TABLE OF CONTENTS

FIGURES

ADDITIONAL PLOTS

GOOGLE EARTH KMZ FILES

INTRODUCTION

This report presents the results of a gravity survey conducted for lithium brine exploration at Lithium Energy Products Inc.'s Jackpot Lake project approximately 60 kilometers northeast of Las Vegas, Nevada. The purposes of the survey are to map depth to bedrock or thickness of sediments, map geologic structure relative to the occurrence of lithium-bearing brine, and to provide information for the selection and design of additional geophysical surveys.

METHODOLOGY

Refer to Appendix A for a description on the methodology of gravity surveying.

DATA ACQUISITION AND PROCESSING

Gravity data were acquired with a leased Scintrex Model CG-3 gravity meter (serial number 711413). The sensing element of the Scintrex gravity meter is based upon a fused quartz elastic system. The gravitational on a mass is balanced by a spring and a relatively small electrostatic restoring force. The position of the mass, which is sensed by a capacitative displacement transducer, is altered by a change in gravity value. An automatic feedback circuit applies DC voltage to the capacitor plates producing an electrostatic force on the mass which brings it back to a null position. The feedback voltage, which is a measure of the relative value of gravity, is converted to a digital signal and then transmitted to the instrument's data acquisition system for processing, display and storage. The parameters of the gravity sensor and its electronic circuits are chosen so that highly accurate reading can be obtained (±0.005 milliGals [mGals] for a standard CG-3 meter) over a worldwide range of values (7000 mGals). Typically instrumentation drift rate is less than 1 mGal per month through the use of a heater and thermostat.

A total of 123 new gravity stations at nominal intervals of 450 meters were acquired along six lines each separated by approximately 900 meters. Additionally, eight new gravity stations were acquired and 28 available public-domain gravity stations outside the detailed data acquisition area were used to provide regional information. The locations of the newly acquired stations along the six lines are shown in Figure 1, while Figure 2 also indicates the locations of the remaining data. Because of the presence of the Moapa River Indian Reservation to the north and northeast of the detailed survey area, only a few public-domain gravity stations were available. The new data were acquired during the period of 14 through 23 April 2017 by KLM Geoscience of Las Vegas, Nevada, subcontracted directly to Lithium Energy Products. Locations and elevations of the new stations were acquired in the field with a base / rover setup using a Trimble TSC2 controller, Trimark 3 base radio and model 5800 antennas for both the base and rover units with accuracies of one cm horizontal and two cm vertical. A local gravity base station was established at station 801 and tied into the absolute base station "Las Vegas K 169", which is located at the downtown Post Office, by repeat reading between the two stations so that data from this survey can be combined with data from other surveys.

Data were acquired between local base readings at times nominally less than four hours apart, depending upon logistics. That is, a reading was taken at the local base, several new station readings were taken within a period of less than four hours, and then another reading was taken at the local base. The repeated base readings allowed for calculation of the instrument drift. The overall quality of the data is very high with repeat readings of new stations ranging between 0.009 and 0.037 mGals, while the spread for base readings (both field and absolute) is 0.017 mGals.

The gravity data are processed by Hasbrouck Geophysics using the *GravMaster* (version 1.30) computer program from Geotools Corporation following the processing outline described in the Appendix A. Data for each observation (date, time, latitude, longitude, elevation and value) are entered into the processing program with the gravity value directly in mGals (i.e., the field data values are in mGals and no correction factor is necessary). Next, the instrument and tide drifts are calculated, and then an absolute gravity value is calculated from the local base to the referenced absolute gravity base station "Las Vegas K 169". Using the referenced absolute gravity value for each station, both the theoretical (using the NIMA 1998 formula) and free-air gravity values are computed. From previous surveys conducted in the general area by the author and other investigators, a Bouguer slab density of 2.67 g/cm^3 is chosen to process the data. This density value and reference of the field data to an absolute gravity station enables the data to be combined with public-domain data.

Compartment elevation differences for terrain corrections were estimated in the field for Hammer zones B (2.0 to 16.6 meters radius) and C (16.6 to 53.3 meters radius). Compartment elevation differences for each station for zones from 53.3 to 21,943 meters (Hammer zones D through M) were determined from high resolution Digital Elevation Models (DEMs). Terrain corrections ranged from 0.256 to 4.109 mGals. Using data from all these Hammer zones and a Bouguer slab density of 2.67 g/cm^3, complete Bouguer gravity anomaly values were calculated.

Modeling of the gravity data is conducted by Hasbrouck Geophysics using Interpex Ltd.'s *IX2D-GM* (version 1.04) computer program. *IX2D-GM* is capable of interactive forward and inverse modeling in 2½-dimensions (i.e., the models can extend both along and perpendicular to profiles) based upon polygonal models. The forward modeling algorithm is based upon the Rasmussen and Pedersen method, while an Inman-style ridge regression is used for nonlinear least-squares fitting in the inversion modeling.

RESULTS

Gravity exploration is a potential field method and as such the modeling of the data produces a non-unique solution. Consequently, variations in density contrasts and thicknesses of subsurface bodies can result in the same model fit to the field data. For example, in a two-layer case if one decreases the density of the upper layer (increases the density contrast) then the thickness of the upper layer must also be decreased for a proper model fit. As another example, if an additional layer is added with a density value in between the original upper and lower layers then the depth to bedrock may be increased for a correct model. Therefore, without geologic data from wells there can be several models that fit the data.

