,000 ft (elevations down to about 2,000 asl; the deepest drilled) have created permeability at greater depths (this seems likely), and (b) whether both permeability and commercially attractive temperatures (such as the ~185°C conditions suggested by geothermometry) exist at commercially acceptable drilling depths.

The area is conceptually a good target for further deep exploration drilling, which needs to target both the linear zone of anomalously high temperatures between the two NE-trending faults (Figure 6.3-4) and also the zone of lowest gravity (and possibly higher deep gradients) to the SE of the Teton Fault. Areas further to the NW of the Teton Fault (and its northern branch) than about 2 miles (the NW fringe of the prospect) appear to be less prospective.

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8. EXPLORATION

Beyond the activities described above, SST has done no further exploration on the property.

SST is planning to drill to about 5,000 - 6,000 ft at a site (yet to be chosen) in the approximate center of the temperature anomaly (about the location of the Zirker well). We consider this to be a reasonable target.

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9. DRILLING AND SAMPLING

The drilling and sampling done by SST has been described in Sections 6.3 - 6.5.

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10. ADJACENT PROPERTIES

To the best of our knowledge, there are no properties adjacent to the SST leases that have been leased for geothermal exploration or that are being explored for geothermal resources.

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11. RESOURCE ESTIMATE

The presence of a geothermal resource at Newdale is indicated by available data and information, even though the depth(s), temperature(s) and permeability conditions of the resource are only modestly constrained. This is in part because most of the available data from drilling (down to a depth of about 3,400 ft) do not include stabilized, well-controlled temperature measurements. The following estimate is a first approximation of recoverable heat-in-place.

11.1 Methodology

The amount of recoverable heat-in-place that is associated with the resource is estimated using a Monte Carlo method that is described in Appendix A of this document and somewhat more fully in Appendix III of GeothermEx, Inc. (2004).

Complete input parameters for the estimate are shown along with results of the calculations on Figure 11.1.1. The following narrative describes the choices of resource area, temperature and thickness that have been used. The other input parameters are as described in GeothermEx (2004).

11.2 Parameter Estimation

Area

Assume that deep permeability exists in an area that more-or-less corresponds to the shallow temperature anomaly on Figure 6.3-4, between and along the two NE-trending faults and in the basin area to the SE. The maximum area of this anomalous temperature is about 25 square km (10 square miles). Use as minimum one-third of this (8.5 square km/3.3 square miles), which assumes that the outer edges of the anomaly are a result of shallow outflow and the cool central area at 4,700 ft asl extends to considerable depth (Figure 6.3-4).

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Thickness

GeothermEx (2004) presents data from eleven relatively well-known geothermal reservoirs in Nevada and establishes reasonable thickness values for similar reservoirs. Specifically, a minimum average reservoir thickness of 800 m (2,500 feet), a most-likely average reservoir thickness of 1,100 m (3,500 feet) and a maximum average reservoir thickness of 1,700 m (5,500 feet) are used to estimate the reserves at otherwise un-drilled and poorly understood resource areas in the State. These values are used herein, but it must be recognized that permeability sufficient for well production (not yet proven) may be restricted to a lesser thickness.

Temperature

Assume that the average lowest temperature likely to yield a commercially successful project is 150°C (300°F) and that it is likely to be too costly to drill to average temperatures in excess of 175°C (350°F). Use these two values as minimum and maximum, respectively.

11.3 Results

Figure 11.1.1 shows that 90% of the Monte-Carlo trials yield estimates of 71 MW and higher for 20 years, for a resource at depth beneath the Newdale prospect. This estimate is regarded as a minimum indicated resource value, but it should be regarded with caution with respect to planning and/or projecting an actual development. There are two general reasons for this.

- First, any heat-in-place estimate (even if elevated temperatures are probably present) must be followed by subsequent proof of commercial permeability at commercially drillable depths. This means drilling and testing of individual wells and wells jointly. There are geothermal projects in regions of crustal heat flow (no recent volcanism) and fracture permeability in mostly crystalline rocks (as at Newdale) where it has proven very difficult to extract the amount of heat-in-place at commercially viable rates, particularly when power plants have been over-designed. No heat-in-place estimate should ever be

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used to determine the final, installed size of a wellfield and power plant, for example; drilling and well testing are needed.

- Second, the estimates of area, thickness and temperature that have been used herein are uncertain and may be overly optimistic relative to acceptable drilling costs. They are used nevertheless, because better estimates are not available at this time.

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12. OTHER RELEVANT DATA AND INFORMATION

12.1 Geothermal Energy in Idaho

Geothermal power generation is established in Idaho at the Raft River Project, which is generating about 8 to 10 MW from a ~150°C (300°F) resource at depths of about 1,200 to 1,800 m (4,000 to 6,000 ft). Raft River Valley lies in a Basin and Range setting just south of the western end of the ESRP, about 240 km (150 miles) SW of Newdale.

The type of technology used to generate power depends in large part on the temperature of the resource. It is most likely that a Newdale project will use a binary-cycle system to generate electricity, as is done at Raft River. A binary system uses a closed loop to exchange heat between hot water from the geothermal resource and a circulating working fluid. The hot water is pumped from production wells, which allows higher overall flow rates than obtained under self-flowing conditions. This technology is well established, and has been in commercial operation for decades in Nevada, as well as other parts of the world.

It is also possible but much less likely that the resource temperature will be hot enough that self-flowing flashed steam wells will be developed, and the power plant designed to use steam turbine(s). This technology is also well established.

12.2 Energy Market

The Newdale project is still in the early stage of development, and does not have a power purchase agreement in place. Potential customers include Nevada Energy, utilities in California (such as Pacific Gas and Electric, and Southern California Edison), Idaho (Idaho Power Company), and Oregon (Eugene Water and Electric Board).

Power consumption has been forecast to increase annually by 1.4% in the USA (International Energy Agency, 2004). While the bulk of this power is expected to be produced from fossil-fuel fired plants, environmental concerns may affect the ability to build and operate these facilities.

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There is a strong push towards renewable energy in both California and Nevada. California has recently enacted legislation (Senate Bill 107) requiring investor-owned utilities to provide 20% of their electrical generation from renewable sources by 2010. In Nevada, similar legislation (Assembly Bill 03 passed in 2005) has mandated that 20% of power be renewable by 2015.

In recent years power purchase agreements have been signed between geothermal power producers and private utilities in both Nevada and California, examples of which are included in the table below. With the increasing demand for power and the legislative requirement for renewable energy, there should be a viable market for the electricity produced from the Newdale project.

Vendor	Purchaser	Contract
Ram Power	NV Energy	20 MW (Clayton Valley NV; Feb.2010)
U.S. Geothermal (as USG Oregon)	Idaho Power Co.	25 MW (Neal H.S. OR; Dec.2009
Ormat Technologies	NV Energy	30 MW (McGinness Hills NV; Nov.2009)
Geysers Power	PG&E	375 MW (renewal of existing, The Geysers, CA; pending)
Ormat Technologies (as ORNI 18 LLC)	SCE	50-100 MW (North Brawley CA; Mar.2008)
Caithness Dixie Valley LLC	SCE	50 MW (renewal of existing, Dixie Valley NV; Mar.2008)
Nevada Geothermal Power	NV Energy	Up to 35 MW (Blue Mtn. NV; Mar.2007)
Ormat Technologies (as ORNI 14 LLC)	NV Energy	20 MW (Steamboat NV Galena No.3; May 2006)
Ormat Technologies	NV Energy	30 MW (Carson Lake

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		- Fallon NAS NV; July 2006)
Ormat Technologies (as ORNI 15 LLC)	NV Energy	24 MW (Buffalo NV; July 2006)
Western Geothermal Power Co.	Northern California Power Agency	35 MW (The Geysers CA)
CHAR LLC	Salt River Project	50 MW (Hudson Ranch I CA)
ENEL Green Power	NV Energy	13 MW (Salt Wells NV)
ENEL Green Power	NV Energy	32 MW (Stillwater NV)
Thermo Raser	City of Anaheim	10 MW (Thermo UT)

Sources: internet, various

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13. INTERPRETATION AND CONCLUSIONS

The SST leasehold at Newdale ID includes a temperature anomaly covering almost 25 square km (10 square miles) that has been explored by drilling to a depth of about 1,000 m (3,300 ft). Within this depth range (at least, and probably deeper) there is abundant permeability in the host rhyolites (silicic volcanic rocks). Most of the downhole temperature data from the anomaly have been collected under unstable conditions and are likely to be somewhat to very inaccurate. The maximum recorded temperature is probably accurate: 83°C (181°F) at 600 m (2,000 ft) at a location near the edge of the anomaly. Considering chemical geothermometry and limited downhole temperature information, the probable maximum temperature under the center of the anomaly at this same depth is about 120°C (248°F).

The heat source for the anomaly is considered to be deep circulation of meteoric waters in an area of regionally high heat flow (the Eastern Snake River Plain). The deep circulation is in turn a result of some as yet unexplained pattern of deep permeability, which may well be quite heterogeneous in vertical and horizontal dimension, even while being relatively high overall.

Given the regionally high heat flow in the area, it is all but certain that temperatures above ~120°C are present beneath the shallow, drilled anomaly. Chemical geothermometry implies (but does not prove) that the water in the shallower anomaly may come from a deeper source at about 185°C. Temperatures approaching this may be within reach of a commercial drilling and development project, but the deep temperature profile beneath the anomaly remains to be proven, and it remains to be proven that there is adequate permeability at these greater depths to support commercial well production. (For a commercial project, permeability must exist both at individual wells and within a reservoir volume that allows pressure support without undue cooling.)

The area lies within the province of elevated crustal heat flow beneath the ESRP, the geothermal resource appears to share characteristics with some in the Basin and Range province, a number

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of which have been developed for power generation, and continued exploration of the Newdale area is justified based on the results of exploration to date.

Deeper drilling will be needed to confirm the commercial viability of the Newdale resource and to define its characteristics. A very preliminary model of the geothermal system, based on inferences that can be made at present, is contained in Section 7 of this report. This preliminary model can serve as a guide for the next stage of exploration, but will need to be updated and modified as new data become available. Similarly, a preliminary estimate of indicated generation potential is presented in Section 11; a more accurate estimate will be possible when data from deeper wells are obtained.

SST is proposing to continue exploration by drilling a hole to about 1,700 m (5,500 ft), beneath the approximate center of the anomaly. This is a reasonable first location, and the proposed depth of the hole should be sufficient to establish the deeper distributions of permeability and temperature in that area. A second hole, of similar depth, might be considered for the area SE of the Teton Dam fault, to investigate whether hot water rises into the shallower anomaly from that direction. A third hole of similar depth might be considered at location W or SW of the first, to investigate whether hot water may be entering the area along a W-dipping detachment surface as postulated by SST (see Chapter 7).

The physical and logistical conditions of the project area, including accessibility, land use and climate, do not present any known obstacles to the continued exploration and development of the Newdale resource, or to generating and transmitting electric power from the area.

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14. RECOMMENDATIONS

We recommend that exploration of the Newdale project area proceed with drilling to a depth of at least 1.5 km (5,000 ft) using a hole design and drilling rig that would permit continuing to at least about 1.8 km (6,000 ft).

A location NW of the Teton (Dam) Fault should be considered first, in the SW ¼ of Section 18 or the NW ¼ of Section 19, T7N, R41E.

At least one location SE of the Teton Fault should be considered second, probably located more or less at the center of Sections 29 – 32, T41N, R42E. The design of the first hole would be used, and the second hole would be drilled only if the first produces promising results.

A third location that may be considered would be about 1.5 km (1 mile) SW of the first, using the same hole design, and only drilled if the results of at least one of the first two holes are promising.

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(http://www.geothermex.com/CEC-PIER_Reports.htm) and at http://www.energy.ca.gov/pier/final_project_reports/500-04-051.html.

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16. QUALIFICATIONS AND SIGNATURES

16.1 History and Experience of GeothermEx, Inc.

GeothermEx is a U.S. corporation, in business since 1973, specializing exclusively in providing consulting, operational and training services in the exploration, development, assessment and valuation of geothermal energy. We are the largest and longest-established such organization in the Western Hemisphere. The staff consists of specialists in geosciences (geology, geochemistry, geophysics, hydrology), engineering (drilling, well testing, reservoir, production, power plant, chemical), computer science and economic analysis. All technical staff members have advanced degrees and lengthy geothermal experience (average 15 years), with several members having more than 25 years in the geothermal industry.

GeothermEx's clients include:

- major oil and mineral companies requiring assistance in exploration, drilling and field development;
- electrical utilities requiring independent resource evaluation;
- financial organizations requiring advice on loan, acquisition and grant programs; and
- agencies of government, land owners, legal counselors, and engineering companies requiring specialized technical assistance.

GeothermEx has been associated with more than 750 projects for some 180 clients in 44 countries. The company has been involved in the development of The Geysers geothermal field in California and in all the other producing geothermal fields in the United States, including those in the Imperial Valley, the Basin and Range, Hawaii, Alaska and the Cascade Range. GeothermEx has carried out detailed geothermal exploration, drilling, field development and/or assessment projects for government agencies or private companies in Canada, Costa Rica,

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Nicaragua, Indonesia, Papua New Guinea, Guatemala, Portugal (the Azores), Iran, Mexico, the Philippines, El Salvador, Honduras, Peru, Macedonia, Argentina, Italy, Japan and Taiwan. We have also carried out geothermal reconnaissance and evaluation projects in Viet Nam, Bolivia, China, Panama, St. Lucia, Kenya, Ethiopia, Mozambique, Yemen, Turkey, India, Thailand, Djibouti, Uganda, Hungary, Samoa, Jordan, Madagascar, and Fiji for the United Nations or World Bank. GeothermEx has conducted technology transfer or training projects in many countries, including Bolivia, Brazil, China, Costa Rica, Greece, Japan, Nicaragua, New Zealand and The Philippines.

GeothermEx's specialties include:

- Design and implementation of exploration programs.
- Design and management of drilling projects.
- Design and management of well logging operations.
- Design, execution and interpretation of well tests.
- Conceptual modeling based on integration of geologic, geochemical, geophysical, drilling and well-test data.
- Reservoir engineering and numerical simulation of reservoirs.
- Wellbore simulation and well design.
- Optimization of resource use.
- Design of power plants and gathering systems.
- Economic evaluation, risk appraisal and project financing support.
- Monitoring and maintenance of producing fields.

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- Production chemistry services.
- Project feasibility studies.

GeothermEx has conducted due diligence and verified resource adequacy for financial institutions in nearly all geothermal projects in the United States and abroad financed by bank loans or bonds. This has enabled the development of more than 6,000 MW of geothermal power, the total financed to date being more than US $6,500,000,000.

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16.2 Statements of Qualifications of Principal Investigators

(see pages following)

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STATEMENT OF QUALIFICATIONS

I, Christopher W. Klein, certify that:

1. I reside at 818 Oxford Street, Berkeley, California 94707, U.S.A.

2. I have a Ph.D. in Geology from Harvard University and a Bachelor of Arts degree in Chemistry from the University of California (Berkeley).

3. I have worked as a geologist and geochemist with GeothermEx since 1975.

   My expertise includes: exploration geochemistry; structural geology; well testing and well-site geochemical studies; computerized thermodynamic and kinetic modeling of fluids behavior; design and evaluation of scale and corrosion controls; interpretation of chemical, geological, well logging, well test and reservoir engineering data from geothermal fields around the world; conceptual modeling of geothermal resources, relationships between temperature and structure and resource capacity assessment.

   I have been responsible for on-the-ground geothermal exploration, fluids sampling and well-testing in: Mexico, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Argentina, Iran, Indonesia, The Philippines, Papua New Guinea, Portugal, Japan, Yugoslavia and western U.S.A. Major recent projects have included resource evaluations, conceptual modeling, geochemical data interpretation, database development and due-diligence review of geotechnical programs for: western Turkey (multiple areas), 2009; all known resources of Chile, 2009; a Coast Range, CA hot spring region, 2009; The Geysers steam reservoir, CA, 2009; four geothermal resource areas in Indonesia, 2008-9; all known geothermal resources of British Columbia, 2008; the Germencik project, Turkey, 2007-9; numerous prospects in Nevada, Idaho, Portugal and Serbia (Barren Hills, Alum, Hot Sulfur Springs, Blue Mountain, Magic Hills, Crane Creek, Chaves, Vrajnska Banya), 2005-9; fluids sampling at tests of geothermal wells, Raft

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River, ID, 2004; development of an integrated database of reserve estimates and development cost data for the California Energy Commission, covering over 80 geothermal resource areas in California and western Nevada, 2002 – 2004; conceptual modeling and evaluation of outflow zone effects on groundwater at the Steamboat geothermal field, 2005.

Prior to joining GeothermEx, I performed minerals exploration and structural geology studies from 1969 to 1975.

4. I am a member of the Geothermal Resources Council (Davis, California), the International Geothermal Association (Reykyavik, Iceland), and the American Chemical Society.

5. My knowledge of the Newdale geothermal project is based on (1) technical documents provided to GeothermEx by Standard Steam Trust LLC, (2) the publications listed in the References section of this report, (3) geotechnical information concerning the prospect area obtained from public domain databases available through the internet, and (4) a site visit in September, 2009.

6. I do not own, nor do I expect to own, any shares or interest in Standard Steam Trust LLC or any related company.

7. I hereby grant Standard Steam Trust LLC and related companies permission to use this report for fund-raising purposes.

8. The effective date of this report is 10 February 2010.

Dated at Richmond, California, USA, this 10th day of February, 2010

Christopher W. Klein, Ph. D. CWKlein

GeothermEx, Inc. 3260 BLUME DRIVE, SUITE 220
RICHMOND, CALIFORNIA 94806 USA

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STATEMENT OF QUALIFICATIONS

I, James W. Lovekin, certify that:

1. I reside at 2100 Jefferson Avenue, Berkeley, CA 94703-1415, U.S.A.

2. I have an Engineer's Degree in Petroleum Engineering from Stanford University and am a registered Professional Engineer in the State of California. I also have a Bachelor's degree in Geological Engineering from the University of Nevada, Reno, as well as a Bachelor's degree in American Studies from Amherst College.

3. I have worked as a geothermal engineer since 1987 and joined GeothermEx as Manager of Field Operations in 1996.

   My expertise includes: planning and execution of geothermal project development; assessment of geothermal reserves and sustainable reservoir capacity; design and supervision of well workovers; prevention of scale in geothermal wells and surface facilities; selection of optimal injection strategies for geothermal fields; forecasting reservoir performance and estimating make-up drilling requirements; and budgeting for drilling and for monitoring reservoir performance.

   I have been responsible for planning development and monitoring project performance at numerous geothermal fields in the United States, Indonesia, and Central America.

   Prior to joining GeothermEx, as Director of Geothermal Resources for CalEnergy Company, I was a key person in field development and power plant construction for nine years, during which a total generation capacity of 270 MW (9 individual power plants) was installed at the Coso geothermal field in California. I was personally involved in the testing and evaluation of approximately 50 production wells at Coso, and established a

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reservoir monitoring program at Coso incorporating flow rate measurements, pressure and temperature surveys, geochemical sampling, and tracer studies.

During my tenure with CalEnergy Company, I also managed field development and operations at the Salton Sea (then 240 MW), Roosevelt Hot Springs (then 25 MW), and Desert Peak (then 9 MW) geothermal fields, and coordinated the assessment and development planning for a number of exploratory geothermal projects, including Newberry Crater in Oregon, Glass Mountain (Telephone Flat) in northern California, San Jacinto-Tizate in Nicaragua, and the Dieng and Patuha fields in Indonesia.

4. I am a board member of the Geothermal Resources Council and a member of the International Geothermal Association, the Society of Petroleum Engineers, and the American Association of Petroleum Geologists.

5. My knowledge of the Newdale geothermal project is based on (1) technical data collected during a site visit in September 2009 by my colleague, Christopher W. Klein, (2) technical documents provided to GeothermEx by Standard Steam Trust LLC, (3) the publications listed in the References section of this report, and (4) geotechnical information concerning the prospect area obtained from public domain databases available through the internet.

6. I do not own, nor do I expect to own, any shares or interest in Standard Steam Trust LLC or any related company.

7. I hereby grant Standard Steam Trust LLC and related companies permission to use this report for fund-raising purposes.