The geologic map prepared by Beard, et al (2007) includes all of the survey area except for the northernmost regional public-domain stations. The Arrow Canyon Range to the west of the survey area is composed of PMb (Bird Spring Formation, lower Permian to upper Mississippian) which is described as thin to thick bedded limestone and dolomite with calcareous sandstone, siltstone, and layers and nodules of chert. Also on the west side of the survey area are surficial deposits of QTa (lower Pleistocene to upper Pliocene sidestream alluvium) and Q2a (middle to lower Pleistocene older sidestream alluvium). To the east of the survey area the Dry Lake Range also consists of PMb with relatively large surficial deposits of QTk (lower Pleistocene to upper Pliocene calcrete) and small outcrops of Pr (Permian red beds described as medium- to fine-grained sandstone and siltstone that is locally gypsiferous), Tmf (fine-grained facies of the Tertiary Muddy Creek Formation described as interbedded pink sandstone, siltstone and claystone as well as lesser amounts of gypsum and gypsiferous sandstone and siltstone) and T2k (lower Pliocene calcrete deposits). PMb primarily outcrops to the south of the survey area and it is unknown, but expected, that PMb also outcrops to the north. Surficial deposits within the Dry Lake Valley itself (termed Jackpot Lake for this survey) are primarily Q1a (upper to middle Pleistocene intermediate-age sidestream alluvium), Qa (young Holocene alluvium), Qe (Holocene to Pleistocene eolian deposits) and Qp (Holocene to Pleistocene playa deposits) with small outcrops of QTa. The eastern and western ends of all of the model lines are on PMb, except for the eastern ends of lines 5 and 6 where PMb is slightly farther west.

The complete Bouguer gravity anomaly maps along lines 1 through 6 (Figure 3) and of all 151 new and public-domain data (Figure 4) are contoured using Golden Software's *Surfer* computer program (64-bit version 14.1.661) and a Bouguer slab density of 2.67 g/cm^3. The modeled depth section of each line, presented using Golden Software's *Grapher* computer program [64-bit version 12.5.811]), is located in the *Additional Plots* section of this report. Calculated bedrock depth from each of the modeled lines is compiled and presented using Golden Software's *Surfer* computer program as three-dimensional contour maps as shown in Figure 5. The modeled bedrock depth map (that can be thought of as a thickness of sediments map) has been converted to a Google Earth kmz file and is included with this report.

From results of previous modeling conducted in the general area by the author and other investigators, a density contrast between valley fill sediments and Paleozoic bedrock (PMb) of 0.5 g/cm^3 (2.67 g/cm^3 minus 2.17 g/cm^3) is chosen to best represent a two-layer case. All six modeled lines are extended to outcrop at or near each end, thus the depth to bedrock at those stations is considered zero and is used as a constraint for modeling purposes since no other modeling constraints (i.e., drill hole information) are available within the survey area. The bedrock depths presented within this report should be considered estimates that could change when additional bedrock depth information from drilling becomes available. However, the modeling results provide an accurate shape of the basin.

There are two main factors that must be considered regarding target areas for lithium mineralization and concentration: 1) where is the source of the lithium, and 2) does a basin environment exist for the concentration of the lithium transported by meteoric water from the source? In the Jackpot Lake vicinity it is thought that the Muddy Creek Formation contains various saline deposits that are rich in lithium as well as other alkali metals and alkaline earths. Once lithium has been liberated into the water system it remains highly mobile and movement of the lithium with surface water and groundwater will follow basic hydrological principles. Hydrologic basins in Nevada consist of basin fill underlain by either low-permeability or permeable rock with water movement through the basin fill, permeable rock and along faults. Nothing more complex than a topographic low or closed basin is required to concentrate lithium-bearing water. For topographic lows with larger catchment areas there is a greater opportunity to accumulate lithium from wider sources. The water trapped in these lows may move through dipping aquifers until it reaches an impermeable barrier such as a fault scarp.

The complete Bouguer gravity anomaly map for all new and public-domain data (Figure 4) indicates a closed anomaly centered near the Jackpot Lake claims. However, it should be noted that data from very few gravity stations are available in the area thus the southern and northern outlines of the closed anomaly are not well defined. Also, the scarcity of data precludes accurate depth modeling but it is reasonable to assume that if additional regional data were available then depth modeling would most likely indicate a closed bedrock low extending to the south and north.

The modeled bedrock depth, shown in Figure 5, reaches a maximum approaching 625 meters. At a bedrock depth of 575 meters the closed depression covers an area of approximately 1.9 square km (~0.74 square miles) within the claim block and another about 0.48 square km (~0.19 square miles) just beyond the northeast corner of the claims. At a slightly shallower bedrock depth of 550 meters, the depression encompasses approximately 5.6 square km (~2.16 square miles) within the claim block and another about 0.9 square km (~0.35 square miles) just beyond the northeast corner of the claims. At a shallower depth of about 500 meters the bedrock depression is not closed within the area modeled; however, if it is assumed that the basin is closed at that shallower depth to the south and north, which is reasonable as noted in the paragraph above, then essentially the entire claim block is within a closed depression at a depth of 500 meters.

RECOMMENDATIONS

To map geologic stratigraphy and structure relative to the occurrence of lithium-bearing brine, to identify conductors that may be representative of lithium-bearing brine aquifer units, to map the continuity, thickness, dip and extent of those units, and to delineate basinal features, it is recommended that a controlled-source audio-magnetotellurics / magnetotellurics (CSAMT / MT) survey be conducted. Several major power lines and a petroleum products pipeline cross or are near the Jackpot Lake claims. The general rule-of-thumb is that CSAMT / MT stations should be a minimum of 100 meters away from such electromagnetic noise sources, but given the large size of the power lines it is recommended that the stations be located at least 300 meters away. Data acquisition will begin at stations that are farthest removed from the utilities and then progress towards the noise sources until the data become unacceptable. Figure 6 shows the initially proposed 20 CSAMT / MT station locations with the realization that the locations may need to be modified in the field.

CSAMT / MT data for the nominal total 20 proposed stations (40 separate reading) will be acquired with a leased Geometrics *StrataGem EH-4* system operating from 0.1 Hz to 92 KHz. Because of anticipated extremely low resistivities at the CSAMT / MT stations it will be necessary to acquire data in two passes at each station (from 0.1 Hz to 1 KHz and 10 Hz to 92 KHz) in order to investigate to depths greater than 150 to 200 meters. Consequently, field data acquisition and processing time will be almost doubled from standard CSAMT / MT surveys. Several successful CSAMT / MT surveys have been conducted in other similar valleys and experience gained from those surveys will be applied to this survey.

LIMITATIONS OF INVESTIGATION

This investigation was performed using the degree of care and skill ordinarily exercised, under similar circumstances, by an experienced and licensed geophysicist practicing in this or similar locations. No warranty, expressed or implied, is made as to the conclusions and professional advice included within this report.

The findings of this report are valid as of the present date. However, changes in the conditions of a property can and do occur with the passage of time, whether they be due to natural processes or the work of people on this or adjacent properties. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside of our control. Therefore, this report is subject to review and revision as changed conditions are identified.

REFERENCE

Beard, L.S., Anderson, R.E., Block, D.L, Bohannon, R.G., Brady, R.J., Castor, S.B., Duebendorfer, E.M., Faulds, J.E., Felger, T.J., Howard, K.A., Kuntz, M.A., and Williams, V.S., 2007, Preliminary geologic map of the Lake Mead 30’ x 60’ quadrangle, Clark County, Nevada and Mohave County, Arizona: U.S. Geological Survey, Open-File Report 2007-1010, scale 1:100,000.

APPENDIX A: GRAVITY SURVEYING METHODOLOGY

Gravity is the attractive force between two bodies with the strength of the force depending upon the masses of the bodies and the distance between them. The force of the Earth's gravity field is not constant everywhere and its measurement changes based upon many known and predictable factors including elevation, latitude, instrumentation drift and tides. Additionally, gravity changes are related to lateral differences in the densities of subsurface rock. Lateral density changes are useful in exploration because many types of rocks have characteristic densities and thus are distinct from other rock types. By taking very careful measurements of the Earth's gravity field at the surface and then removing all the predictable effects, subsurface density variations can be modeled into a meaningful geologic picture of the subsurface.

From Newton's law, the formula for the force of gravity between two masses (m_1 and m_2) separated by a distance r is $F = (Gm_1m_2)/r^2$, where G is the universal gravity constant. For gravity exploration we are interested in the acceleration of gravity rather than the force of gravity. Since force is mass times acceleration, the acceleration due to gravity becomes $a = G(m_1/r^2)$. The Earth's gravitational acceleration is approximately 980,000 milliGals (mGals) while anomalies less than one part per million, or less than one mGal, of the Earth's gravity field often have significance in exploration. Exploration using the gravity method focuses on the relative change in gravity instead of the absolute value of the earth's gravitational field.

Since the purpose of collecting gravity data is to determine the location and nature of buried geologic bodies, factors not related to those bodies must be removed from the data. Essentially we have *Gravity Anomaly = Observed Gravity – Earth Model*. Observed gravity represents the "real" gravity value (the actual acceleration) at any point on the earth's surface. However, this real value does not come directly from an instrumentation measurement but involves numerous corrections. Absolute gravity is defined as the exact vertical acceleration due to gravity. This can be measured in a number of ways such as accurately timing a falling body over a known distance. Through such means, absolute gravity at a given location can be determined. By using high precision absolute gravity meters, a network of tied stations where the absolute gravity is known has been established and is known as the International Gravity Standardization Net 1971 (IGSN71). Most gravity surveys are designed to include at least one station where the absolute gravity value is known. The difference between the gravity reading acquired at the known base station (after applying all the corrections as discussed below) and the published absolute gravity value for that station results in how much all the observed gravity values must be shifted in order to make them absolute gravity values.

The Earth Model is what we would measure if we were dealing with a simple and virtually homogeneous Earth. The largest contribution to the Earth Model comes from the Theoretical Gravity, or Gravity Reference Field. This is a mathematical model of the Earth's worldwide gravity field and, in differential form, is known as the latitude correction. The U.S. National Imagery and Mapping Agency (NIMA) published the most recent (and recommended) version of the formula is 1998. According to this new formula, the theoretical gravity (γ) obtained from the gravity field of the World Geodetic System (WGS84) reference ellipsoid is:

$$\gamma = (978032.53359)*[(1+0.00193185265241\sin^2(\varphi))/(\sqrt{1-0.00669437999014\sin^2(\varphi)})] \text{ mGals}$$

where φ is the geodetic latitude. The latitude correction is approximately 0.812 sinφ mGals/km. The maximum value occurs at 45° latitude where the correction amounts to 0.01 mGals per 12.2 meters.

The theoretical gravity formula accounts for three major phenomena that impact gravity measurements: 1) the Earth spins at different angular velocities at different latitudes thus producing different outward accelerations (resulting in a gravity reading different than that produced by a non-spinning body), 2) the Earth's ellipsoidal shape, and 3) the ellipsoidal bulges contain rock. Because of these effects, gravity measurements can vary considerably. The range goes from about 978,000 mGals at the equator to about 983,000 mGals at the poles for a total change of approximately 0.5%. Obviously, the formula involves some simplifying assumptions, including: 1) the Earth is homogeneous in lateral density distribution, 2) the observation point is static (not moving with respect to the Earth), and 3) the observation is made at sea level. The first assumption is, of course, wrong in the local sense since inhomogeneities are what we want to exploit when analyzing an area's geology. The second and third assumptions are the reasons it is necessary to make Eotvos (for marine and airborne surveys) and elevation corrections. In an attempt to make up for the incorrect assumptions made in the Earth Model it is necessary to make a series of corrections to gravity data.

The tidal correction is the factor applied to the gravity reading that compensates for the gravitational attraction of the Sun and Moon. The tide correction is a complex function with approximately twelve hours between peaks. The waveform is complex because it contains components that peak with periods of 12 hours, 24 hours, 14 days, and six months. The maximum peak to trough variation is about 0.3 mGals.

A drift correction is required because, over time, components within a gravity meter change their basic configuration slightly. Although these effects are very small, they should be removed whenever possible by re-measuring the gravity value at the same location at different times. Meter drift is assumed to occur in a linear or nearly linear manner over time, and it is usually recommended that repeat base station reading should be made on the order of every three or four hours.

Elevation is a critical factor in the measurement of gravity. The acceleration of gravity is highly dependent upon the distance from the center of mass of the Earth. Small elevation changes can result is relatively large variations in gravity compared to the gravity anomalies of interest. The free-air correction accounts for the fact that the gravity measurement was not made at sea level and is the derivative of *a* (acceleration of gravity) with respect to the station elevation *h* as follows:

$$\delta_{fa} = [(-2E_G h)/R_E]*[1-(3h/2R_E)]$$

where E_G is the average Earth gravity and R_E is the average Earth radius. This formula can be simplified to 0.09406 mGals/foot or 0.3086 mGals/meter. The free-air gravity value is calculated by adding the free-air correction and subtracting the theoretical gravity value from the absolute gravity value.