8. The effective date of this report is 10 February 2010

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Dated at Richmond, California, USA, this 10th day of February, 2010

James W. Lovekin, P.E. (State of California, No. 1594)

PROFESSIONAL ENGINEER
JAMES W. LOVEKIN
No. P001594
EXP. 30 SEP 2011
PETROLEUM
OF CALIFORNIA

GeothermEx, Inc.
3260 BLUME DRIVE, SUITE 220
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TABLES

Table 3.1-1:
Standard Steam Trust LLC, Newdale ID Project, Properties
(Exhibit B to Newdale Voluntary Unitization 1/20/2010 v12)

BLM = Bureau of Land Management
SST = Standard Steam Trust
StID = Divison of lands Minerals and Range, Bureau of Surface and Mineral resources, State of Idaho

State Lands

Tract Num.	Co.	Twp	Rng	Sec	Description	Serial Number DR sst #	Net Geothermal Acre	Percent Unit Participation	Basic Royalty	Geothermal Ownership	Working Interest Percentage
1	Mad	T7N	R42E	28	Legal Subdivisions: W2, SE, S2NE, NWNE	H03010	600	4.55%	100.00%	StID	SST %100
2	Mad	T7N	R42E	29	Legal Subdivisions: NESE	H03011	40	0.30%	100.00%	StID	SST %100
3	Mad	T7N	R42E	33	Legal Subdivisions: NENW, S2NE	H03012	120	0.91%	100.00%	StID	SST %100
4	Fre	T7N	R42E	4	W2SW; SESW	H03008	120	1.58%	100.00%	StID	SST %100
5	Fre	T7N	R42E	5	S2 Legal Subdivisions containing 320 acres, more or less, Public School lands and subject to such rights as the state may have t olease geothermal resources in any or all of the said lands.	H01038	320	4.20%	100,00%	StID	SST %100
6	Fre	T7N	R42E	6	Lots 1,2,3,4,5,6,7 SENW, S2NE, E2SW, SE (AKA (ALL)	H01040	623.3	8.19%	100.00%	StID	SST %100
7	Fre	T7N	R42E	8	N2NW, S2SE	H01041	160	1.05%	100.00%	StID	SST %100
8	Fre	T7N	R42E	30	Lot 1 Legal Subdivisions containing 38.19 acres, more or less, Public School lands and subject to such rights as the state may have t olease geothermal resources in any or all of the said lands.	H01037	38.19	0.50%	100.00%	StID	SST %100
9	Fre	T7N	R41E	11	N2	H03004	320	4.20%	100.00%	StID	SST %100
10	Fre	T7N	R41E	12	W2	H03005	320	4.20%	100.00%	StID	SST %100
11	Fre	T7N	R41E	13	N2NE4	H03006	80	1.05%	100.00%	StID	SST %100
12	Fre	T7N	R41E	25	N2NE4; SW4NE4	H03007	120	1.58%	100.00%	StID	SST %100
4	Fre	T7N	R42E	9	N2NW4, E2, E2SW4,SW4SW4	H03008	520	6.83%	100.00%	StID	SST %100
13	Fre	T7N	R42E	17	N2NE4, Pts S2NE4, N2SE4	H03009	280.68	3.69%	100.00%	StID	SST %100
14	Fre	T7N	R41E	23	riverbed lands tbd		80	1.05%	100.00%	StID	StID
15	Mad	T7N	R42E	20	SESE		40	1.58%	100.00%	StID	StID
16	Mad	T7N	R42E	21	S2SW, SWSE, S2N2SE		160	0.13%	100.00%	StID	StID
							3942.17	**29.87%**			

Federal Lands

Tract Num.	Co.	Twp	Rng	Sec	Description	Serial Number DR sst #	Net Geothermal Acre	Percent Unit Participation	Basic Royalty	Geothermal Ownership	Working Interest Percentage
17	Fre	T7N	R42E	30	S2 lying south of the North bank of the Teton Riverbed		200	1.52%	100.00%	Bureau of Land Management 100%	BLM 100%
18	Fre	T7N	R42E	29	N2 lying south of the North bank of the Teton Riverbed		200	1.52%	100.00%	Bureau of Land Management 100%	BLM 100%
19	Fre	T7N	R42E	20	All excepting that portion of the Teton Riverbed and the SESE; and a portion of the NW		300	2.27%	100.00%	Bureau of Land Management 100%	BLM 100%
20	Fre	T7N	R42E	21	NW4 that portion lying south of the North bank of the Teton riverbed		100	0.76%	100.00%	Bureau of Land Management 100%	BLM 100%
21	Fre	T7N	R42E	17	a Tract of land to be described being Tax 3654 and the S2NE plus NE4 & N2SE less Tax 1		319.7	4.20%	100.00%	Bureau of Land Management 100%	BLM 100%
22	Fre	T7N	R42E	19	E2		320	4.20%	100.00%	Bureau of Land Management 100%	BLM 100%
23	Fre	T7N	R42E	30	Lot 3, NESW (aka N/SW lying north of Teton River)		43	0.56%	100.00%	Bureau of Land Management 100%	BLM 100%
							1482.7	**8.68%**			

PATENTED LANDS

Tract Num.	Co.	Twp	Rng	Sec	Description	Serial Number DR sst #	Net Geothermal Acre	Percent Unit Participation	Basic Royalty	Geothermal Ownership	Working Interest Percentage
24	Fre	T6N	R41E	1	T6NR41E Section1:NENE		40	0.30%	100%	Shawn and Jeffery Walters	SST %100
25	Fre	T7N	R41E	11	NWSW		40	0.30%	100%	Oyle Peterson Trust	Oyle Peterson Trust
26	Fre	T7N	R41E	11	SWSE, W2E2SE, E2E2SE		120	2.10%	100%	Robert and Janette Reynolds	Reynolds
27	Fre	T7N	R41E	12	S2NE, N2SE, S2SE, N2NE LESS; Commencing at the Northeast corner of said section 12, thence north 89 degrees 2 minutes 34 seconds West, along the North line of said Section 40,03 feet to a point on the westerly line of a County road; said point being the true point of beginning; thence continuing North 89 degrees 2 minutes 34 seconds West, along the section line 612.05 feet; thence South 253.12 feet; thence east 611.96 feet, to a point on the WESTERLY LINE OF SAID coUNTY Road; thence North 242.89 feet to the point of true beginning.		312.72	4.11%	100%	Schwendiman, Dean & Sons, Inc. 100%	SST %100
28	Fre	T7N	R41E	13	SE/4		160	2.10%	100%	Rose Irene Hansen 100%	SST %100
29	Fre	T7N	R41E	14, 23, 24, 25	Section 14: N2NE4 E of Enterprise Canal, SE4, S2NE4 Section 23: NE4 N of Teton River section 24: N2NW4, E2, E2SW4, SE4NW4 Section 25: SE4NE4		910.28	11.95%	100%	Riverside Farms 100%	SST %100
30	Fre	T7N	R42E	19	Lots 1, 2, E2NW		154.98	2.04%	100%	John and Gerry Zirker 100%	SST %100
29	Fre	T7N	R41E	13	Sec 13: W2		320	6.76%	100%	Riverside Farms 100%	SST %100
29	Fre	T7N	R42E	19, 30	Section 19: Lots 3(37.72), 4(37.88), E2SW Section 30: Lot 2(38.50), NENW excepting therefrom (see attachment)		215	6.76%	100%	Riverside Farms 100%	SST %100
31	Fre	T7N	R42E	18	Lots 1, 2, E/2NW/4, W2NE		233.95	3.07%	100%	Hughes, Randy 100%	SST %100
27	Fre	T7N	R42E	5, 7, 8	Section 5: lots 1,2,3,4,S2N2 Section 7: lots 1,2,3, E2NW, NE, NESW, NWSE, NESE less: Commencing at a point 400 feet north and 75 feet west of the SE corner of NESE of said section7, Township 7 North, Range 42 east, Boise Meridian, Freemont county ID, and running thence north 400 feet, thence west 100 feet, thence south 400 feet; thence east 100 feet to the point of the beginning Section 8; S2NW, NE4, N2S2		1189.88	15.63%	100%	Schwendiman, Dean & Sons, Inc. 100%	SST %100

Table 3.1-1:
Standard Steam Trust LLC, Newdale ID Project, Properties
(Exhibit B to Newdale Voluntary Unitization 1/20/2010 v12)

BLM = Bureau of Land Management
SST = Standard Steam Trust
SBD = Divison of lands Minerals and Range, Bureau of Surface and Mineral resources, State of Idaho

Tract Num.	Co.	Twp	Rng	Sec	Description	Serial Number OR sst #	Net Geothermal Acre	Percent Unit Participation	Basic Royalty	Geothermal Ownership	Working Interest Percentage
32	Fre	T7N	R42E	7, 8, 17, 18, 20	Section 7: Lot 4, SE/4SW/4, S/2SE/4 Section 8: S2SW Section 17: NE, N2SE, EXCEPT all that portion of the S2NE and the N2SE described in attachment Section 17: NW4, N2SW, SWSW, W2SESW, and beginning at the SW corner of the E2SESW and running thence N1320 feet, thenceE 990 feetto the NE cornerof the NWNWSWSE thence Southweseterly to the SW corner of the SESESESW, thence W 330 feet to the point of the beginning Except the W 4 rods Section 18: E2NE, lots 3, 4, E2SW, SE Section 20: beginning at the NW corner of sec 20, and running thence E 2310' to the NE corner of the NWNENENW and running thence Southwesterly to the NE corner of the SWSWNW, thence Southerly to the SE corner of the SWSWNW, thence Southwesterly to the SE corner of the NWNWNWSW, thence westerly to the SW corner of the NWNWNWSW, thence N along the W line of said section 20, 2970', more or less, to the point of beginning; EXCEPT the W 4 rods		1036	13.60%	100%	Hughes, Neal and Randy 100%	SST %100
33	Fre	T7N	R41E	23	Sec23: Pt of NE4; E2 So of river		155.9	1.18%	100%	Helm Energy	Helm Energy 100%
34	Fre	T7N	R41E	35	Section 35: E2, NW4		480	3.64%	100%	Little, Dwight	Little, Dwight 100%
35	Fre	T7N	R41E	24	W2SW		80	0.61%	100%	Dorma Nelson Living Trust	Dorma Nelson Living Trust
24	Fre	T6N	R42E	6	Section 6: NWNW		40	0.30%	100%	Shawn and Jeffery Walters	SST %100
36	Fre	T6N	R42E	33	Section 4: Lots 3&4 less a piece, Section 4: NWSW less a piece, Section 4: SWNW less a piece described in lease (Section 4 total 81.93ac.)		41.93	0.32%	100%	David & Melanie Schwendiman Val & Diane Schwendiman	SST %100
37	Fre	T7N	R41E	25	NW, S2 less 2 pieces as further described in lease		159.66	1.21%	100%	Donald & Phyllis Trupp	SST %100
38	Fre	T7N	R41E	25	NW4 less a parcel more fully described in lease		78.1	0.59%	100%	Melvin Schwendiman et ux	SST %100
39	Fre	T7N	R41E	25	Beginning @ the SE corner, thence North 660', thence West 1980', thence North 1300' to the south side of the Bureau of Reclamation road, thence west 1090' along the side of Bureau of Rec. Easement Rd, thence North aprox 1670' to a point where there exists not less than 30' of land between cultivated ground and the Teton River Canyon edge; thence West 2280'; thence south 3630', thence east 5280'to the point of the beginning. ALSO beginning at a pont that is South 19 minutes 35 seconds East 108' along the west section line from the NW cornerof section 25, and running thence north89 degrees 47 minutes 55 seconds East 317', thence south 19 minutes 35 seconds east 250'; thence 89 degrees 47minutes 55seconds west 317', thence north 19 minutes 35 seconds west to the point of beginning		210	1.59%	100%	Randall & Jana Hillman	SST %100
40	Fre	T7N	R41E	26	NE less an acre described in lease		159	1.20%	100%	Wayne Larsen	SST %100
24	Fre	T7N	R41E	31	W2SW, N2, SE, PART OF E2SW(644.68)		644.68	4.89%	100%	Shawn and Jeffery Walters	SST %100
24	Fre	T7N	R41E	34	NW4		40	0.30%	100%	Shawn and Jeffery Walters	Shawn and Jeffery Walters
40	Fre	T7N	R41E	34	N2 Lot 4; Lots 5, 6, 7 (Block 2)		0.29	0.00%	100%	TBD	City of Newdale 100%
40	Fre	T7N	R41E	34	Lots 10-11; N35' Lot 12 Block 1		0.50	0.00%	100%	TBD	Candelario & Ann I Ayon 100%
40	Fre	T7N	R41E	34	Lots 1, 2, 3, 4, 5, 6, 7, 8, 9 Block 1		1.65	0.01%	100%	TBD	Warren (Walters Inc) Walters 100%
40	Fre	T7N	R41E	34	S 15' Lot 12 LESS TAX 3163;TAX 3163; Lots 13-14 Block 1		0.43	0.00%	100%	TBD	Newdale Rental Investments LLC 100%
40	Fre	T7N	R41E	34	E 120' Lots 10-11 Block 2		0.28	0.00%	100%	TBD	Mark E. Murri 100%
40	Fre	T7N	R41E	34	Lot 1; S 37.5' Lot 2 Block 2		0.24	0.00%	100%	TBD	Jose E (Rose) Castillo
40	Fre	T7N	R41E	34	Lot 13; W 120' Lot 14 Block 2		0.39	0.00%	100%	TBD	Mike Trust Garner 100%
40	Fre	T7N	R41E	34	Lots 8-9 LESS TAX 4135 Block 2		0.44	0.00%	100%	TBD	Kenneth M. & Laida Papenfuss 100%
40	Fre	T7N	R41E	34	N 12.5' Lot 2; Lot 3; S2 Lot 4 Block 2		0.23	0.00%	100%	TBD	Joel & Reynalda Arreola 100%
40	Fre	T7N	R41E	34	ax 4135 of Lots 8-9; Lots 10, 11 Less E 120'; Lot 12 Less Tax 6436 Blk 2		0.21	0.00%	100%	TBD	David Ladell & Brenda D. Miller 100%
40	Fre	T7N	R41E	34	Tax 6436 Block 2		0.02	0.00%	100%	TBD	Don L Fresh 100%
40	Fre	T7N	R41E	34	W 50' of E 90' of Lot 14 and E 40' of Lot 14; Block 2		0.02	0.00%	100%	TBD	Mike Garner Trust 100%
40	Fre	T7N	R41E	34	Lots 11-12 Blk 3		0.49	0.00%	100%	TBD	Lon & Beverly (Lon and Beverly Ricks L.L.C) Ricks 100%
40	Fre	T7N	R41E	34	Lots 13-14 Block 3		0.54	0.00%	100%	TBD	Jesse & Linda Brown 100%

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40	Fre	T7N	R41E	34	Lots 1, 2, 3, 4 Block 3		0.47	0.00%	100%	TBD	Richard & Nedra Baldwin 100%
40	Fre	T7N	R41E	34	Lots 5-6-7 Block 3		0.49	0.00%	100%	TBD	Wallace Shane Klingler 100%
40	Fre	T7N	R41E	34	Lots 8-9-10 Block 3		0.63	0.00%	100%	TBD	Mabel Lois Trust Stalker 100%
40	Fre	T7N	R41E	34	Lot 14 Block 4		0.18	0.00%	100%	TBD	Roberto & Crisoforo Benitez 100%
40	Fre	T7N	R41E	34	Lot 5 Blk 4		0.18	0.00%	100%	TBD	General Mills Inc 100%
40	Fre	T7N	R41E	34	Lots 10-11 Blk 4		0.37	0.00%	100%	TBD	Ignacio & Ofelia Luna 100%
40	Fre	T7N	R41E	34	Lots 12-13 Blk 4		0.37	0.00%	100%	TBD	Raul H. Beltran 100%
40	Fre	T7N	R41E	34	Lots 1, 2, 3, 4 Blk 4		0.73	0.01%	100%	TBD	General Mills Inc 100%
40	Fre	T7N	R41E	34	Lots 6-7 Block 4 Blk 7		0.37	0.00%	100%	TBD	W. Jeffrey & Mona (& Shawn J. and Patrice Walters) Walters 100%
40	Fre	T7N	R41E	34	Lots 8-9 Blk 4		0.37	0.00%	100%	TBD	Val & Diane Schwendiman 100%
40	Fre	T7N	R41E	34	Lots 10-11 Blk 5		0.37	0.00%	100%	TBD	Ferron John & S. Rachelle Martineau 100%
40	Fre	T7N	R41E	34	Lots 12-13-14 Blk 5		0.55	0.00%	100%	TBD	Darwin B. & Joann Klingler 100%
40	Fre	T7N	R41E	34	Lots 1, 2, 3, 4, 5; S2 Lot 6 Blk 6		1.01	0.01%	100%	TBD	Val & Diane Schwendiman
40	Fre	T7N	R41E	34	Lots 8-9 Blk 5		0.37	0.00%	100%	TBD	Ferron John & S. Rachelle Martineau 100%
40	Fre	T7N	R41E	34	N2 Lot 6; Lot 7 Blk 5		0.28	0.00%	100%	TBD	Bott Land Inc 100%
40	Fre	T7N	R41E	34	Lots 11-12 Blk 6		0.39	0.00%	100%	TBD	Elmer Schwendim an
40	Fre	T7N	R41E	34	Lots 1-2-3 Blk 6		0.49	0.00%	100%	TBD	Robert H. & Renee K. Wood 100%
40	Fre	T7N	R41E	34	Lots 13-14 Blk 6		0.44	0.00%	100%	TBD	Kevin L. & Erlene Torgrimson 100%
40	Fre	T7N	R41E	34	Lots 4-5 Blk 6		0.40	0.00%	100%	TBD	Salvador & Raquel L. Fkores 100%
40	Fre	T7N	R41E	34	Lots 6-7 Block 6		0.42	0.00%	100%	TBD	Walters Family LP 100%
40	Fre	T7N	R41E	34	Lots 8-9-10 Block 6		0.49	0.00%	100%	TBD	Shaun J & Patricia Walters 100%
40	Fre	T7N	R41E	34	Lots 10, 11, 12, 13, 14 Blk 7		0.60	0.00%	100%	TBD	Lon N. & Beverly J. Ricks 100%
40	Fre	T7N	R41E	34	Lots 1-2 Blk 7		0.44	0.00%	100%	TBD	Amy Flores 100%
40	Fre	T7N	R41E	34	Lots 3-4 Blk 7		0.51	0.00%	100%	TBD	Brindley & Misty Hanson 100%
40	Fre	T7N	R41E	34	Lots 5, 6, 7 LESS TAX 1389 Blk 7		0.55	0.00%	100%	TBD	Val Ricks 100%
40	Fre	T7N	R41E	34	Lots 8-9 Blk 7		0.44	0.00%	100%	TBD	Malinda & Lon (not h/w) Ricks 100%
40	Fre	T7N	R41E	34	Tax 1389 of Lots 5 and 6 Block 7		0.41	0.00%	100%	TBD	Newdale Rental Investments LLC 100%
40	Fre	T7N	R41E	34	Lot 14 Blk 8		0.18	0.00%	100%	TBD	Reva Yuvonne Le (Remaindermen: Sue Ricks, Michael D. Garner) Garner 100%
40	Fre	T7N	R41E	34	Lots 10-11 Blk 8		0.37	0.00%	100%	TBD	The Earl V. Jensen Family Trust 100%
40	Fre	T7N	R41E	34	Lots 12-13 Blk 8		0.37	0.00%	100%	TBD	Jerry K. Garner 100%
40	Fre	T7N	R41E	34	Lots 1-2-3-4-5 Blk 8		0.92	0.01%	100%	TBD	General Mills Inc 100%
40	Fre	T7N	R41E	34	Lots 8-9 Block 8		0.37	0.00%	100%	TBD	Dennis C. & Dorothy Huffman 100%
40	Fre	T7N	R41E	34	Lots 10-11-12 Block 9		0.55	0.00%	100%	TBD	Layne & Beverly Harris 100%
40	Fre	T7N	R41E	34	Lots 1-2 Blk 9		0.37	0.00%	100%	TBD	WM K et ux Furness 100%