The free-air correction assumes that there is nothing (except air) between the observation point and sea level. Of course, this is not true. Thus a Bouguer correction is made to replace the “air” in the free-air correction with rock. The space between the gravity reading and the reference surface (generally sea level) is filled with an infinite horizontal slab of rock. The Bouguer correction formula for an infinite horizontal sheet is as follows:

$$\text{Bouguer Correction} = 2\pi G\rho h$$

Where G is the universal gravity constant, ρ is density in g/cm^3, and h is elevation in meters. The correction can also be expressed in differential form as:

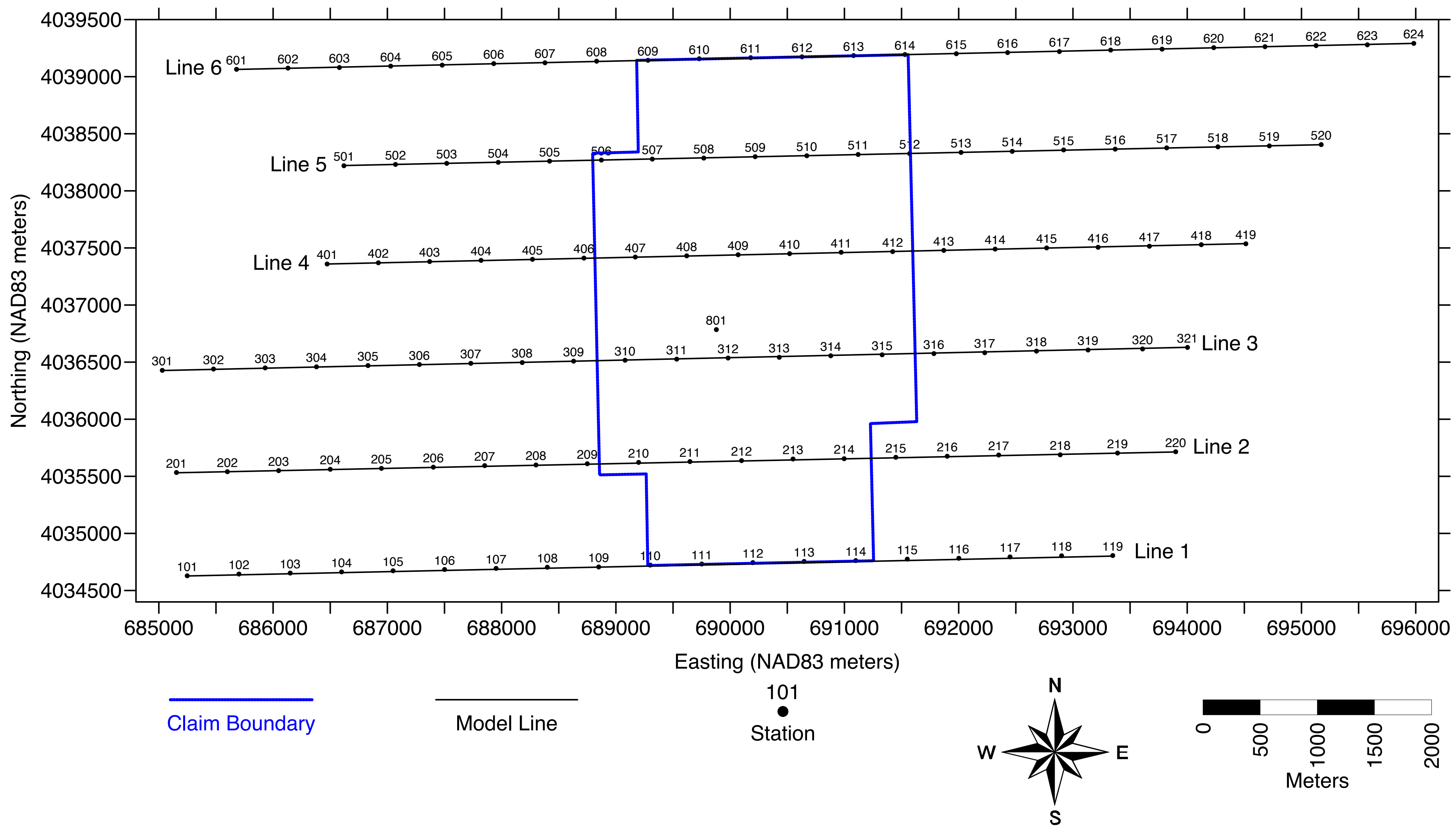
$$\delta g = 0.01278\rho \text{ mGal/foot or } \delta g = 0.04193\rho \text{ mGal/meter}$$

Two major assumptions are made: 1) that the elevation difference can be filled in with an infinite horizontal sheet, and 2) that the fill has a uniform mass (i.e., slowly varying density) distribution. The density of the Bouguer slab correction is generally chosen using what is termed the Nettleton method wherein the gravity data are reduced multiple times using different densities. The density that has the least correlation to the observed topography is taken as the best estimate of the density of the slab.

The terrain correction is an attempt to make the infinite slab assumption more realistic. The Bouguer correction assumes a perfectly flat infinite horizontal slab, while the terrain correction tries to account for the local topography. Since these variations can be very close to the observation point and their effect varies by the square of the distance, terrain corrections can be important in high relief areas. There are two forms of the Bouguer correction: with the terrain correction (complete Bouguer) and without the terrain correction (simple Bouguer). Mountains, that are positive departures from the plane, reduce the observed gravity because they pull the gravity meter’s sensor upward. Similarly, valleys reduce the observed gravity because they fail to pull the meter’s sensor downward as strongly as the assumption predicts.

Terrain corrections are made using a chart (*Hammer Chart*) that consists of a series of concentric zones (termed zones B through M). Each zone is divided into 4 to 16 compartments and each compartment is assigned a value that represents the difference between the station elevation (at the center of the chart) and the average elevation of the compartment. In relatively open areas, compartment elevation changes out to about 53 meters (Hammer zones B and C) from the observation point are generally estimated in the field. In areas with good digital elevation model (DEM) coverage, compartment elevations are estimated from about 53 to 22,000 meters (Hammer zones D through M) using those models.

Lithium Energy Products Inc.
Jacpot Lake, Nevada, Gravity Survey
Newly Acquired Station Locations Along Model Lines Map

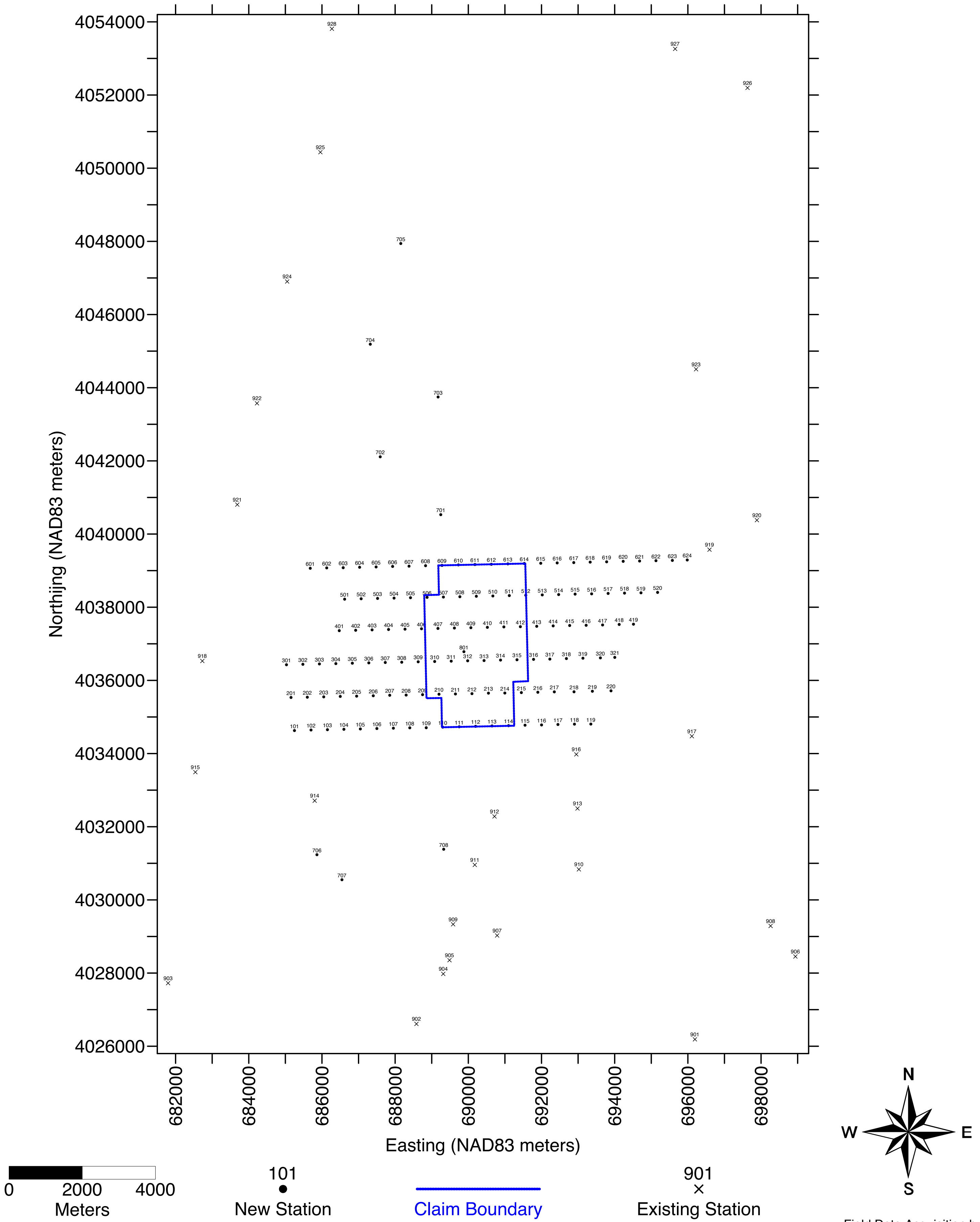


Hasbrouck Geophysics, Inc.

Figure 1

Field Data Acquisition by:
KLM Geoscience

Lithium Energy Products Inc.
Jacpot Lake, Nevada, Gravity Survey
Newly Acquired and Existing Public-Domain Station Locations Map



Hasbrouck Geophysics, Inc.

Figure 2

Field Data Acquisition by:
KLM Geoscience

Lithium Energy Products Inc.
Jacpot Lake, Nevada, Gravity Survey
Complete Bouguer Gravity Anomaly Map Alolng Lines 1 Through 6