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Tract Num.	Co.	Twp	Rng	Sec	Description	Serial Number OR sst #	Net Geothermal Acre	Percent Unit Participation	Basic Royalty	Geothermal Ownership	Working Interest Percentage
40	Fre	T7N	R41E	34	Lots 13-14 Blk 9		0.37	0.00%	100%	TBD	Glen R. & Louise Godfrey 100%
40	Fre	T7N	R41E	34	Lots 3, 4, 5, 6, 7 Block 9		0.92	0.01%	100%	TBD	Warren (Walters Inc) Walters 100%
40	Fre	T7N	R41E	34	Lots 8-9 Blk 9		0.37	0.00%	100%	TBD	Jeffrey C & Teresa Lynn Huntsman 100%
40	Fre	T7N	R41E	34	Lots 10-11 Blk 10		0.14	0.00%	100%	TBD	L M S K Partnership 100%
40	Fre	T7N	R41E	34	Lots 12-13-14 Blk 10		0.35	0.00%	100%	TBD	Karen Staker 100%
40	Fre	T7N	R41E	34	Lots 1-2-3 Blk 10		0.78	0.01%	100%	TBD	Miles T & Marva R Allen 100%
40	Fre	T7N	R41E	34	Lots 4-5 Blk 10		0.59	0.00%	100%	TBD	Miles T & Marva R Allen
40	Fre	T7N	R41E	34	Lots 6-7 Blk 10		0.69	0.01%	100%	TBD	Cole D Klingler
40	Fre	T7N	R41E	34	Lots 8-9 Blk 10		0.06	0.00%	100%	TBD	Norman Ross
40	Fre	T7N	R41E	34	Lot 4-5; S 15' Lot 6 Blk 11		0.56	0.00%	100%	TBD	Shayne L & Holly A Harris
40	Fre	T7N	R41E	34	Lots 12-13 Blk 11		0.25	0.00%	100%	TBD	Jeremiah H & Christina L Johnson
40	Fre	T7N	R41E	34	Lots 1-2-3 Blk 11		0.81	0.01%	100%	TBD	Natalie K & Robert B Godby
40	Fre	T7N	R41E	34	Lots 14-16 Blk 11		0.30	0.00%	100%	TBD	Shayne S & Susan E Hansen
40	Fre	T7N	R41E	34	Lots 9-10-11 Blk 12		0.59	0.00%	100%	TBD	Danny L Harris
40	Fre	T7N	R41E	34	N 35' Lot 6; Lots 7-8 Blk 11		0.46	0.00%	100%	TBD	Robert Layne & Beverly K Harris
40	Fre	T7N	R41E	34	Lot 13 Blk 12		0.18	0.00%	100%	TBD	Kenneth & Glenda Lent
40	Fre	T7N	R41E	34	Lot 14 Blk 12		0.18	0.00%	100%	TBD	Kenneth & Glenda Beth Lent
40	Fre	T7N	R41E	34	Lot 15-16 Blk 12		0.37	0.00%	100%	TBD	Kenneth & Glenda Beth Lent
40	Fre	T7N	R41E	34	Lots 11-12 Blk 12		0.37	0.00%	100%	TBD	Clyde & Carma Jean Haws
40	Fre	T7N	R41E	34	Lots 1, 2, 3, 4, 5, 6, 7, 8 Block 12		1.47	0.01%	100%	TBD	Warren (Walters Inc) Walters
40	Fre	T7N	R41E	34	Lots 9-10 Blk 12		0.37	0.00%	100%	TBD	Lisa J Trust (Bart H and Lisa J Nelson Family Trust) Nelson
40	Fre	T7N	R41E	34	Lots 1-2 Blk 15		0.37	0.00%	100%	TBD	Gregory Brett & Ronda Carol Leavitt
40	Fre	T7N	R41E	34	Lots 3-4-5 Blk 15		0.55	0.00%	100%	TBD	Kip & Jennifer Klingler
40	Fre	T7N	R41E	34	Lots 6-7 plus 40' VAC St Blk 15		0.51	0.00%	100%	TBD	Dorothy D Trust & Dale Siddoway
40	Fre	T7N	R41E	34	Lots 8-9-10-11-12; N2 Lot 13 Blk 15		1.01	0.01%	100%	TBD	Jerry D & Susan Lott
40	Fre	T7N	R41E	34	S2 Lot 13; Lot 14 Blk 15		0.28	0.00%	100%	TBD	Jerry D & Susan Lott
40	Fre	T7N	R41E	34	Lots 11-12 Blk 16		0.37	0.00%	100%	TBD	Clinton Jacob & Jessica Bowman
40	Fre	T7N	R41E	34	Lots 1-2 Blk 16		0.37	0.00%	100%	TBD	Chad & Jolynn Stevens
40	Fre	T7N	R41E	34	Lots 13-14 Blk 16		0.37	0.00%	100%	TBD	Barrett G & Shannon Godfrey
40	Fre	T7N	R41E	34	Lots 3-4 Blk 16		0.37	0.00%	100%	TBD	Douglas Gibson
40	Fre	T7N	R41E	34	Lots 5-6-7 Blk 16		0.55	0.00%	100%	TBD	Stephen & Deann Reish
40	Fre	T7N	R41E	34	Tax 5235 of Lot 9 Blk 16		0.20	0.00%	100%	TBD	Robert L & Sandy J Edwards
40	Fre	T7N	R41E	34	Tax 5236 Blk 16		0.11	0.00%	100%	TBD	Roger Lee & Sandra June Edwards
40	Fre	T7N	R41E	34	Tax 5237 Blk 16		0.24	0.00%	100%	TBD	Robert Lee & Sandy Edwards
40	Fre	T7N	R41E	34	Lots 10-11 Blk 17		0.37	0.00%	100%	TBD	Dennis Adrian & Glenna Stocks
40	Fre	T7N	R41E	34	Lots 1-2 Blk 17		0.37	0.00%	100%	TBD	Ryan & Kalie Lerwill
40	Fre	T7N	R41E	34	Lots 12, 13, 14 Blk 17		0.55	0.00%	100%	TBD	Wallace & Belva, Trustees of the Wallace and Belva Robinson Living Trust Robinson
40	Fre	T7N	R41E	34	Lots 3-4 Blk 17		0.37	0.00%	100%	TBD	Robert & Diane Inama
40	Fre	T7N	R41E	34	Lots 5, 6, 7 Blk 17		0.55	0.00%	100%	TBD	Steve & Darlene Hilton

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Tract Num.	Co.	Twp	Rng	Sec	Description	Serial Number OR sst #	Net Geothermal Acre	Percent Unit Participation	Basic Royalty	Geothermal Ownership	Working Interest Percentage
40	Fre	T7N	R41E	34	Lots 8-9 Blk 17		0.37	0.00%	100%	TBD	Eric & Nikki Andreasen
40	Fre	T7N	R41E	34	Lots 11-12 Blk 18		0.37	0.00%	100%	TBD	Vernyle & Alison Staker
40	Fre	T7N	R41E	34	Lots 1-2 Blk 18		0.37	0.00%	100%	TBD	Michael J & Cindy L Powell
40	Fre	T7N	R41E	34	Lots 13-14 Blk 18		0.37	0.00%	100%	TBD	Mark & Falina R Niederer
40	Fre	T7N	R41E	34	Lots 3-4-5 Blk 18		0.55	0.00%	100%	TBD	David & Patti Lott
40	Fre	T7N	R41E	34	Lots 6-7 Blk 18		0.37	0.00%	100%	TBD	Glenn Ronning
40	Fre	T7N	R41E	34	Lots 8-9-10 Blk 18		0.55	0.00%	100%	TBD	Vernyle & Alison Staker
40	Fre	T7N	R41E	34	Lots 11-12 Blk 19		0.37	0.00%	100%	TBD	Jeremy D & Misty Ann Abel
40	Fre	T7N	R41E	34	Lots 1-2 Blk 19		0.37	0.00%	100%	TBD	Daryl R & Donnel Kathryn Thomson
40	Fre	T7N	R41E	34	Lots 13-14 Blk 19		0.37	0.00%	100%	TBD	George E & Patricia A Burt
40	Fre	T7N	R41E	34	Lots 3-4 Blk 19		0.37	0.00%	100%	TBD	Eliseo & Imelda Olivas
40	Fre	T7N	R41E	34	Lots 5-6-7 Blk 19		0.55	0.00%	100%	TBD	Floyd & Leslie Simper
40	Fre	T7N	R41E	34	Lots 8-9-10 Blk 19		0.55	0.00%	100%	TBD	Marcie Jayne McMinn
40	Fre	T7N	R41E	34	Lot 6 LESS S 14'; Lot 7 Blk 20		0.32	0.00%	100%	TBD	Esther Mae Hoyt
40	Fre	T7N	R41E	34	1-2-3-4-5; S 14' Lot 6; ALLEY & W 50' Lots 8, 9, 10, 11, 12, 13, 14 Blk 20		1.53	0.01%	100%	TBD	Corp of Presiding Bishop
40	Fre	T7N	R41E	34	Lots 10-11 Blk 21		0.37	0.00%	100%	TBD	Ty (Kathleen Papenfuss, h/w) Whitman
40	Fre	T7N	R41E	34	Lots 1-2 Blk 21		0.37	0.00%	100%	TBD	Charles A & Carolyn Moulton
40	Fre	T7N	R41E	34	Lots 12-13-14 Blk 21		0.55	0.00%	100%	TBD	Ty B Whitman
40	Fre	T7N	R41E	34	Lots 3-4-5 Blk 21		0.55	0.00%	100%	TBD	Dee David & Peggy M Klingler
40	Fre	T7N	R41E	34	Lots 6-7 Blk 21		0.36	0.00%	100%	TBD	J Leigh & Erna Chantrill
40	Fre	T7N	R41E	34	Lots 8-9 Blk 21		0.36	0.00%	100%	TBD	Bruce F & Christine Harper
40	Fre	T7N	R41E	34	Lot 5 Blk 22		0.18	0.00%	100%	TBD	Raymond H III Voss
40	Fre	T7N	R41E	34	Lots 11, 12, 13, 14 Blk 22		0.73	0.01%	100%	TBD	Scott L & Suzanne M Brewer
40	Fre	T7N	R41E	34	Lots 1-2 Blk 22		0.37	0.00%	100%	TBD	Darris Leavitt
40	Fre	T7N	R41E	34	Lots 3-4 Blk 22		0.37	0.00%	100%	TBD	Richard & Patricia D Bargman
40	Fre	T7N	R41E	34	Lots 6-7 Blk 22		0.37	0.00%	100%	TBD	Robert (& Chastine Watson) Taylor
40	Fre	T7N	R41E	34	Lots 8-9-10 Blk 22		0.55	0.00%	100%	TBD	Donald & Delilah Staker
40	Fre	T7N	R41E	34	Lots 11-12 Blk 23		0.37	0.00%	100%	TBD	Douglas W Smith
40	Fre	T7N	R41E	34	Lots 1-2; S2 Lot 3 Blk 23		0.48	0.00%	100%	TBD	Phil (& Randall Neibaur) Neibaur
40	Fre	T7N	R41E	34	Lots 13-14 Blk 23		0.39	0.00%	100%	TBD	Donald D & Delilah Staker
40	Fre	T7N	R41E	34	Lots 6-7 Blk 23		0.37	0.00%	100%	TBD	Richard W & Marsha J Ellis
40	Fre	T7N	R41E	34	Lots 8, 9, 10 Blk 23		0.55	0.00%	100%	TBD	Roger & Kelly Batton
40	Fre	T7N	R41E	34	N2 Lot 3; Lots 4-5 Blk 23		0.46	0.00%	100%	TBD	Rulon Wayne & Gay a/k/a Gaynel Neibaur Ball
40	Fre	T7N	R41E	34	Lot 1 Blk 24		0.20	0.00%	100%	TBD	Rexford & Thelma Howard
40	Fre	T7N	R41E	34	Lot 2-3 Blk 24		0.37	0.00%	100%	TBD	Rexford S Howard
40	Fre	T7N	R41E	34	Lot 8 Blk 24		0.18	0.00%	100%	TBD	Stan Schwendiman
40	Fre	T7N	R41E	34	Lots 11-12 Blk 24		0.37	0.00%	100%	TBD	Ty (Kathleen Papenfuss, h/w) Whitman 100%
40	Fre	T7N	R41E	34	Lots 13-14 Blk 24		0.39	0.00%	100%	TBD	Rose Mary Prato 100%
40	Fre	T7N	R41E	34	Lots 4-5 Blk 24		0.37	0.00%	100%	TBD	Boyd E Howard 100%
40	Fre	T7N	R41E	34	Lots 6-7 Blk 24		0.37	0.00%	100%	TBD	Wayne Larsen 100%
40	Fre	T7N	R41E	34	Lots 9-10 Blk 24		0.37	0.00%	100%	TBD	V Scott & Twila Kent 100%

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Tract Num.	Co.	Twp	Rng	Sec	Description	Serial Number OR sst #	Net Geothermal Acre	Percent Unit Participation	Basic Royalty	Geothermal Ownership	Working Interest Percentage
40	Fre	T7N	R41E	34	EASTSIDE ADD Lots 11, 12, 13, 14 Blk 37		0.77	0.01%	100%	TBD	Dal & Ann (& Shannon and Brett Wardle & Collette and Jim Lasson) Schwendiman 100%
40	Fre	T7N	R41E	34	EASTSIDE Add Lots 1, 2, 3, 4 Blk 37		0.77	0.01%	100%	TBD	Delene & Loren (& Heyli Schwendiman, Ken Schwendiman) Hurd 100%
40	Fre	T7N	R41E	34	EASTSIDE Add Lots 5, 6, 7 Blk 37		0.55	0.00%	100%	TBD	Daris N & Sara A Howard 100%
40	Fre	T7N	R41E	34	EASTSIDE ADD Lots 8-9-10 Blk 37		0.55	0.00%	100%	TBD	Clarence Ronald & Carol M Hymas 100%
40	Fre	T7N	R41E	34	EASTSIDE ADD Lots 1-2-3; Less Tax 2495 & HWY ROW Blk 38		0.54	0.00%	100%	TBD	Nancy R & Kenny K Stout 100%
40	Fre	T7N	R41E	34	EASTSIDE ADD Tax 1561 less Lots 1-2-3 Blk 38		0.66	0.01%	100%	TBD	Dal & Ann Schwendiman 100%
40	Fre	T7N	R41E	34	EASTSIDE ADD Tax 2413 Blk 38		0.55	0.00%	100%	TBD	Dal & Ann Schwendiman 100%
40	Fre	T7N	R41E	34	EASTSIDE ADD part of Tax 4874 in BLK 39		1.35	0.01%	100%	TBD	Melvin R & Faye Schwendiman 100%
40	Fre	T7N	R41E	34	EASTSIDE ADD Lot 5 Blk 41		0.18	0.00%	100%	TBD	Jerry & Angela Palmer 100%
40	Fre	T7N	R41E	34	EASTSIDE ADD Lots 1-2 Blk 41		0.37	0.00%	100%	TBD	Glenn Reese & Louise Godfrey 100%
40	Fre	T7N	R41E	34	EASTSIDE ADD Lots 3-4 Blk 41		0.37	0.00%	100%	TBD	Ivan & Ruth Harper 100%
40	Fre	T7N	R41E	34	EASTSIDE ADD Lots 6-7 Blk 41		0.37	0.00%	100%	TBD	Grant & Betty Klingler 100%
40	Fre	T7N	R41E	34	EASTSIDE ADD Lots 12-13-14 Blk 41		0.55	0.00%	100%	TBD	Donald & Delilah Staker 100%
40	Fre	T7N	R41E	34	EASTSIDE ADD Lots 8, 9, 10, 11 Blk 41		0.73	0.01%	100%	TBD	Melvin & Faye Schwendiman 100%
40	Fre	T7N	R41E	34	EASTSIDE ADD Lots 1-2 Blk 44		0.37	0.00%	100%	TBD	Grant & Betty Klingler 100%
40	Fre	T7N	R41E	34	EASTSIDE ADD Lots 13-14 Blk 44		0.37	0.00%	100%	TBD	Grant & Betty Klingler 100%
40	Fre	T7N	R41E	34	EASTSIDE ADD Lots 5-6-7 Blk 44		0.55	0.00%	100%	TBD	Jason F & Jerri L Grover 100%
40	Fre	T7N	R41E	34	EASTSIDE ADD Lots 3-4 Blk 44		0.37	0.00%	100%	TBD	Melvin & Faye Schwendiman 100%
40	Fre	T7N	R41E	34	EASTSIDE ADD Lots 8, 9, 10, 11, 12 Blk 44		0.92	0.01%	100%	TBD	Donald & Delilah Staker 100%
40	Fre	T7N	R41E	34	Lots 6, 7 Block 8		0.37	0.00%	100%	TBD	City of Newdale 100%

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Tract Num.	Co.	Twp	Rng	Sec	Description	Serial Number OR sst #	Net Geothermal Acre	Percent Unit Participation	Basic Royalty	Geothermal Ownership	Working Interest Percentage
40	Fre	T7N	R41E	34	E 110' Lots 8, 9, 10, 11, 12, 13, 14(Block 20)		0.9	0.01%	100%	TBD	City of Newdale 100%
40	Fre	T7N	R41E	34	Eastside Add (All Lots 1 thru 14) (Block 40)		2.58	0.02%	100%	TBD	City of Newdale 100%
41	Fre	T7N	R41E	34	W2SW		80	0.61%	100%	TBD	Ron Clark Trust 100%
42	Fre	T7N	R41E	34	NE		160	1.21%	100%	TBD	Harris Trust 100%
43	Fre	T7N	R41E	34	NW		160	1.21%	100%	TBD	Mortensen LP 100%
44	Fre	T7N	R41E	35	S2SW		80	0.61%	100%	Schwendiman, Mel	Schwendiman, Mel 100%
45	Fre	T7N	R41E	26, 35	Section 26: SE; Section 35: N2SW		240	1.82%	100%	Donald Staker	SST %100
36	Fre	T7N	R42E	33	SENW, NESW, S2SW		160	1.21%	100%	David & Melanie Schwendiman Val & Diane Schwendiman	SST %100
46	Mad	T6N	R41E	1	LOT 2 GOVERNMENT LOT 2 LESS AND EXCEPTING THEREFROM:Beginning at a point 100 feet East of the North Quarter corner and running thence South 250 feet; Thence East 208 feet; Thence North 250 feet; thence West 208 feet to the point of beginning. ALSOLESS AND EXCEPTING THEREFROM: Commencing at the North Quarter corner of Section 1. Township 6 North, Range 41 East, Boise Meridian, Madison County, Idaho which is the true point of beginning, and running thence South 1,320 feet; thence East 518 feet; thence at an angle 1.080 feet to a point that is 250 feet South and 308 feet East of the North Quarter Corner of Section: thence West 208 feet; thence North 250 feet; thence West 100 feet to the point of beginning. ALSO LESS AND EXCEPTING THERFROM: Commencing at the Northeast corner of Section 1, Township 6 North, Range 41 East, Boise Meridian, Madison County, Idaho and running thence South 3,533 feet to the point of beginning; thence 360 feet; thence South 1,150 feet; thence East 360 feet; thence North 1,150 feet to the point of begining.		39.367	0.30%	100%	NorVue Farms, an Idaho general partnership consisting of George M. Crapo, et al	SST %100
46	Mad	T6N	R42E	5, 6	LOT 3 LESS A PIECE Sec 6: LOT1,2,3, 5 LESS A PIECE, S2NE, SENW LESS A PIECE PLUS PARCELS 1, 2, 3 KNOWN AS "KLINGLER BROS." EASEMENT LANDS		306.07	2.32%	100%	NorVue Farms, an Idaho general partnership consisting of George M. Crapo, et al	SST %100
47	Mad	T6N	R41E	2	See tax 1 and tax 5		3.12	0.02%	100%	TBD	Francisco Yanez 100%
48	Mad	T6N	R41E	2	W128 Rods, tax 2, less tax 1 & 5		1.8	0.01%	100%	TBD	Joseph Ostergar 100%
49	Mad	T6N	R41E	2	N2N2 less and excepting Sec 2 West 128 Rods, Tax 2, less Tax 1 and 5		155.08	1.18%	100%	Val and Dianne Schwendiman	SST %100
50	Mad	T6N	R41E	3	N2		320	2.42%	100%	Warren Walters	Walters Inc 100%
51	Mad	T6N	R42E	4	Sec 4: SENW plus???		393.16	2.98%	100%	Douglas Investments LLC	Douglas Investments LLC 100%
52	Mad	T6N	R42E	5	SECTION 5: W2NW		80	0.61%	100%	Stanley C and Jody Lynn Schwendiman	SST %100
53	Mad	T6N	R42E	5	Sec5 S2NE, SENW		120	0.91%	100%	Schwendiman, L	Schwendiman, L 100%
54	Mad	T6N	R42E	5	Sec5 NENW		40	0.30%	100%	Layne Harris	Harris 100%
55	Mad	T6N	R42E	4, 5	T6N R42E Section 4: SWNW less tax # 1, NWSW les tax #3, part of SWNW Sec5: N2NE		168.25	1.27%	100%	Ricks, Brent and Sue, h/w	SST %100
56	Mad	T7N	R42E	29	SEC 29:SW; W2SE;AND A PARCEL OF LAND BEGINNING AT A POINT 53.3333 RODS WEST OF THE SE CORNER OF SEC 29 AND RUNNING THENCE WEST 26 2/3 RODS, THENCE NORTH 80 RODSS, THENCE 26 2/3 RODS, THENCE S 80 RODS TO THE PLACE OF BEGINNING EXCEPTING THEREFROM: the		238.32	1.81%	100%	3-B LLC, an Idaho LLC	SST %100
55	Mad	T7N	R42E	30	Section 30: SE/4NE/4SE/4, EXCEPT Parcel No. FFC-1A, being those portions of the N 66' of the SENESE, desc. by m&b: Tr 1: 0.1 ac; Tr. 2: 0.6 ac) and EXCEPT Parcel No. FPC-1 (0.9 ac). (7489)		2.1	0.02%	25%	Ricks, Brent and Sue, h/w	SST %100
49	Mad	T7N	R42E	1, 36	Sec 1: E2NW, S2NE, W2NW; Sec 36: PART OF SW		395.32	3.00%	100%	Val and Dianne Schwendiman	SST %100
57	Mad	T7N	R42E	29, 32, 33	Section 29: The east 53.333 rods of the SESE Section 32: NENE, W2NE, East 66.66 rods of the NW Section 33: NWNW		253.33	1.92%	100%	4-B Limited Partnership	SST %100
34	Mad	T7N	R42E	30, 31	Section 30: W2SW, Section 31: S2N2		240	1.82%	100%	Little, Dwight	Little, Dwight 100%
46	Mad	T7N	R42E	30, 31, 32	Section 30: S2SE, SESW less a parcel described in the attached lease Section 31: E2SW,lot1, NEWN, NENE, SE4 less a parcel described in the attached lease Section 32: W2SW, NESW, NWSE less a parcel described in the attached lease Section 32: SE/4SW/4, S/2SE/4 (9001) Section 32: WEST 93 1/3 rods of NW/4 (2420)		889.87	6.74%	100%	NorVue Farms, an Idaho general partnership consisting of George M. Crapo, et al	SST %100
55	Mad	T7N	R42E	32, 33	Section 32: SE/4NE/4, NE/4SE/4 (1801) Section 33: NWSW, SWNW, S2NE		240	1.82%	100%	Ricks, Brent and Sue, h/w	SST %100