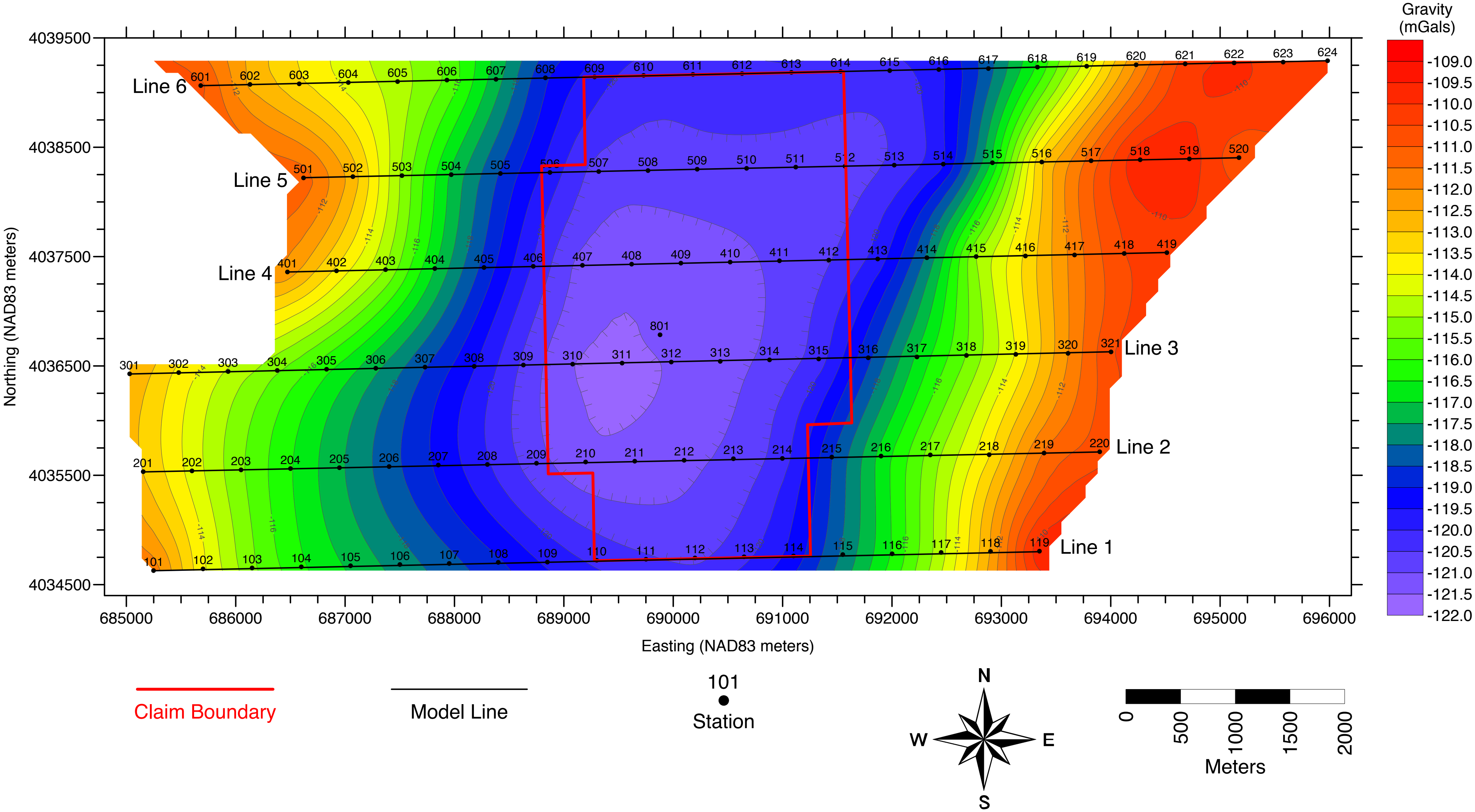


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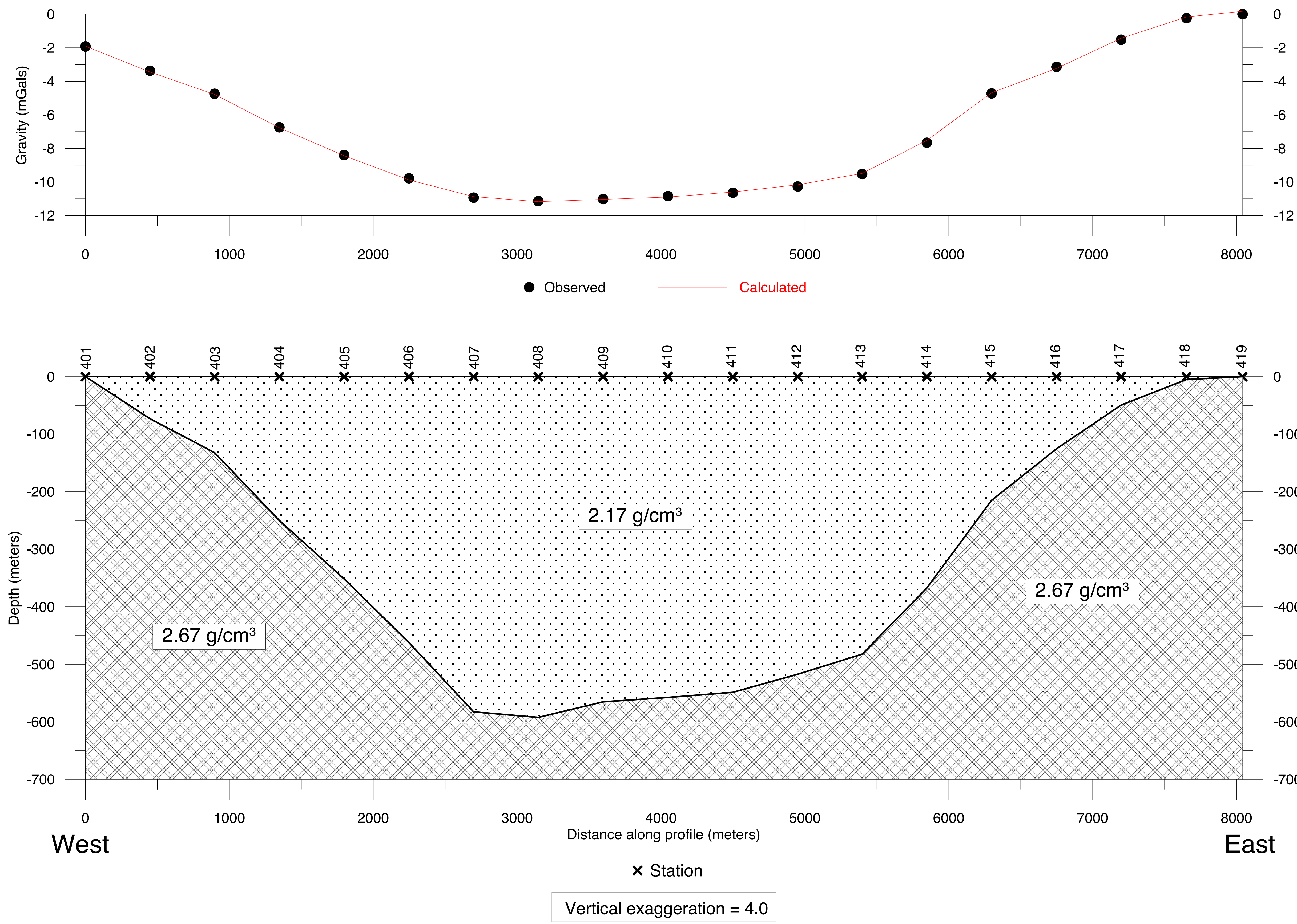
Figure 3

Field Data Acquisition by:
KLM Geoscience

Lithium Energy Products Inc.
Jackpot Lake Gravity Survey
Line 4 Complete Bouguer Gravity Anomaly and Modeled Depth



Hasbrouck Geophysics, Inc.

Lithium Energy Products Inc.
Jacpot Lake, Nevada, Gravity Survey
Newly Acquired and Existing Public-Domain Complete Bouguer Gravity Anomaly Map

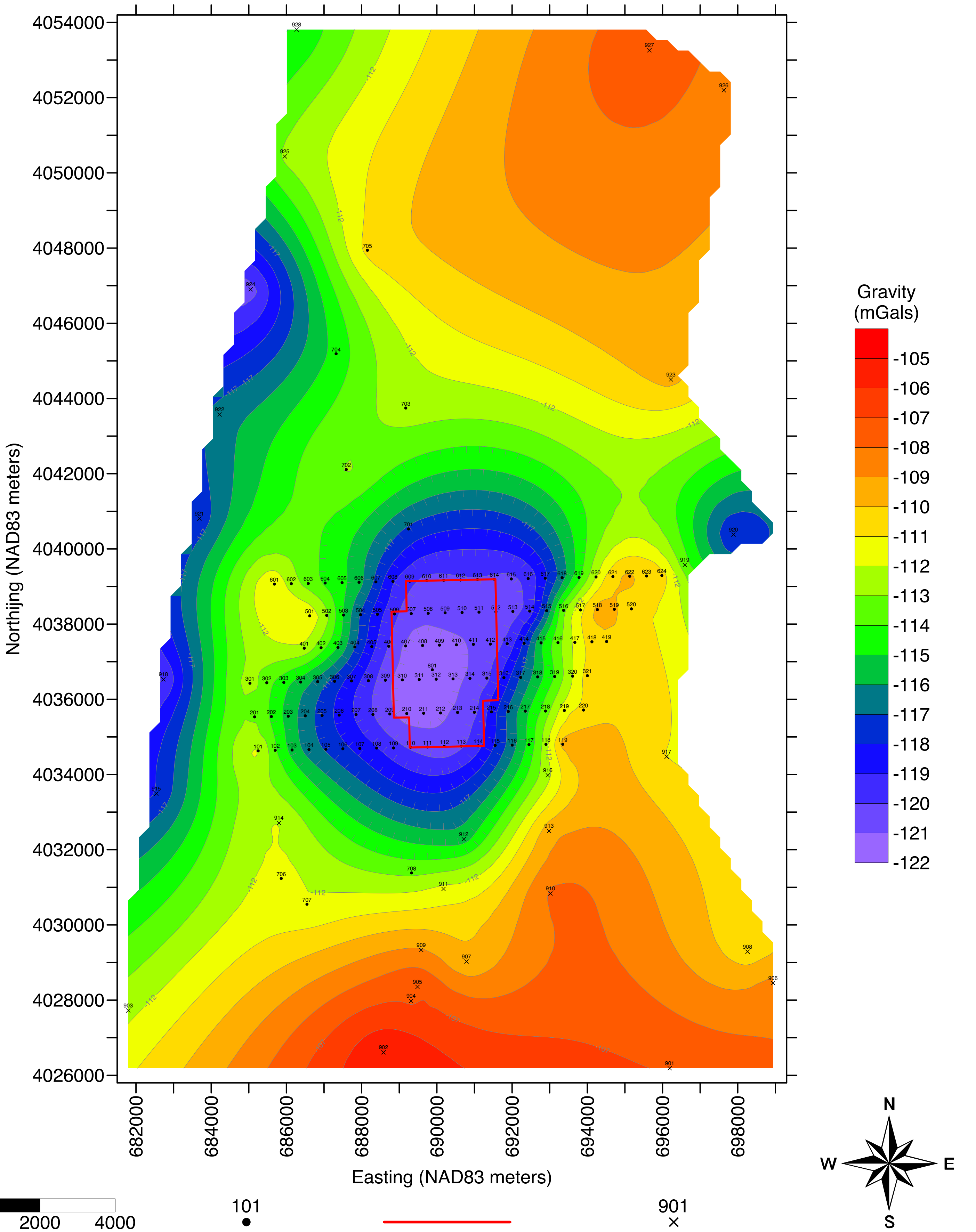


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Figure 4

Field Data Acquisition by:
KLM Geoscience

Lithium Energy Products Inc.
Jackpot Lake, Nevada, Gravity Survey
Modeled Bedrock Depth Map Along Lines 1 Through 6