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Tract Num.	Co.	Twp	Rng	Sec	Description	Serial Number OR sst #	Net Geothermal Acre	Percent Unit Participation	Basic Royalty	Geothermal Ownership	Working Interest Percentage
					PATENTED LANDS		11659.227	68.25%	OF TOTAL LANDS		
					UNLEASED PATENTED LANDS		2404.34	14.07%	OF TOTAL LANDS		
					Patented lands Controled By Operator		9254.89	54.17%	OF TOTAL LANDS		
					STATE LANDS		3942.17	23.08%	OF TOTAL LANDS		
					UNLEASED STATE LANDS		0	0.00%	OF TOTAL LANDS		
					State Controled By Operator		3942.17	23.08%	OF TOTAL LANDS		
					FEDERAL LANDS		1482.7	8.68%	OF TOTAL LANDS		
					UNLEASED FEDERAL LANDS		1482.7	8.68%	OF TOTAL LANDS		
					Federal lands Controled By Operator		0	0.00%	OF TOTAL LANDS		
					TOTAL all lands:		17084.097	100.00%	OF TOTAL LANDS		
					Lands Controlled by Operator		13197.06	77.25%			

Table 6.5.1: Chemical and isotope analyses of water samples from Newdale ID Geothal project area and vicinity

Num	Group	SAMPLE LOCATION	Section	UTME	UTMN	Elev (ft)	TD (ft)	DATE	Time	Ref/By	T°F BHT	T°F WH flow	Flow gpm	pH	l=lab, f=field	mg/l Na	K	Ca	Mg	Li	HCO3	CO3	SO4	Cl	F	meq/l Sum+	Sum-	Bal.% diff/sum	mg/l SiO2	TDS (sum)	B	NH3	Lab	SMOW δ-D	SMOW δ-18O	Iso Lab
1	SST/USGS	Ashton Warm Spring	8N-42E-23DAC1S	463,195	4,882,034	5199	spr	1972-08-23		SST/Geoth		105.8	2.0	7.6		35	1.6	1.1	0.1		92	0	4.7	2.9	2.2	1.67	1.80	-3.84	110	248						
2	GEx		8N-41E-34DCC1	451,227	4,868,557	5020	155	1999-06-24	10:30	nwis		55.0											2.44	7.17												
3	GEx		8N-41E-34DAA1	451,946	4,869,353	5070	102	1999-06-24	11:00	nwis		54.5											1.50	3.26												
4	GEx		8N-41E-34CDC1	451,006	4,868,743	5020	60	1999-06-24	9:50	nwis		48.7											4.49	10.1												
5	GEx		8N-41E-33CDD1	449,580	4,868,816	5010		1999-06-24	10:12	nwis		53.8											4.07	8.07												
6	GEx		8N-41E-33ABB2	449,681	4,870,327	5010		2009-08-04	15:00	nwis		54.3		7.6	I	14.3	2.94	22.4	6.6		140	0	3.63	5.39	1.35	2.36	2.59	-4.89	43.2	239						
7	GEx		8N-41E-33ABB1	449,720	4,866,655	5010	225	1979-11-08	16:00	nwis		52.7				15.0	2.90	21.0	7.0		130	0	3.40	6.10	1.80	2.35	2.47	-2.45	40.0	225						
8	GEx		8N-41E-32DDC1	448,577	4,868,793	4992	240	1999-06-22	12:56	nwis		54.5											2.85	6.34												
9	GEx		8N-41E-32CDD1	447,909	4,868,798	4990	195	1999-06-24	9:46	nwis		53.6											1.73	4.01												
10	GEx		8N-41E-32CAA1	447,891	4,869,446	4995	250	1999-06-24	10:42	nwis		55.4											3.06	7.60												
11	GEx		8N-41E-32ADB2	448,475	4,869,966	5005	240	1999-06-24	11:11	nwis		53.6											4.47	7.86												
12	GEx		8N-41E-32ADB1	448,586	4,869,965	5005	75	1999-06-24	11:30	nwis		55.4											5.20	4.80												
13	GEx		8N-41E-32ACC1	448,164	4,869,783	4995	220	1999-06-22	15:45	nwis		55.2											3.76	7.53												
14	GEx		8N-41E-32ABC2	448,030	4,870,062	4996	50	1999-06-22	13:15	nwis		51.1		8.4	I	19.4	1.87	62.2	16.5		165	0	14.5	24.7	1.09	4.85	4.09	8.56	39.3	353						
15	GEx		8N-41E-32ABC1	447,941	4,870,032	5000	148	1991-07-31	15:10	nwis		55.8		7.6	I	11.0	2.90	21.0	5.90		118	0	3.80	5.80	1.20	2.09	2.24	-3.56	38.0	206						
16	GEx		8N-41E-32ABC1	447,941	4,870,032	5000	148	2009-06-19	10:35	nwis		55.8		7.4	I	12.1	3.31	25.9	6.58		116	0	4.51	4.67	1.32	2.44	2.19	5.39	43.0	216						
17	GEx		8N-41E-31CBC1	445,661	4,869,186	4978	190	1999-06-22	13:31	nwis		58.9											2.85	6.17												
18	GEx		8N-41E-28DDC2	450,038	4,870,447	5010	58.5	1999-06-23	13:12	nwis		53.2											6.79	5.42												
19	GEx		8N-41E-27CCB1	450,395	4,870,568	5010	258	1999-06-23	13:37	nwis		54.5											5.18	8.72												
20	GEx		8N-41E-27ACA1	451,605	4,871,423	5020	92	1999-06-29	12:10	nwis		55.8											13.3	9.22												
21	SST/TG	NDX09-16	7N-42E-32BCB	456,739	4,859,926	5355	1000	2009-08-02	12:42	SST	86			8.47	I	49.5	5.19	20.7	4.73	-0.10	189	-2	11.6	12.1		3.89	3.68	0.17	89.2	362	-0.300	-1.280	TCI 14153-3	-144.0	-18.80	TCI 14153-3
22	SST/IRR	NDX09-Crepo South	7N-42E-31A	456,319	4,860,257	5313	920	2009-07-29	13:26	SST		91	800	7.91	I	31.7	1.66	44.3	17.4	-0.10	196	-2	31.9	40.5		5.05	5.02	0.35	44.4	408	-0.300	-1.280	TCI 14153-1	-136.3	-17.68	TCI 14153-1
23	SST/TG	NDX09-15	7N-42E-30DDA	456,713	4,861,074	5400	740	2009-07-01	11:32	SST	109			8.22	I	56.0	4.45	36.6	8.3	0.125	166	-2	35.4	54.5		4.91	5.00	-0.83	43.9	403	-0.150	-0.255	TCI 14133-1	-135.1	-18.27	TCI 14133-1
24	SST/TG	NDX09-7	7N-42E-30BCC	455,168	4,861,536	5295	500	2009-05-18	15:35	SST	80			7.69	I	25.0	6.39	40.5	8.01	-0.10	182	-2	15.5	13.4		3.92	3.68	3.06	74.2	365	-0.150	-0.255	TCI 14047-3	-134.0	-17.86	TCI 14047-3
25	SST/IRR	NDX09-Zirker	7N-42E-19D	455,520	4,863,467	5366	675	2009-05-28	7:44	SST		124	2200	8.03	I	91.8	9.10	16.1	4.20	0.23	241	-2	22.3	25.1		5.41	5.12	2.71	102	512	0.229	-0.255	TCI 14063-2	-141.2	-18.85	TCI 14063-2
26	SST/TG	NDX09-6	7N-42E-19CCC	455,184	4,862,300	5330	500	2009-05-21	13:40	SST	81			8.06	I	20.2	4.61	45.8	15.4	-0.10	204	-2	23.3	26.8		4.53	4.58	-0.55	37.0	377	-0.150	-0.255	TCI 14047-4	-133.7	-18.03	TCI 14047-4
27	GEx	Remington Produce Well	7N-42E-19CCA1	455,414	4,862,565	5338	184	1976-07-19		Geoth		78.8		7.8		15	2.2	35	17		144		22	24	2.2	3.85	3.81	3.25	85	324						
28	SST/TG	NDX09-9	7N-42E-19BDD	455,898	4,863,067	5365	500	2009-05-24	14:56	SST	70			8.03	I	18.8	3.09	34.2	18.7	-0.10	194	-2	16.4	23.9		4.14	4.20	-0.85	29.7	339	-0.150	0.718	TCI 14063-1	-134.7	-17.86	TCI 14063-1
29	GEx		7N-42E-19BBB1	455,206	4,863,839	5260	764	1977-07-23		P&Y(92);nwis; Cros(79)		110		7.7	f																			-143.0	-18.4	
30	SST/TG	NDX09-10	7N-42E-10DBB	455,971	4,864,585	5310	920	2009-05-29	16:30	SST	82			8.05	I	27.0	3.15	37.4	20.3	-0.10	217	-2	17.5	26.1		4.78	4.66	1.26	18.5	367	-0.150	-0.255	TCI 14063-3	-136.8	-17.69	TCI 14063-3
31	SST/TG	NDX09-12	7N-42E-08CAD	457,384	4,866,855	5350	500	2009-06-18	9:15	SST	77			7.76	I	18.4	2.17	45.7	22.1	-0.10	244	-2	11.4	13.1		4.94	4.61	3.50	34.4	391	-0.150	-0.255	TCI 14116-2	-136.7	-18.22	TCI 14116-2
32	SST/USGS	Dean Swindelman Well	7N-42E-08CAA1	457,519	4,866,230	5342	802	1976-06-22		SST/Geoth/P&Y(92);nwis		89.8		7.6	f	22	4.8	38	14		205	0	8.8	14	2.0	4.13	4.04	1.03	65	372						
33	SST/USGS		7N-42E-08CAA1	457,519	4,866,230	5342	802	1976-07-19		SST/P&Y(92);nwis		84.2		7.7	f	22	5.7	40	13		186	0	10	18	2.1	4.17	3.55	8.05	61	336						
34	GEx		7N-42E-08CAA1	457,519	4,866,230	5342	802	1977-07-22		P&Y(92);nwis		92.3		7.5	f																			-140.0	-17.9	
35	GEx		7N-42E-08CAA1	457,619	4,866,230	5342	802	1991-07-31		P&Y(92);nwis		97.7		7.6	f	20	7.4	37	12		210		9.8	17	1.7	3.89	4.21	-3.93	65	378						
36	SST/TG	NDX09-11	7N-42E-07DCB	456,056	4,865,669	5300	500	2009-16-14	8:40	SST	81			7.78	I	21.7	2.36	34.0	21.1	0.103	213	-2	12.2	16.6		4.45	4.21	2.75	39.9	361	-0.150	-0.255	TCI 14116-1	-137.1	-17.77	TCI 14116-1
37	SST/IRR	NDX09-Schwendiman	7N-42E-07B	455,543	4,866,655	5228	650	2009-07-30	8:20	SST		94	1500	7.81	I	20.4	6.83	41.7	15.7	-0.10	212	-2	18.4	16.2		4.42	4.31	1.20	64.0	395	-0.300	-1.280	TCI 14153-2	-133.4	-17.37	TCI 14153-2
38	SST/TG	NDX09-14	7N-42E-06DCC	456,100	4,867,044	5270	500	2009-06-24	14:50	SST	79			7.65	I	21.8	2.54	45.5	18.9	-0.10	198	-2	22.5	24.8		4.62	4.41	4.44	34.3	368	-0.150	-0.255	TCI 14116-4	-134.2	-17.95	TCI 14116-4
39	SST/TG	NDX09-13	7N-42E-05DCD	457,880	4,867,103	5355	500	2009-06-22	10:27	SST	77			7.88	I	20.2	4.34	46.4	17.4	-0.10	220	-2	13.2	24.1		4.72	4.56	1.74	37.4	383	-0.150	-0.255	TCI 14116-3	-136.7	-18.18	TCI 14116-3
40	GEx	Claude Haw's Well	7N-41E-36DDA2	455,087	4,859,397	5262	525	1976-06-24		Geoth/P&Y(92);nwis		89.6		7.5	f	44	4.9	24	7.3		188		16	12	3.0	3.84	3.91	-0.93	68	364	0.16					
41	SST/TG	NDX09-17	7N-41E-36ADA	455,101	4,859,965	5280	500	2009-08-08	14:05	SST	77			7.44	I	74.5	9.22	17.1	3.58	0.174	180	-2	27.4	38.6		4.65	4.61	0.43	88.6	439	0.206	-1.280	TCI 14194-1	-138.9	-17.99	TCI 14194-1
42	GEx		7N-41E-35DDA2	455,087	4,859,397	5262	525	1976-07-20		P&Y(92);nwis		87.8		7.9	f	47	5.2	25	8.0		150		17	14	2.9	4.08	3.36	9.71	59	325						
43	GEx		7N-41E-35DCD1	451,314	4,859,115	5180	400	1977-09-06		P&Y(92);nwis		89.6		6.6	f	76	8.5	34	6.9		230		31	27	5.3	6.79	5.46	2.95	71	484						
44	SST/TG	NDX09-18	7N-41E-35DAA	453,534	4,859,800	5210	500	2009-08-12	18:16	SST	90			8.20	I	68.9	9.13	21.6	7.45	0.116	211	-2	30.6	33.0		4.94	5.03	-0.89	52.2	434	0.177	-1.280	TCI 14194-2	-139.4	-18.19	TCI 14194-2
45	GEx	Wallace Little Well	7N-41E-35CDD1	452,721	4,859,228	5150	350	1972-08-09		Geoth/P&Y(92);nwis		96.8		7.9	f	78	8.6	28	6.3		240		33	24	5.4	5.53	5.58	-0.49	75	493	0.15					
46	GEx		7N-41E-35CDD1	452,721	4,859,228	5150	350	1977-06-16		P&Y(92);nwis		90.5		7.5	f																			-142.0	-18.6	
47	GEx	Newdale City Well	7N-41E-34DCD1	451,429	4,859,191	5088	99(m?)			Geoth		89.6		8.0		73	8.6	31	6.4		236			29	4.7	5.47	4.93	5.15	71	455						
48	SST/USGS	Henry Harris Well	7N-41E-34ADD1	451,922	4,859,882	5087	275	1976-06-18		SST/Geoth/P&Y(92);nwis;Cros(79)		91.4		7.6	f	69	6.9	25	5.9	0.14	204	0	26	22	5.7	4.83	4.81	1.29	64	423	0.15			-144.0	-18.9	
49	SST/USGS		7N-41E-33CDD1	449,420	4,859,229	5011										78	8.6	28								6.01	0.00	100.00	75							
50	SST/TG	NDX09-19	7N-41E-26DDD	453,518	4,860,768	5160	500	2009-08-26	13:28	SST	102			7.80	I	94.8	12.2	22.2	3.08	0.188	243	-2	22.5	28.3		5.82	5.25	5.19	90.8	517	0.239	-1.280	TCI 14231-1	-138.5	-18.30	TCI 14231-1
51	GEx	Wayne Larson Well	7N-41E-26ACC1	452,829	4,861,595	5092				Geoth		71.6		8.1		93	12	19	2.7		243		23	28	7.1	6.52	5.63	-0.92	94	516						
52	SST/USGS	Donald Trupp Well	7N-41E-25CBD1	453,761	4,861,226	5115	91(m?)	1976-07-20	11:40	SST/Geoth/P&Y(92);nwis;Cros(79)		89.8		7.8	f	88	12	23	3.3		181	0	26	25	6.2	5.55	4.54	10.05	76	434			USGS			
53	GEx		7N-41E-25CBD1	453,761	4,861,226	5115		1977-07-23	16:10	P&Y(92);nwis; Cros(79)		95.0		7.6	f																		USGS	-143.0	-19.8	
54	SST/TG	NDX09-20	7N-41E-25BBC	453,566	4,861,912	5115	500	2009-08-29	14:05	SST	105			7.84	I	92.9	10.3	16.4	3.80	0.187	251	-2	19.6	25.0		5.56	5.23	3.10	87.4	508	0.232	-1.280	TCI 14231-2	-139.2	-18.10	TCI 14231-2
55	SST/TG	NDX09-5	7N-41E-24BDD	454,298	4,863,093	5200	500	2009-05-12	9:05	SST	89			7.65	I	28.0	2.11	39.0	6.13	-0.10	165	-2	14.5	21.8		3.75	3.62	1.84	47.2	325	-0.150	-0.255	TCI 14047-1	-139.5	-17.94	TCI 14047-1
56	GEx		7N-41E-24ACA1	454,691	4,863,410	5223	559	1992-07-10	9:15	nwis		84.0		7.9	I	26	1.8	42.0	15.0		180	0	20.0		2.30				37.0	322						
57	GEx		7N-41E-19CAA1	446,303	4,863,103	4944	120	1999-06-23	11:50	nwis		53.6											3.11	5.90												
58	GEx		7N-41E-18DAA1	447,163	4,864,762	4960	200	1999-06-23	12:16	nwis		56.4											5.85	7.22												
59	GEx		7N-41E-18CBC1	445,644	4,864,404	4951	110	1999-06-22	10:55	nwis		50.8												3.04												
60	GEx		7N-41E-18BBD2	445,787	4,865,463	4958	170	1999-06-24	8:40	nwis		55.4											5.33	6.89												
61	GEx		7N-41E-16ABA1	446,724	4,865,567	4963	152	1999-06-23	12:20	nwis		54.9											1.83	5.11												
62	GEx		7N-41E-16AAD1	450,333	4,865,200	5016	60	1999-06-29	13:26	nwis		48.4											2.97	6.59												
63	GEx		7N-41E-15ABC1	450,400	4,865,169	5020	78	1999-06-29	13:40	nwis		57.0											7.01	10.60												
64	SST/TG	NDX09-8	7N-41E-14ADD	453,554	4,864,672	5145	500	2009-05-15	14:50	SST	68			7.43	I	26.8	3.35	37.3	11.0	-0.10	190	-2	18.8	26.9		4.00	4.22	-2.67	34.6	347	-0.150	4.11	TCI 14047-2	-131.5	-16.94	TCI 14047-2
65	SST/TG	NDX09-1	7N-41E-13DDD	455,103	4,863,884	5265	580	2009-04-18	9:36	SST	83			7.63	I	19.9	2.61	52.0	22.1	-0.10	224	-2	19.9	33.5		5.33	5.03	2.89	36.0	248	-0.150	0.300	TCI 14025-1	-135.1	-18.14	TCI 14025-1
66	SST/TG	NDX09-2	7N-41E-13DCC	454,409	4,863,888	5240	500	2009-04-22	9:50	SST	65			7.86	I	32.2	2.21	45.5	18.8	-0.10	196	-2	28.0	40.7		5.24	4.94	2.94	37.1	400	0.187	-0.255	TCI 14025-2	-131.8	-17.08	TCI 14025-2

Table 6.5.1: Chemical and isotope analyses of water samples from Newdale ID Geothal project area and vicinity

Num	Group	SAMPLE LOCATION	Section	UTME	UTMN	Elev (ft)	TD (ft)	DATE	Time	Ref/By
67	SST/TG	**NDX09-3**	7N-41E-13DBB	454,413	4,864,642	5200	500	2009-04-24	17:42	SST
68	SST/TG	**NDX09-4**	7N-41E-13BAA	454,346	4,865,427	5185	500	2009-04-27	17:10	SST
69	GEx		7N-41E-10CCB1	450,404	4,865,786	5032	65	1999-06-29	13:10	nwis
70	GEx		7N-41E-07BCC1	446,175	4,866,590	4965	170	1998-09-23		nwis
71	GEx		7N-41E-07BCC1	446,175	4,866,590	4965	170	1999-06-17	13:00	nwis
72	GEx		7N-41E-05AAA1	448,799	4,868,667	5000	203	1999-06-15	14:14	nwis
73	GEx		7N-41E-04CCB1	448,968	4,867,494	4990	180	1999-06-23	14:00	nwis
74	GEx		6N-42E-10ADA1	461,364	4,856,735	5725	975	1991-07-24	14:22	nwis
75	GEx		6N-42E-10ADA1	461,364	4,856,735	5725	975	2004-09-13	15:40	nwis
76	GEx		6N-42E-07CDA1	455,782	4,856,160	5505		1993-08-03	13:15	nwis
77	GEx		6N-42E-06BCB1	455,104	4,858,533	5290	500	1993-08-03	15:00	nwis
78	GEx		6N-42E-06BCB1	455,104	4,858,533	5290	500	2001-08-31	8:40	nwis
79	GEx		6N-41E-15ACA1	451,368	4,855,386	5208	520	2002-07-20	12:30	nwis
80	GEx		6N-41E-15ACA1	451,369	4,855,396	5206	520	2007-06-15	9:30	nwis
81	GEx		6N-41E-11CDB1	452,399	4,856,178	5216	568	1977-06-17		P&Y(92);nwis
82	SST/USGS	**Wanda Woods Well No.2**	6N-41E-10DBB1	451,200	4,856,688	5140		1977-06-16		SST/Geoth
83	GEx		6N-41E-10DBB1	451,120	4,857,049	5123		1977-06-16		P&Y(92);nwis
84	GEx	**Wanda Woods Well No.1**	6N-41E-10DBB1	451,162	4,856,588	5140				Geoth
85	GEx	**Walz Enterprises Inc.**	6N-41E-10ACC1	451,605	4,857,193	5167				Geoth
86	GEx	**Green Canyon HS**	5N-43E-06BCA 1S	464,473	4,848,782	5933	spr	1970-02-17		MVHDS169
87	GEx	**Green Canyon (Pincock) HS**	5N-43E-06BCA 1S	464,473	4,848,782	5933	spr	1972-06-09		Geoth
88	SST/IRR	**NDX09-Green Canyon HS**	5N-43E-06BCA 1S	464,473	4,848,782	5933	spr	2009-06-03	11:08	SST

Num	T°F BHT	T°F WH flow	Flow gpm	pH	[illegible]	mg/l[a] Na	K	Ca	Mg	Li	HCO3	CO3	SO4	Cl	F	meq/l Sum+	Sum-	Bal.% dif/sum	mg/l SiO2	TDS (sum)[b]	B	NH3	Lab	SMOW δ-D	δ-18O	Iso Lab
67	88			7.68	I	33.9	2.66	50.5	30.2	-0.10	228	-2	59.1	45.8		6.53	6.26	2.13	38.5	489	-0.150	0.582	TCI 14025-3	-134.9	-17.39	TCI 14025-3
68	80			7.76	I	25.2	2.30	43.4	23.6	-0.10	213	-2	24.6	29.1		5.25	4.82	4.22	41.7	403	-0.150	-0.255	TCI 14025-4	-131.1	-17.52	TCI 14025-4
69		54.0											1.53	4.01												
70		56.3		7.3	f								5.10	6.80												
71		54.9											4.83	7.51												
72		55.9											3.82	7.79												
73		39.2											2.99	7.06												
74		56.0		7.7	I	6.80	3.00	42.0	11.0		158	0	28.0	13.0	0.50	3.46	3.57	-1.50	39.0	303						
75		54.0		7.5	I	9.23	2.94	46.6	13.5		148	0	29.1	15.9	0.61	3.91	3.51	5.39	41.3	307						
76		58.0		7.9	I	9.9	2.3	35.0	11.0		160	0	7.5	8.2	0.70	3.14	3.05	1.62	40	274						
77		73.9		8.2	I	38.0	4.50	27.0	10.0		173	0	22.0	11.0	2.70	3.85	3.75	1.38	58.0	342						
78		82.0		7.8	I	37.1	4.46	31.7	12.1		180	0	24.7	9.88	2.43	4.31	3.87	5.27	56.5	357						
79		71.4		8	I	56.7	7.62	31.6	6.71		209	0	22.6	24.7	3.80	4.95	4.78	1.77	61	422						
80		71.4		7.9	I	57.5	7.85	32.1	6.56		217	0	22.2	24.0	3.45	5.01	4.88	1.32	65.7	435						
81		70.7		7.7	1																			-143.0	-18.8	
82		80.6		7.6		70	8.5	31	7.6		217		26	25	4.5	5.43	5.04	3.76	80	465						
83		79.7		7.7	f	13	2.6	47	19	0.005	207	0	13	21	0.4	4.54	4.28	2.89	33	356	0.02			-141.0	-18.4	
84		75.2		8.0		64	8.6	33	7.2		240			24	3.5	5.24	4.79	4.46	86	443						
85		78.8		7.7		65	9.0	31	6.9		232		26	27	3.7	5.17	5.30	-1.23	65	462						
86		108.0		7.52	I	3.80	4.4	133	31.0	0.02	164		314	1	1.6	9.46	9.34	0.63	24	675	-0.100					
87		111.2		6.8	I	3.90	3.6	140	32.0		167		330	1.7		9.88	9.66	1.13	25	703						
88		118	130	7.37	I	3.68	3.88	136	30.2	-0.10	165	-2	334	0.963		9.47	9.69	-1.16	25.1	696	-0.300	-1.280	TCI 14153-4	-136.2	-18.08	TCI 14153-4

Groups:

- SST/TG Year 2009 sample from SST temperature gradient hole: drilled and collected by SST
- SST/IRR Year 2009 sample obtained by SST from irrigation well
- SST/USGS Older analysis compiled by SST from a USGS data source.
- GEx Older analysis compiled by GeothEx (various sources)

References:

- Cros(79) Crosthwaite, E.G. (1979). Chemical analyses of ground water related to Geothal investigations in the Teton River area, Eastern Idaho. United States Geological Survey Open-File Report 79-687.
- Geoth USGS Geoth database
- nwis National Water Information Service of the USGS, waterdata database (nwis)
- P&Y(92) Parliman, D.J. and H.W.Young (1992). Compilation of selected data for thermal-water wells and springs in Idaho, 1921 through 1991. U.S. Geological Survey Open-File Report 92-175.
- SST Analysis compiled by SST (reference not given), or sample collected and analysed by SST
- Separator / or ; separates common reference sources of the same data.

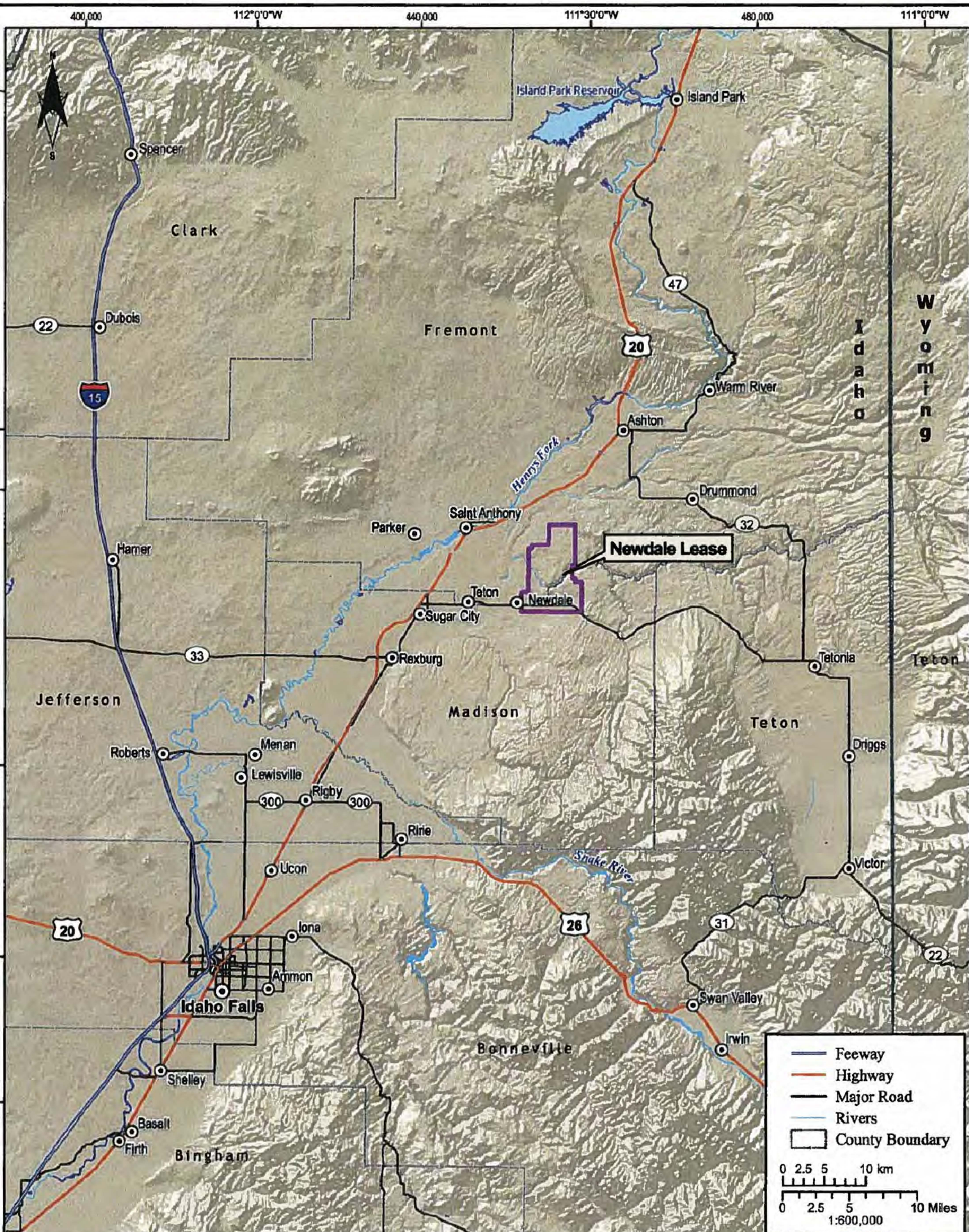
Notes:

- a Negative values are "less than" e.g. -2.00 is <2.00; 0 value is as reported, probably meaning less than detection
- b TDS sum includes Na-Mg, HCO3, SO4, Cl and SiO2

GeothermEx, Inc. 3260 BLUME DRIVE, SUITE 220
RICHMOND, CALIFORNIA 94806 USA

TELEPHONE: (510) 527-9876
FAX: (510) 527-8164
E-MAIL: mw@geothermex.com

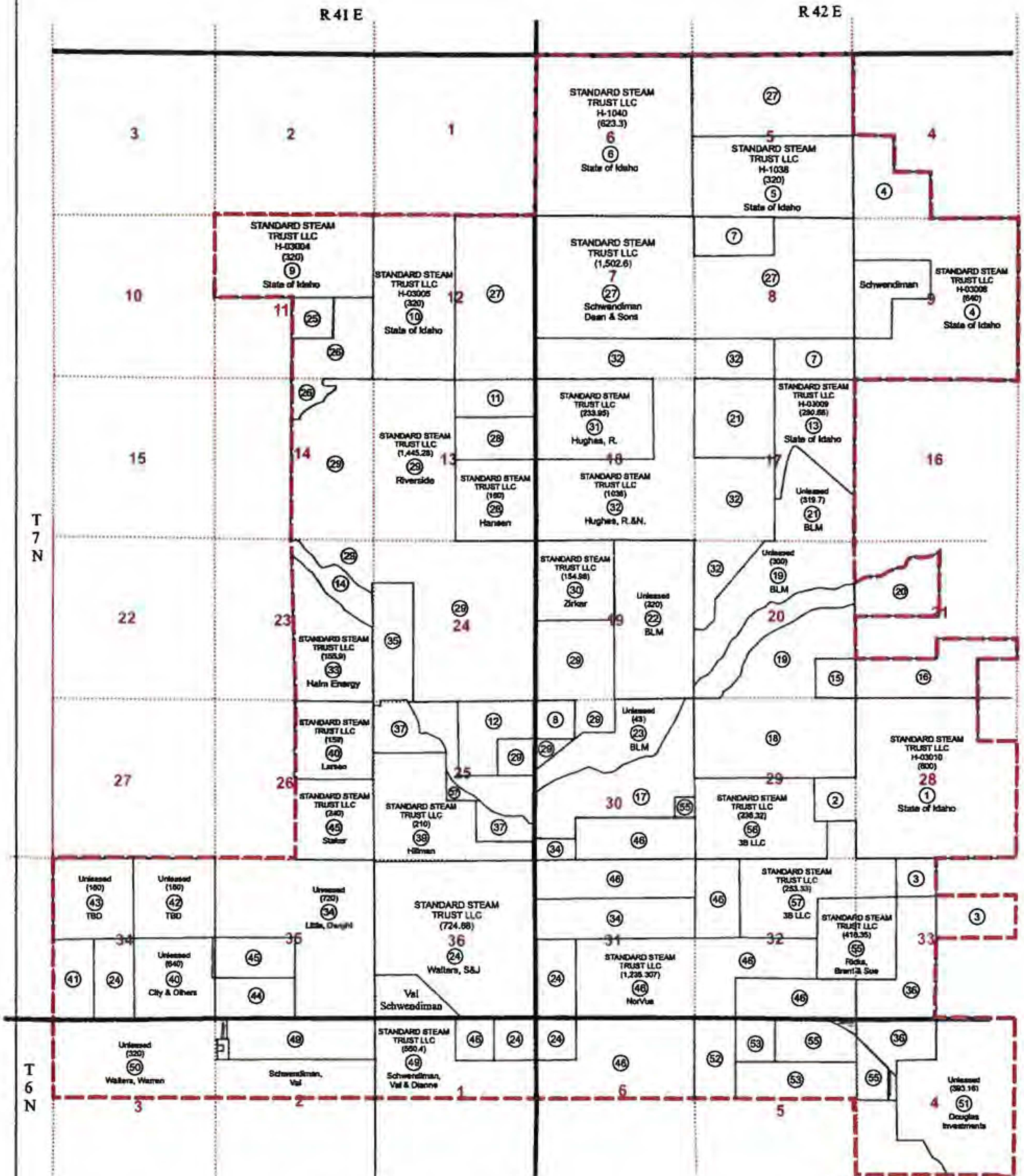
FIGURES



Projection:
NAD83 UTM 12N
Plot Date:
November 3, 2009

Figure 1.1-1: Location of Newdale geothermal energy prospect, eastern Snake River Plain, Idaho

GeothermEx, Inc.



Legend

- 10 ← Section Number
- STANDARD STEAM TRUST LLC ← Lessee
- (NVN-86898) ← Lease Number
- (800) ← Acreage
- ② ← Tract Numbers
- BLM ← Lessor

R 41 E

R 42 E

	Acreage	Percentage
Federal Lands	1,483	8.7%
State Lands	3,942	23.13%
Patented Lands	11,619	68.17%
Total	17,044	100%

Standard Steam Trust LLC
Denver, Colorado
Exhibit "A" - January 19, 2010
NEWDALE PROJECT
ELKO COUNTY, NEVADA
v.10 by: DN

STANDARD STEAM TRUST LLC H-1041 (160) ⑦ State of Idaho

STANDARD STEAM TRUST LLC H-1037 (38.19) ⑧ State of Idaho

STANDARD STEAM TRUST LLC H-03006 (80) ⑪ State of Idaho

STANDARD STEAM TRUST LLC H-03007 (120) ⑫ State of Idaho

STANDARD STEAM TRUST LLC H-03011 (40) ② State of Idaho

STANDARD STEAM TRUST LLC H-03012 (120) ③ State of Idaho

STANDARD STEAM TRUST LLC H-03008 (640) ④ State of Idaho

STANDARD STEAM TRUST LLC (201.93) 36 Schwendiman, D&M

STANDARD STEAM TRUST LLC (159.66) 37 Trupp

STANDARD STEAM TRUST LLC (78.1) 38 Schwendiman, Melvin

STANDARD STEAM TRUST LLC (80) 52 Schwendiman, S & J

Unleased (100) 20 BLM

Unleased (160) 16 State of Idaho

Unleased (40) 25 Peterson, Dyle

Unleased (80) 35 Dorma Nelson Trust

Unleased (40) 15 State of Idaho

Unleased (80) 14 TBD

Unleased (80) 41 TBD

Unleased (80) 44 Schwendiman, Mel

Unleased (120) 53 Schwendiman, L

Unleased (40) 54 Harris, L

Figure 3.1-1: Standard Steam Trust LLC, Newdale ID Lease Map

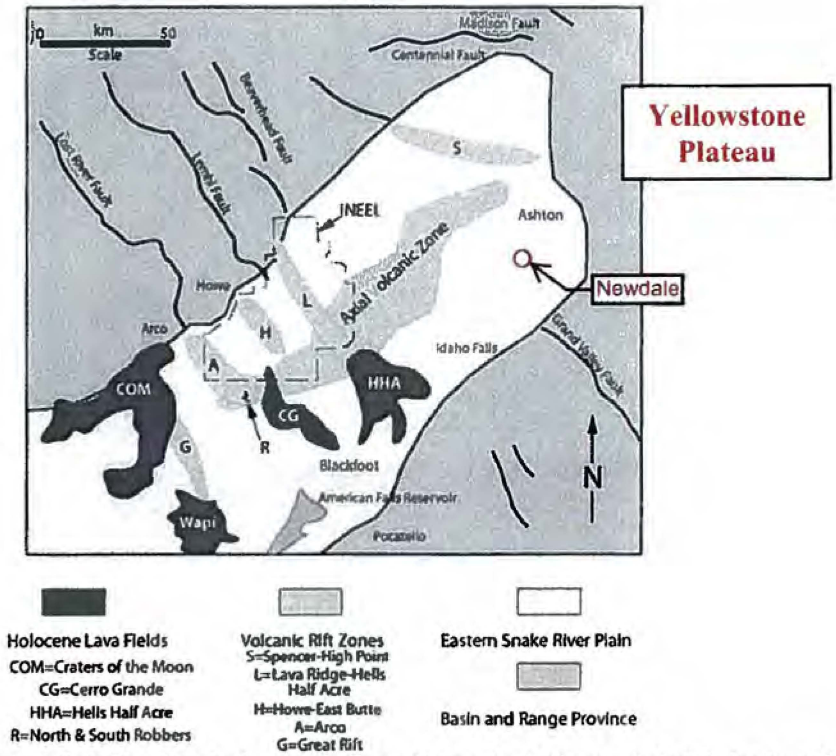


Fig. 4. Regional map of the eastern Snake River Plain showing volcanic rift zones, Holocene lava fields, and major faults in the adjacent Basin and Range province (modified from Kuntz et al., 1992).

Figure 6.1-1:
Geologic setting of the Eastern Snake River Plain and location of the Newdale prospect (modified from Smith, 2004)

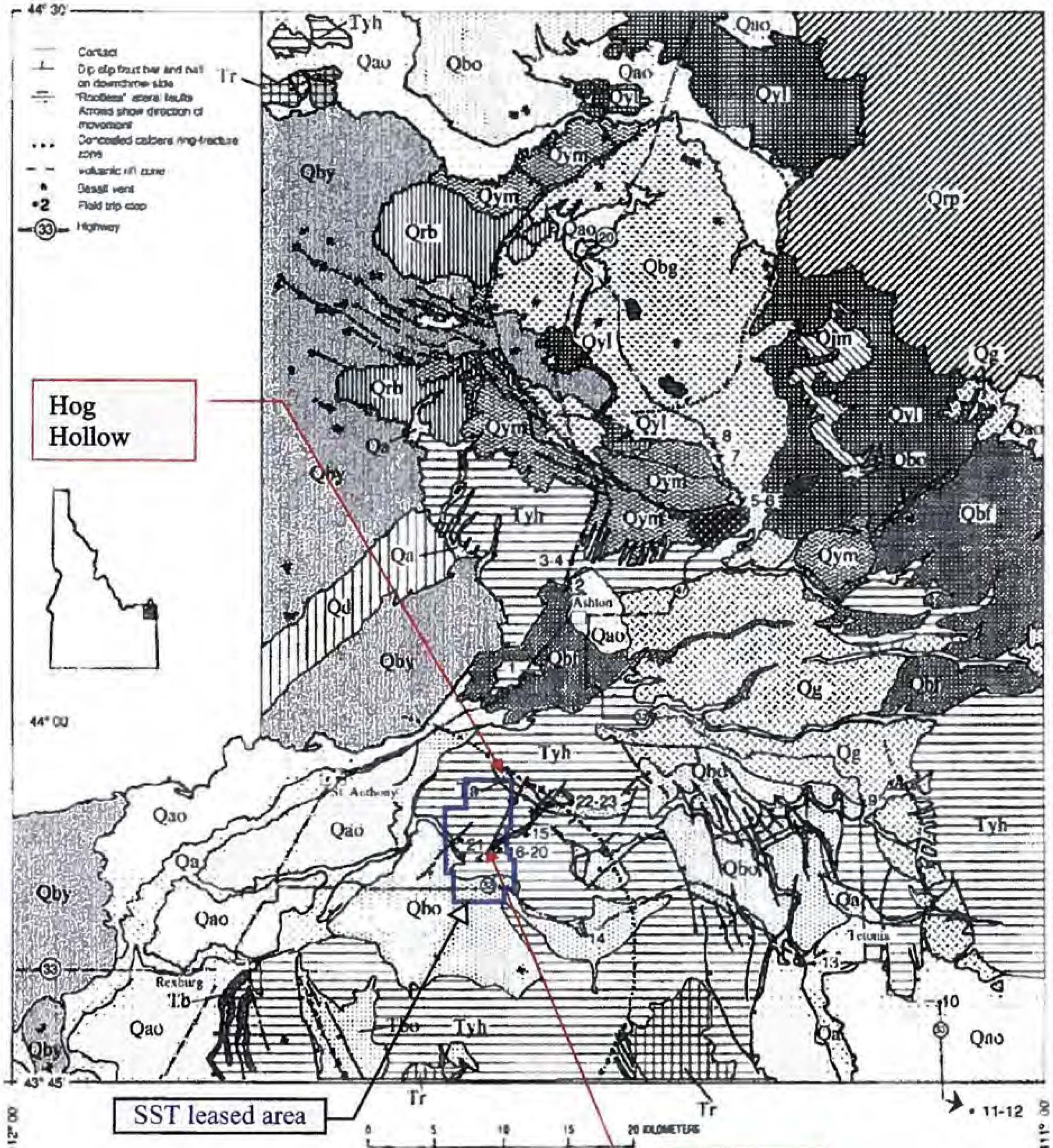


Figure 6.1-2:
Geologic map of the area around the Newdale prospect
(from Embree and Hoggan, 1999).

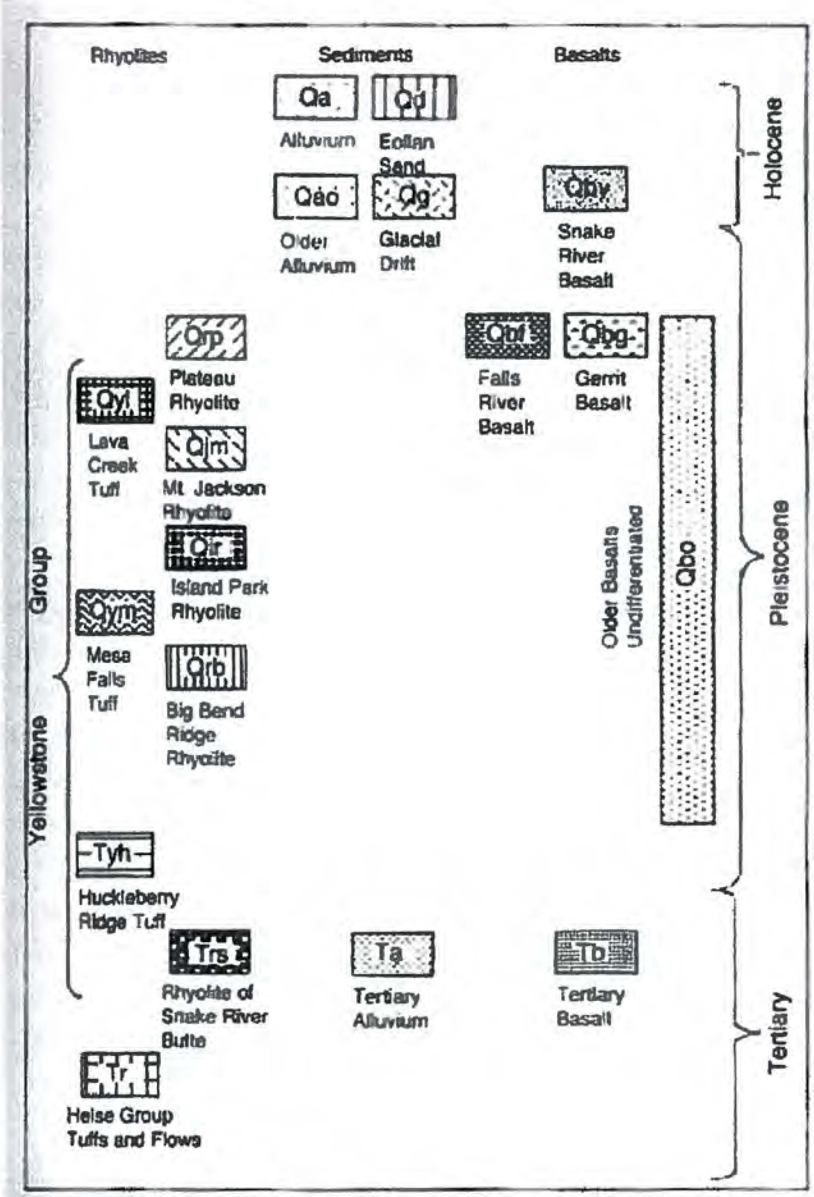


Figure 1. Generalized geologic map of the northeastern end of the Snake River Plain and Island Park area. Major roads and field trip stops are labeled. Geology from Christiansen (1982), Prostka and Hackman (1974), Prostka and Embree (1978), Scott (1992) and Mitchell and Bennett (1979).

Key to Figure 6.1-2

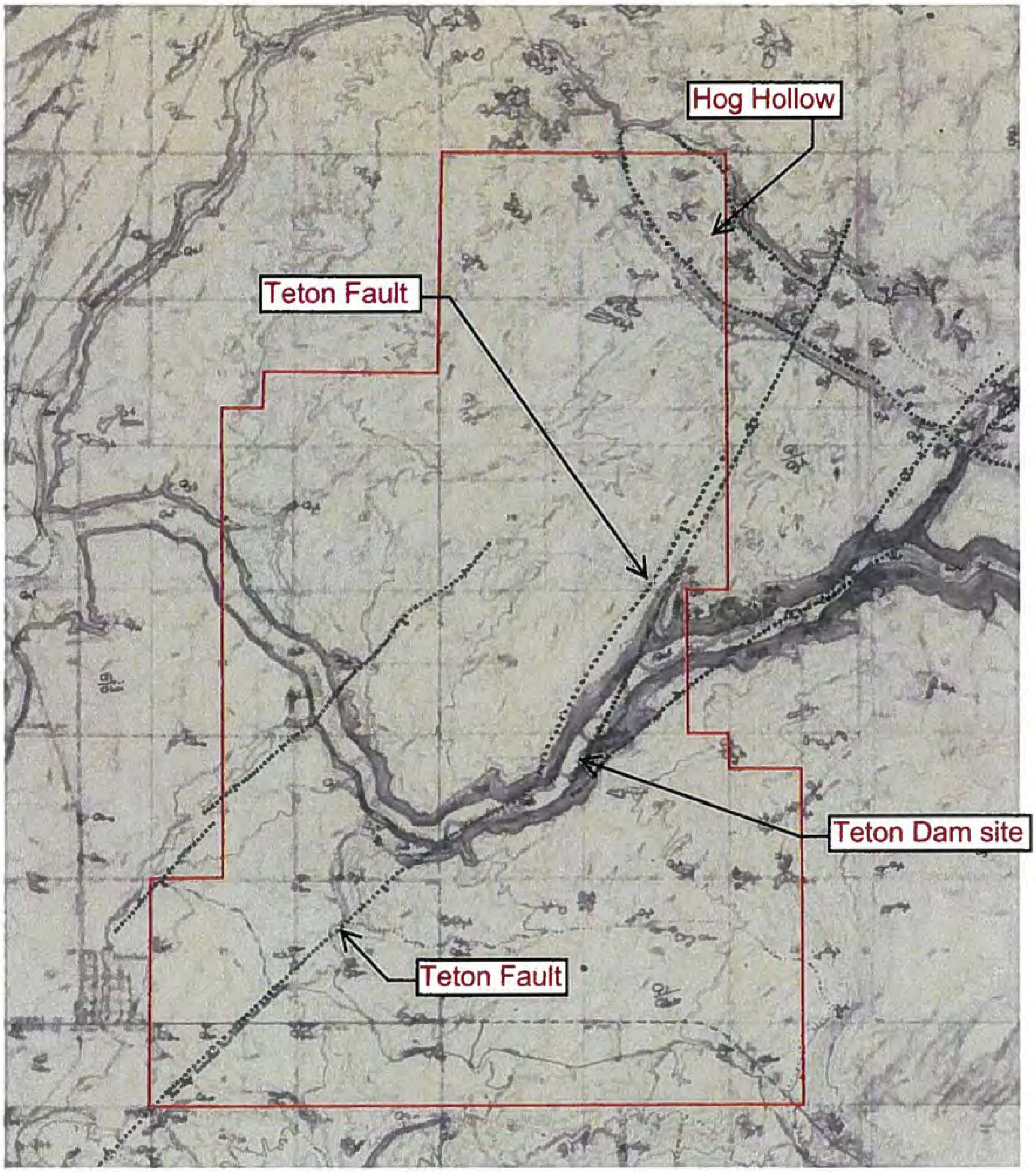


Figure 6.1-3:
Geologic map of the project area,
showing mapped structures
(from Protska and Embree, 1978)

Figure 1. Regional Bouguer Gravity data for the eastern Snake River Plain.

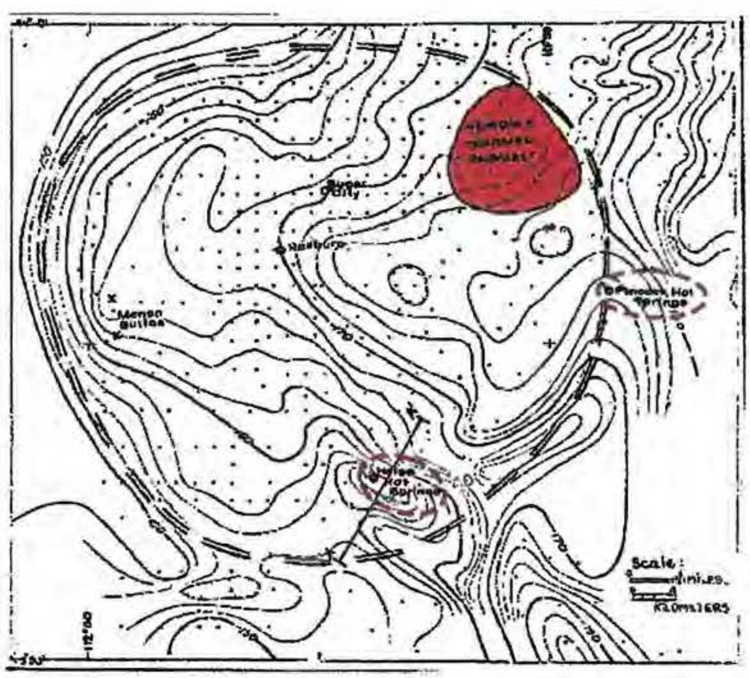
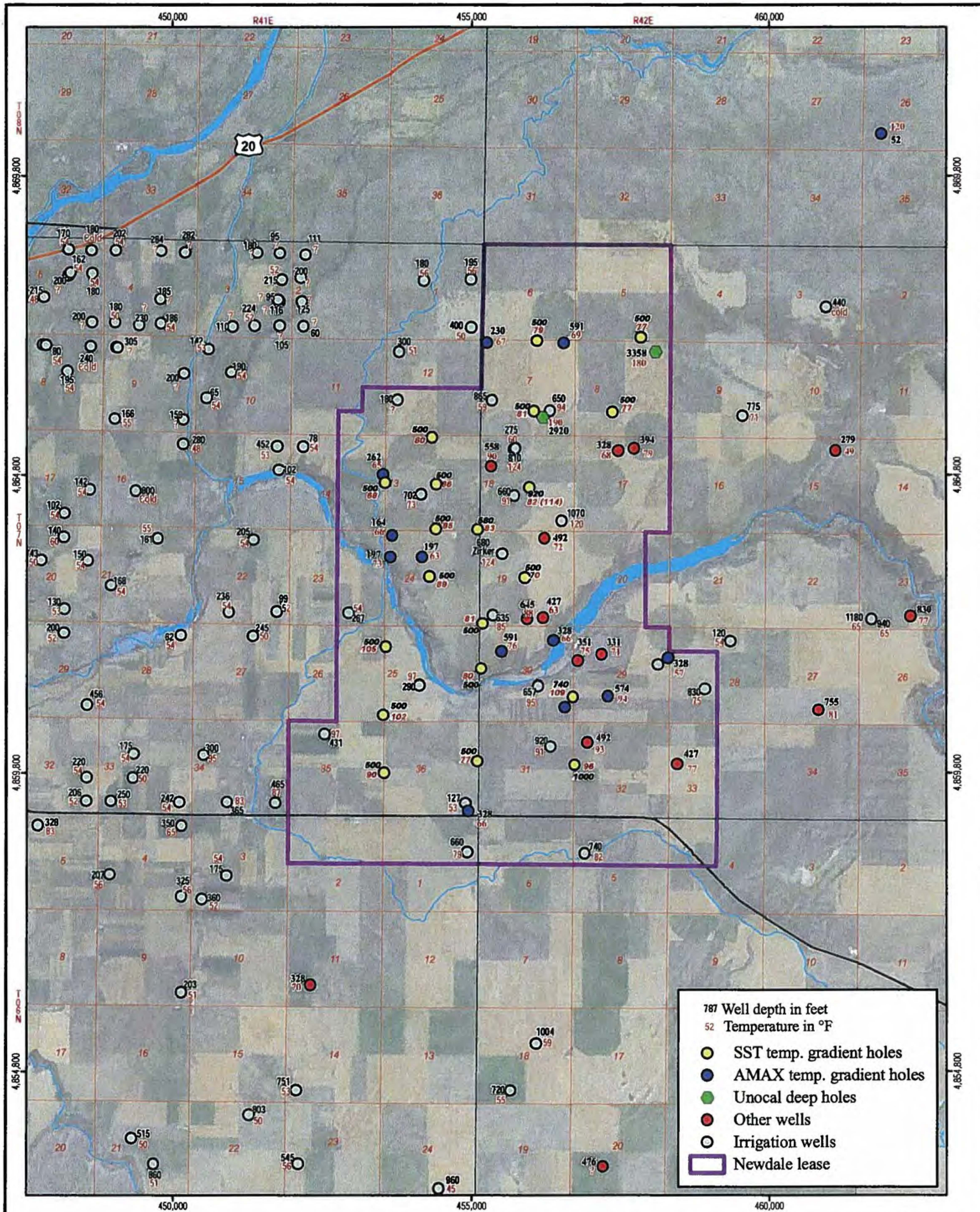


Figure 2. Bouguer Gravity data covering the Rexburg Caldera area, showing the location of the Newdale Thermal Anomaly and surface hot springs along the caldera margin.

Figure 6.1-4:
Regional gravity setting of the Newdale thermal anomaly.
(source: illustrations prepared by SST, based on Mabey (1978))

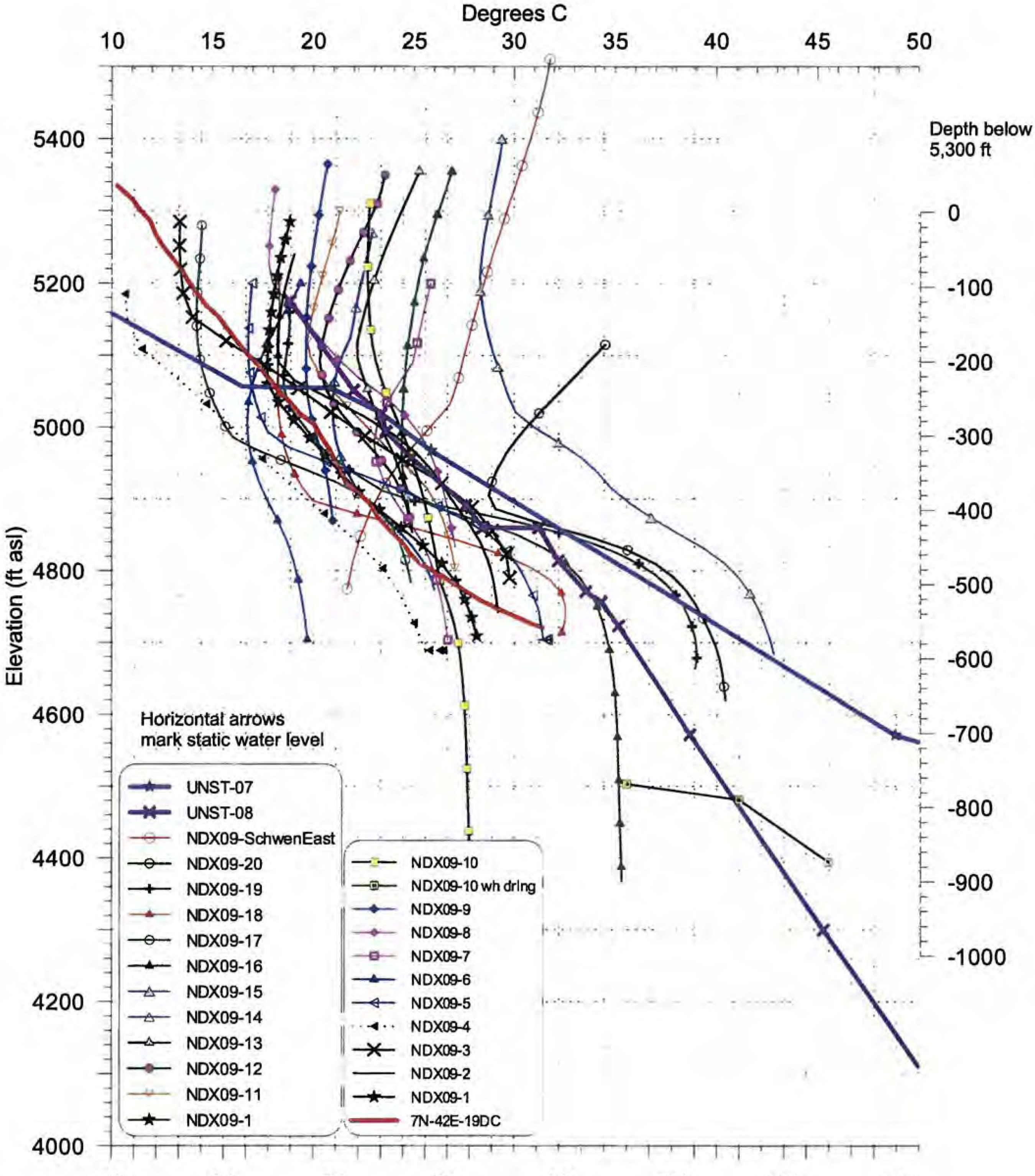


Projection:
NAD83 UTM 12N
Plot Date:
January 6, 2010

0 1 km
0 0.25 0.5 1 mi
1:80,000

Figure 6.3-1: Locations of wells with depth and temperature information, Newdale ID prospect and vicinity

GeothermEx, Inc.



All NDX09-series profiles were measured one day after completion of drilling. Flowing water temperatures at the wellhead, during drilling near bottom, are available for NDX09-2, -4, -8, -10, -16, -19 and -20. Of these, all are within a few degrees +- of temperatures logged at the same depths downhole, except at -10 (see graph).

Figure 6.3-2: Downhole temperature profiles of wells drilled by SST and by Unocal - shallow range

GeothermEx, Inc. 3-Feb-10

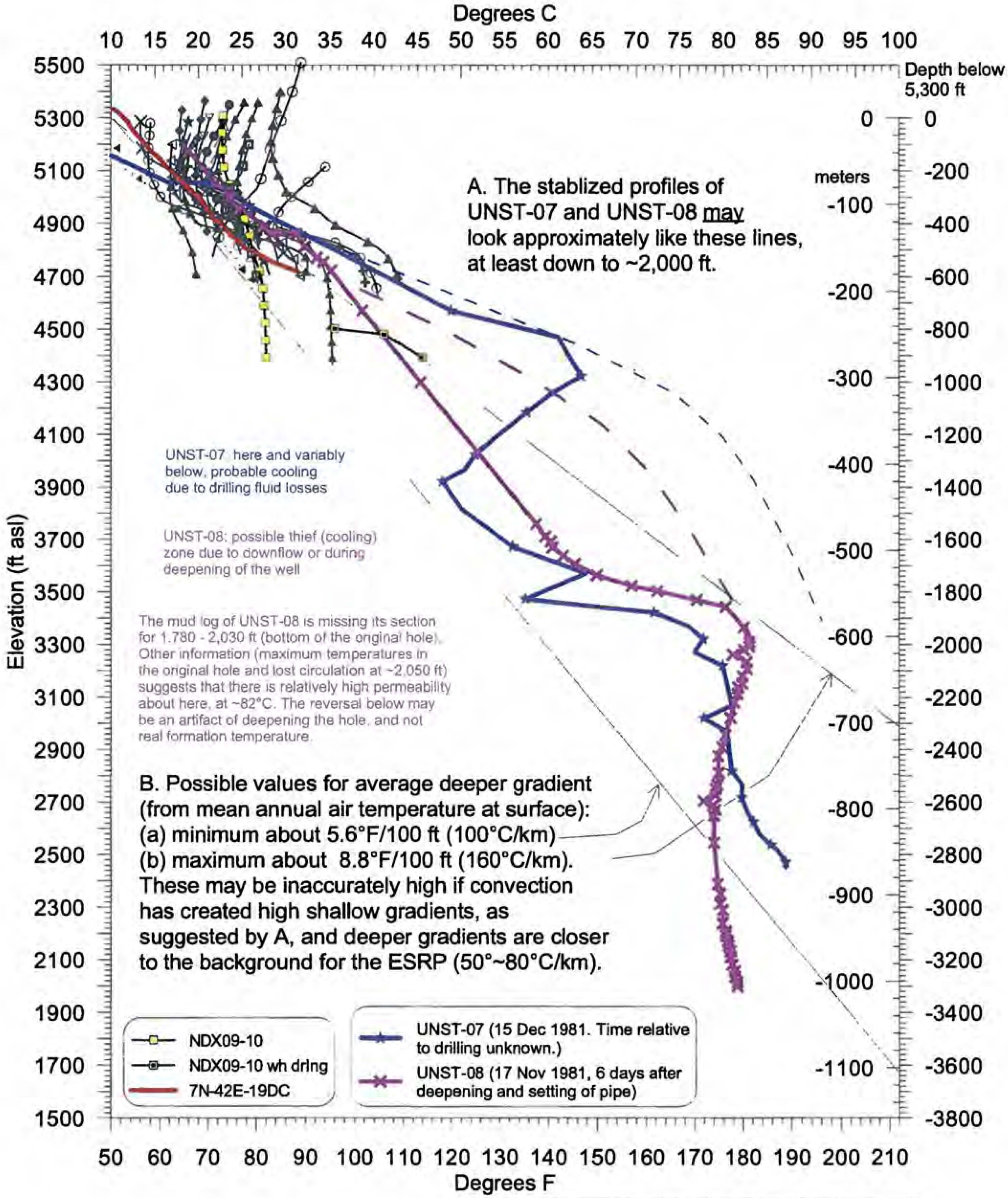
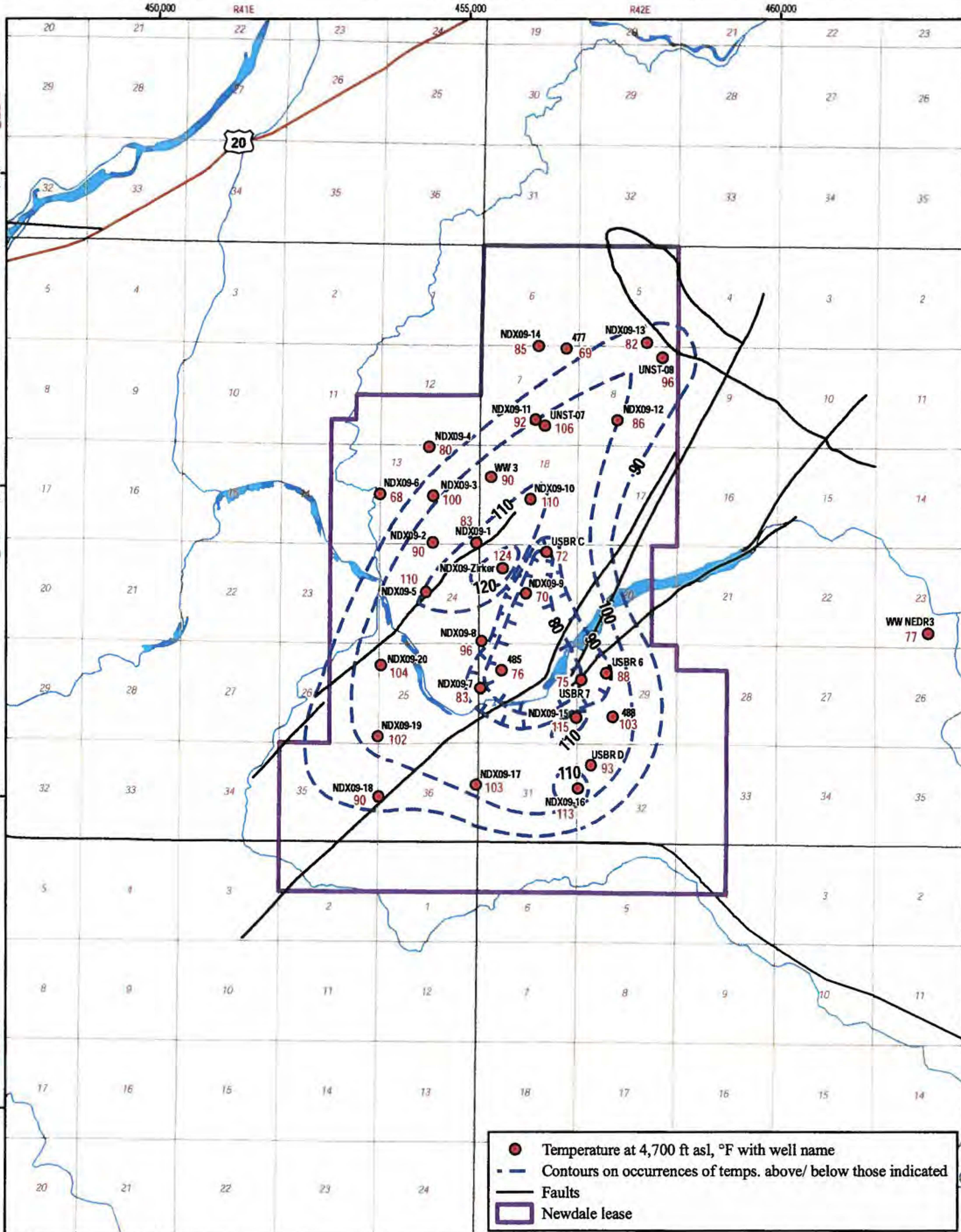


Figure 6.3-3:
Downhole temperature profiles
of wells drilled
by SST and by Unocal - deep range

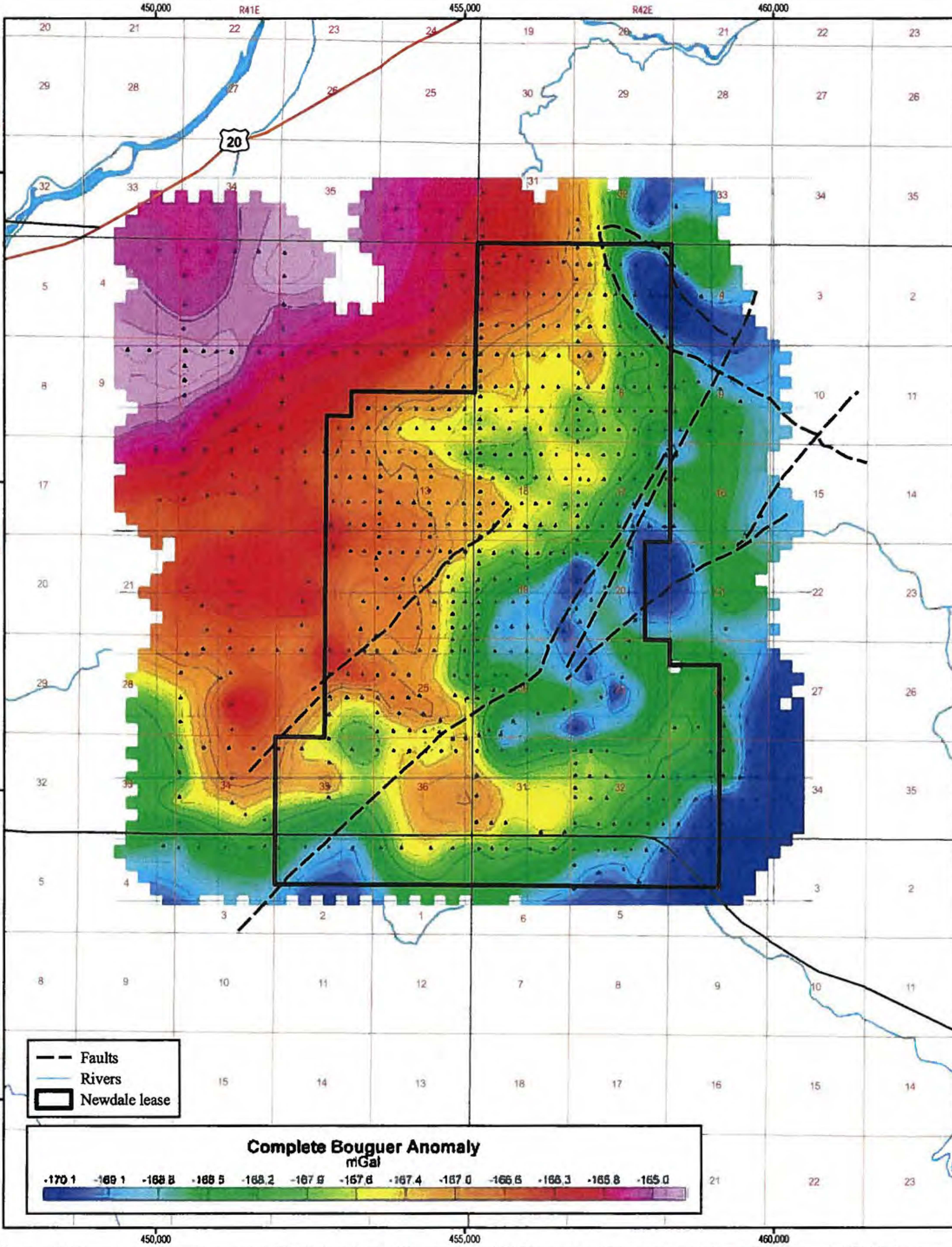


Projection: NAD83 UTM 12N
Plot Date: February 5, 2010

1:80,000

Figure 6.3-4: Temperatures at 4,700 ft above sea level

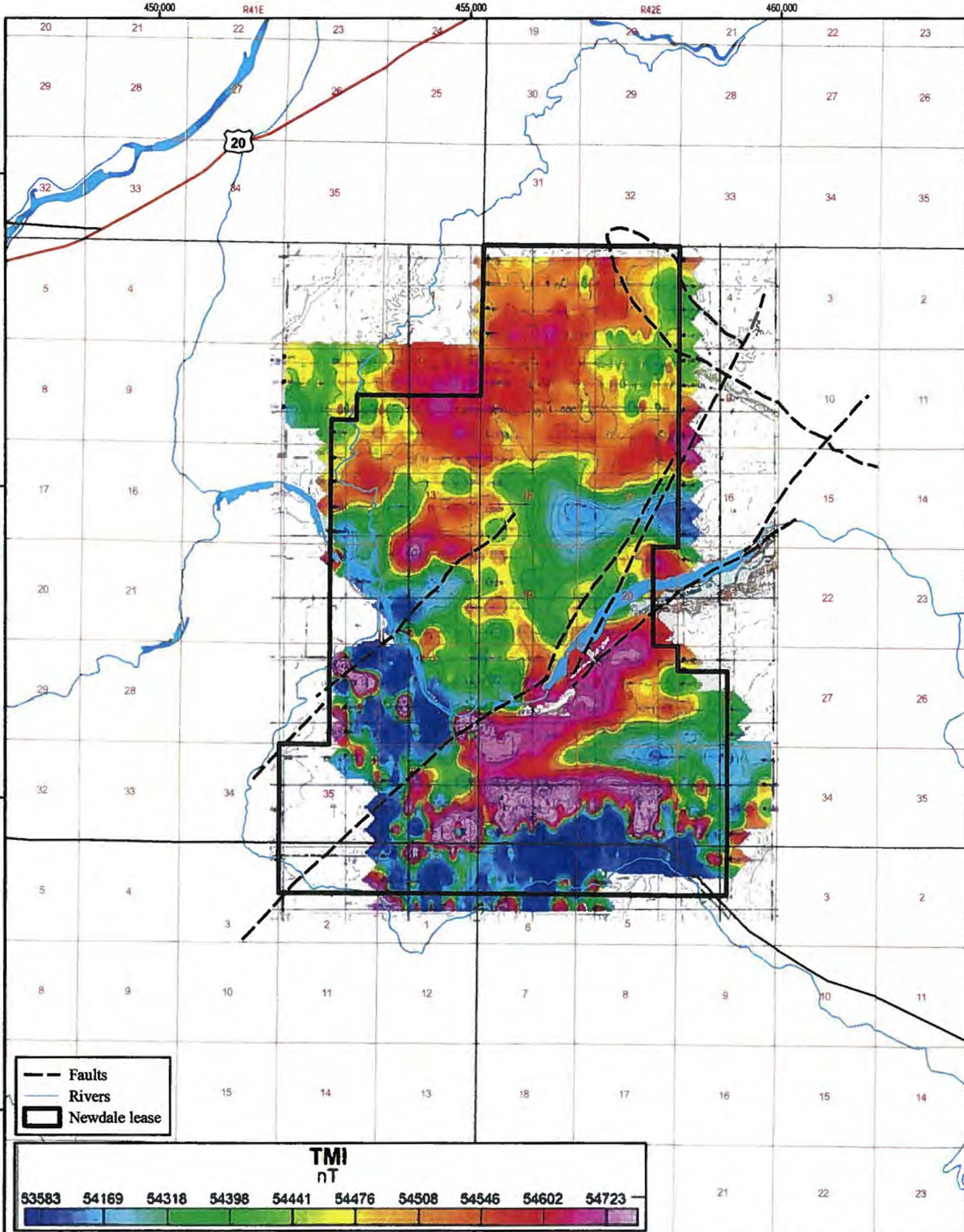
GeothermEx, Inc.



Projection: NAD83 UTM 12N
Plot Date: January 7, 2010
0 0.5 km
0 0.5 mi
1:80,000

Figure 6.4.1: Complete Bouguer Anomaly (density 2.55) of the project area and surroundings, survey by Magee Geophysical Services year 2009, Newdale geothermal prospect, Idaho

GeothermEx, Inc.

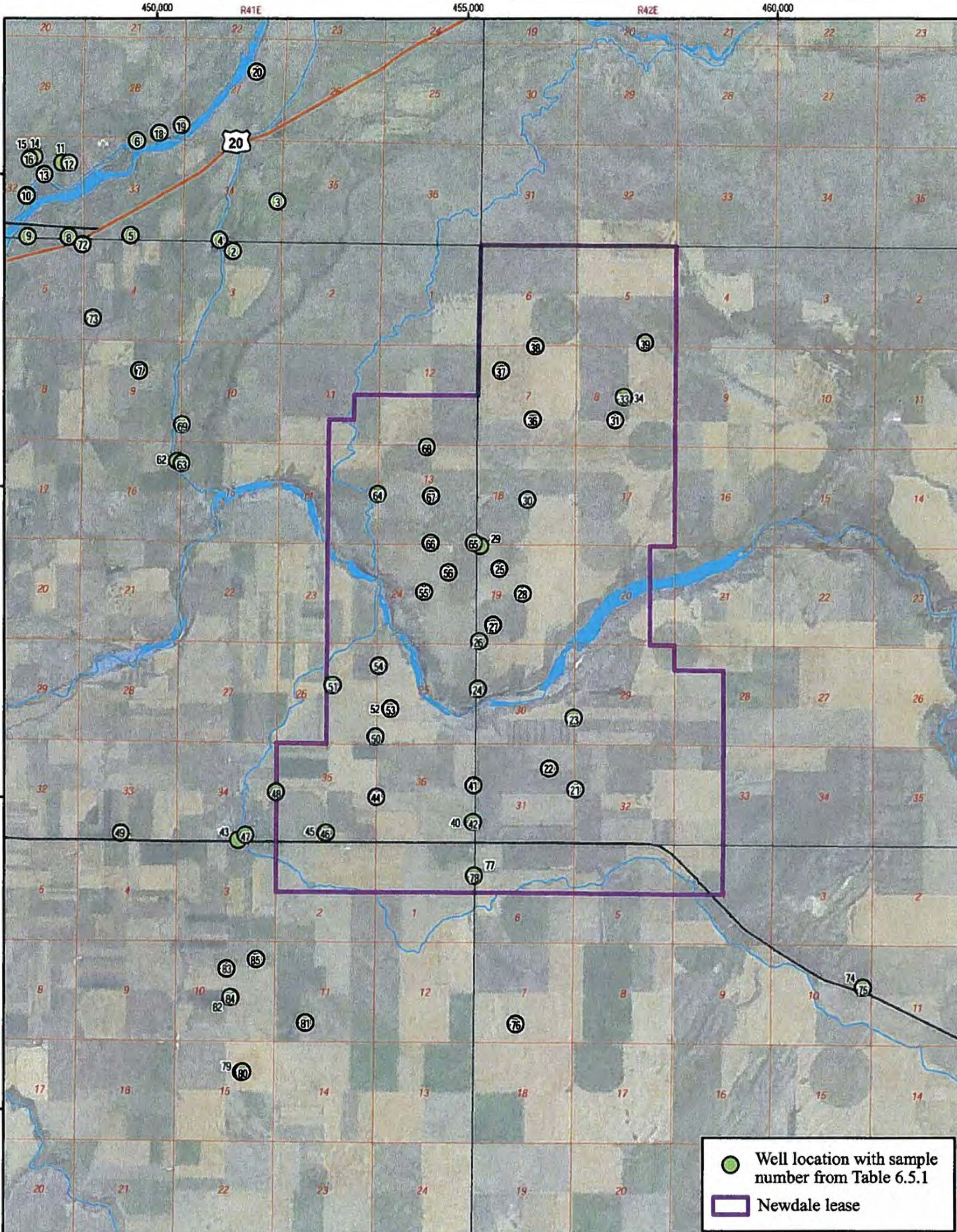


Projection:
NAD83 UTM 12N
Plot Date:
January 15, 2010

0 0.5 km
0 0.5 mi
1:80,000

Figure 6.4-2: Total magnetic intensity map, Newdale prospect, ID

GeothermEx, Inc.



Projection:
NAD83 UTM 12N
Plot Date:
January 14, 2010

0 1 km
0 0.25 0.5 1 mi
1:80,000

Figure 6.5.1: Map showing locations of water and isotope samples

GeothermEx, Inc.

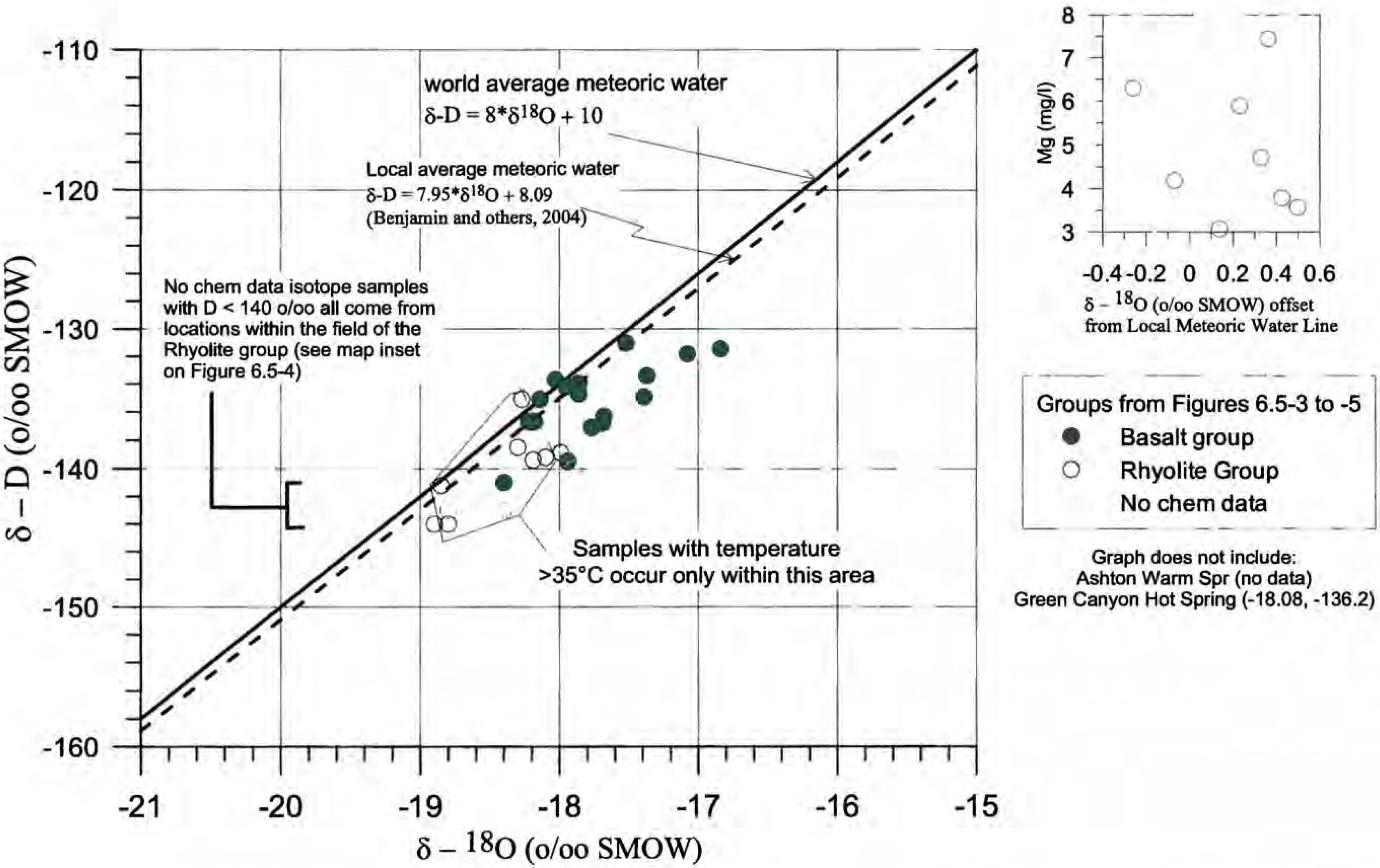
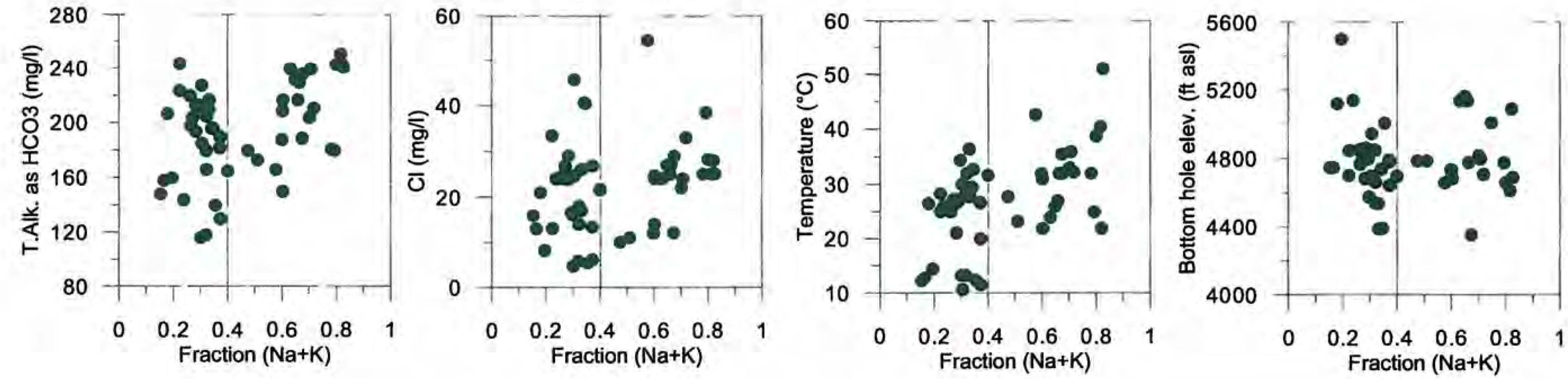


Figure 6.5.2:
Stable isotope compositions of waters in Newdale ID database (Table 6.5.1)

GeothermEx, Inc. 4-Feb-10



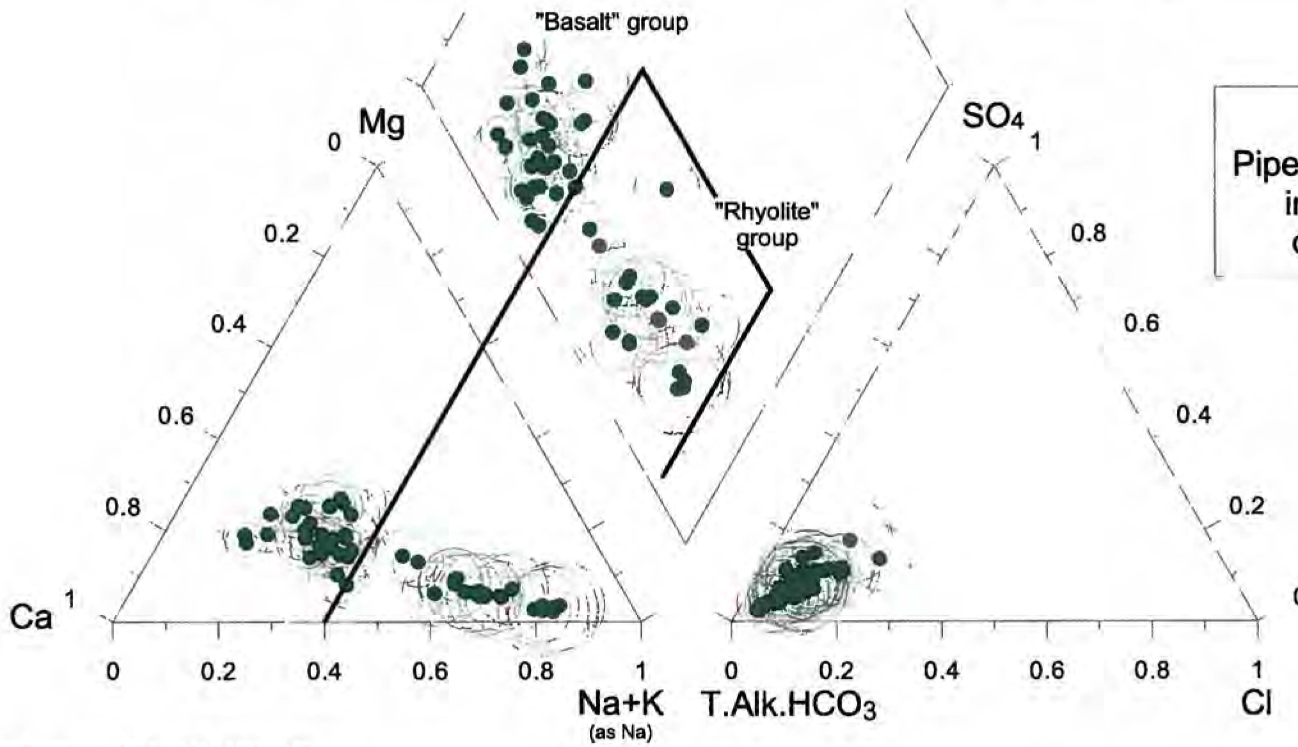


Figure 6.5.3:
Piper diagram showing solutes in waters of Newdale ID database - with salinity

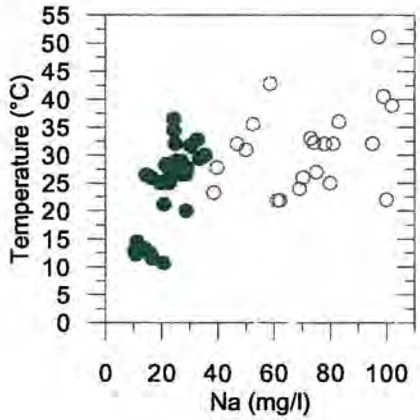
Graph does not include:
Ashton Warm Spr
Green Canyon Hot Spring

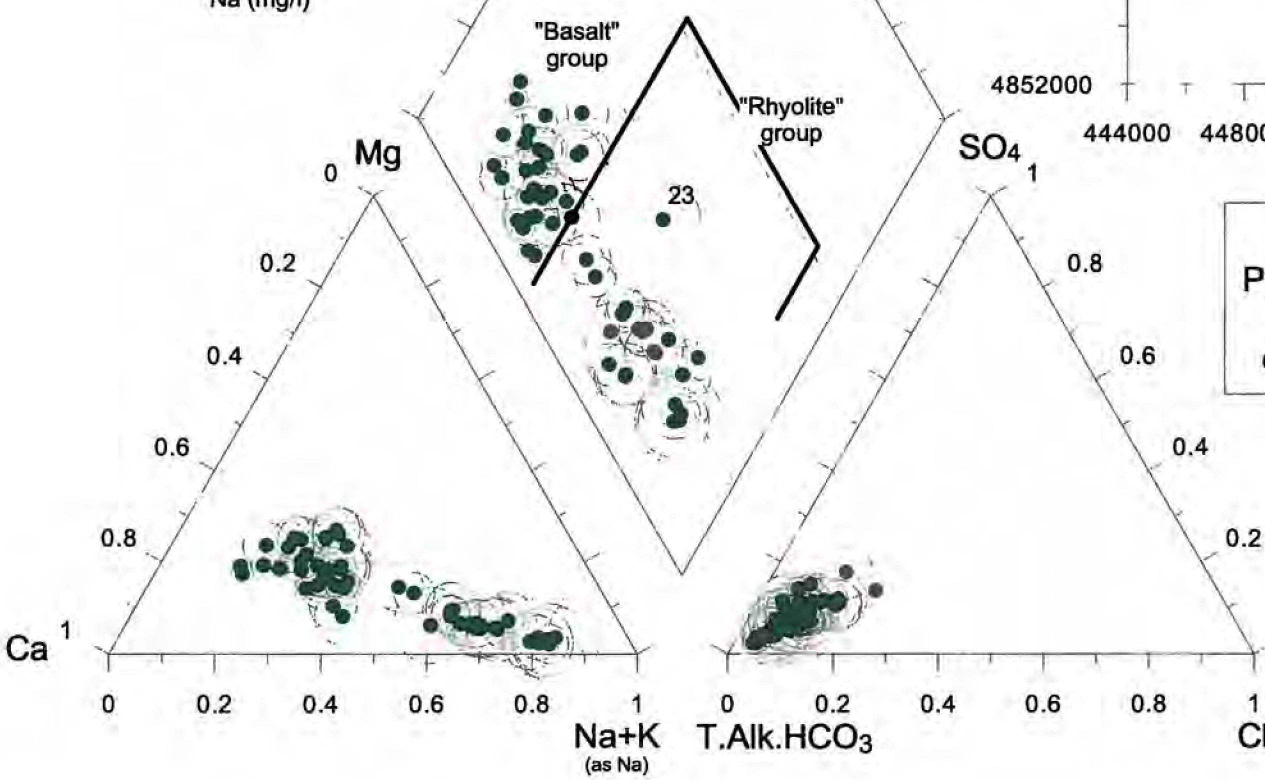
Bubble size is proportional to total dissolved solids (mg/l) - see Table 6.5.1

500

200

GeothermEx, Inc. 13-Jan-10





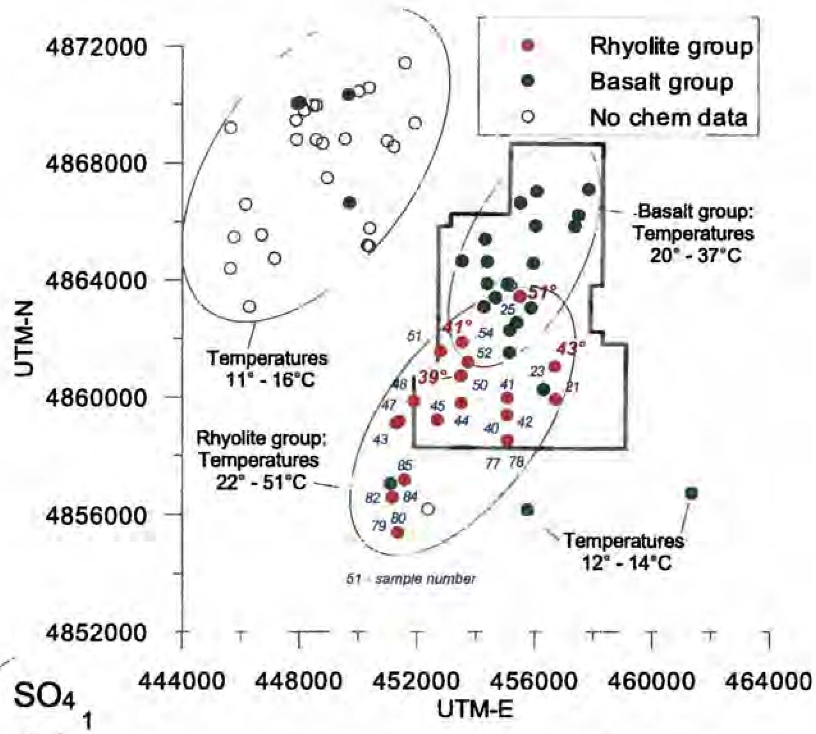


Figure 6.5.4: Piper diagram showing solutes in waters of Newdale ID database - with temperature

Graph does not include:
Ashton Warm Spr
Green Canyon Hot Spring

Bubble size is proportional to temperature (°C) - see Table 6.5.1

50°

10°

GeothermEx, Inc. 15-Jan-10

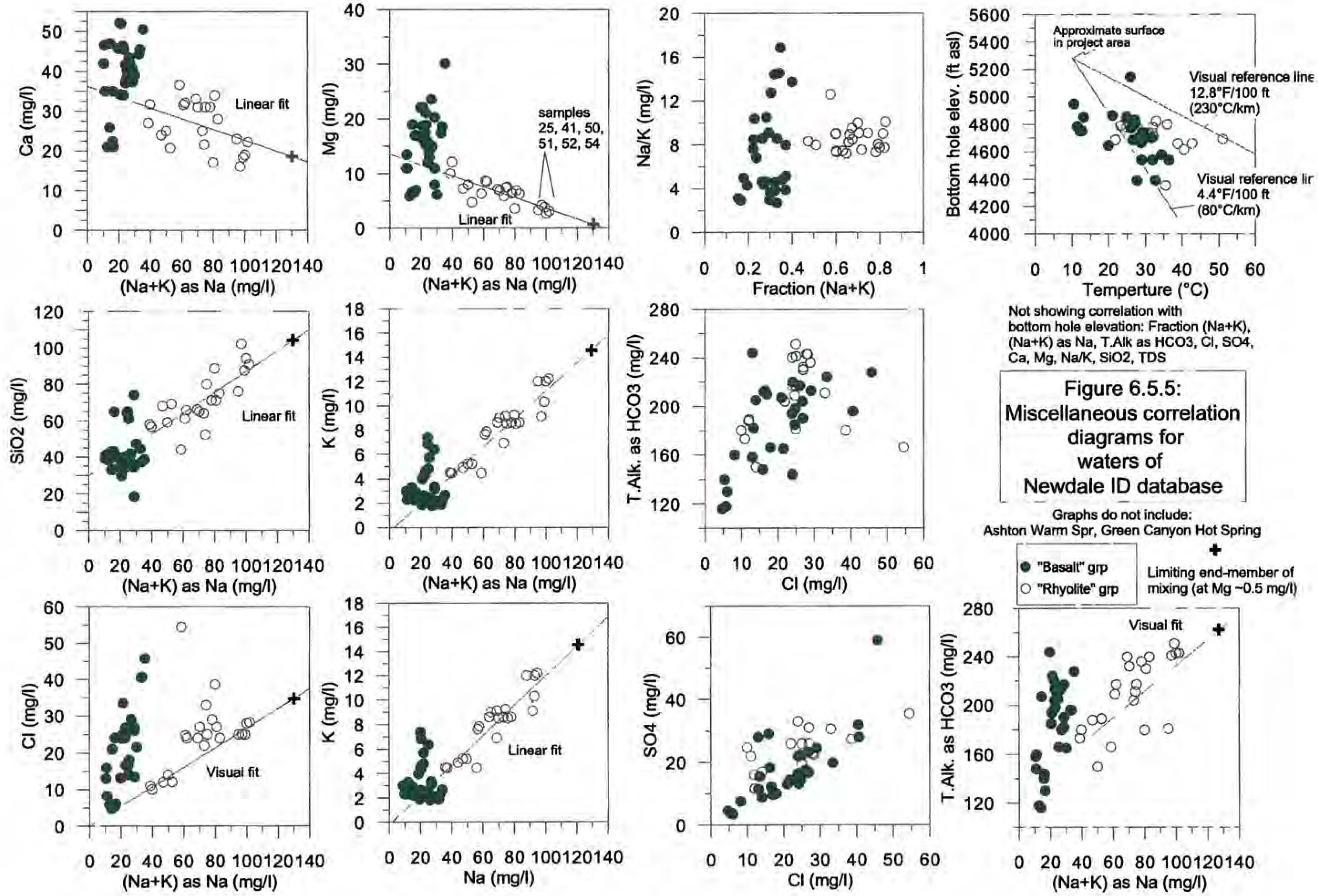


Figure 6.5.5: Miscellaneous correlation diagrams for waters of Newdale ID database

GeothermEx, Inc. 16-Jan-10

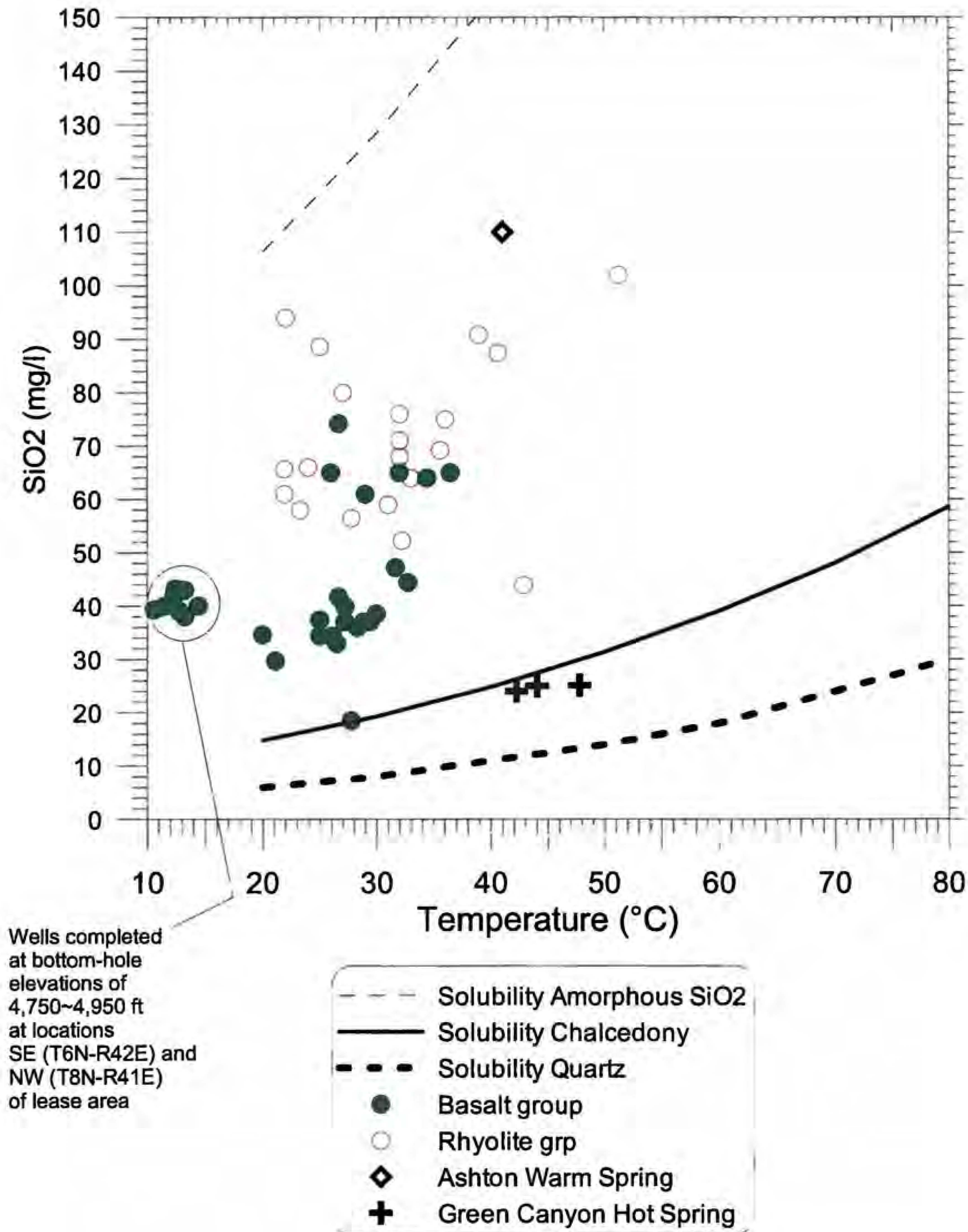


Figure 6.5.6:
SiO_2 versus temperature in waters of Newdale ID database

SUMMARY OF INPUT PARAMETERS

Variable Parameters	Minimum	Most Likely	Maximum
Reservoir Area (sq. km)	8.5		25.0
Reservoir Thickness (m)	800	1100	1700
Rock Porosity	0.03		0.07
Reservoir Temperature (°C)	150		175
Recovery Factor	0.05		0.20

Fixed Parameters		
Rock Volumetric Heat Capacity	2613	kJ/cu. m°C
Rejection Temperature	10	°C
Utilization Factor	0.45	
Plant Capacity Factor	0.90	
Power Plant Life	20	years

RESULTS

Statistics	MW	MW/sq. km	Recovery Efficiency
Mean	164	9.8	1.13%
Std. Deviation	81	3.9	0.39%
Minimum (90% prob.)	**71**	4.9	0.58%
Median (50% prob.)	**149**	9.5	1.12%
Most-likely (Modal)	**114**	9.4	1.64%

Figure 11.1.1:
Probabilistic Estimate
of Indicated Geothermal Resource
Newdale Prospect ID
Standard Steam Corp LLC