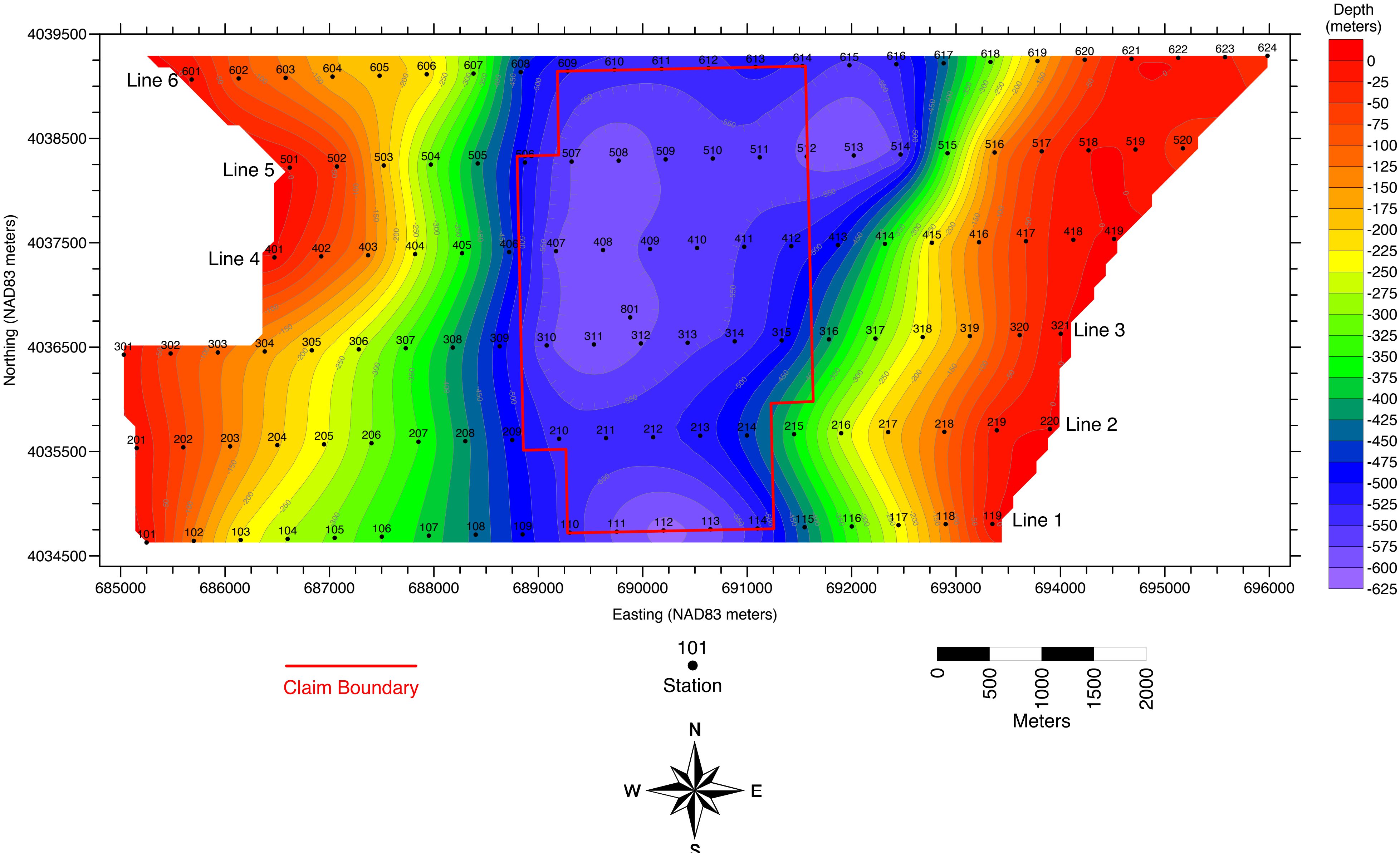

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Figure 5

Field Data Acquisition by:
KLM Geoscience

Lithium Energy Products Inc.
Jackpot Lake, Nevada, CSAMT/MT Survey
Proposed Station Locations Over Modeled Bedrock Depth Map With Utility Locations

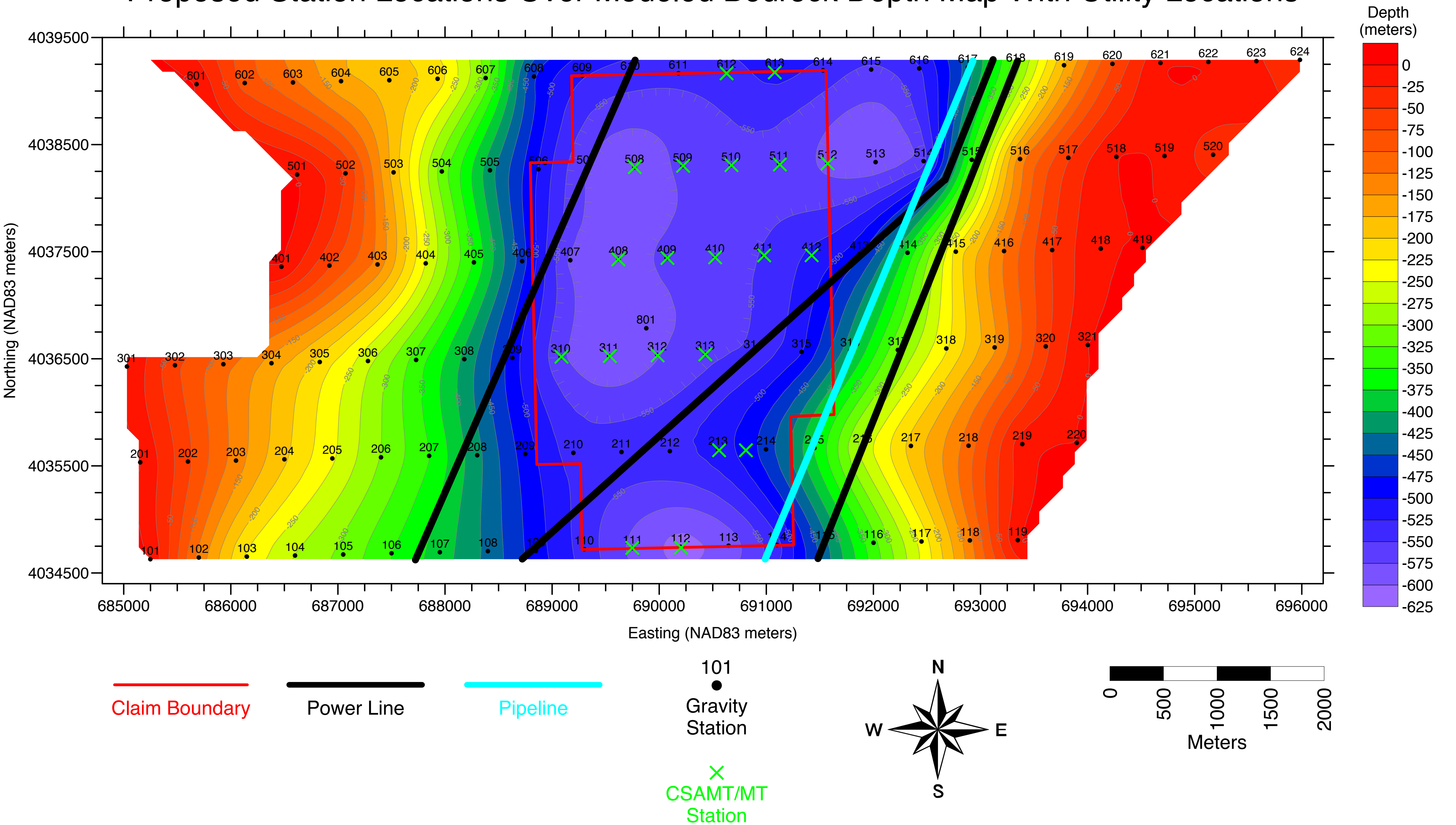

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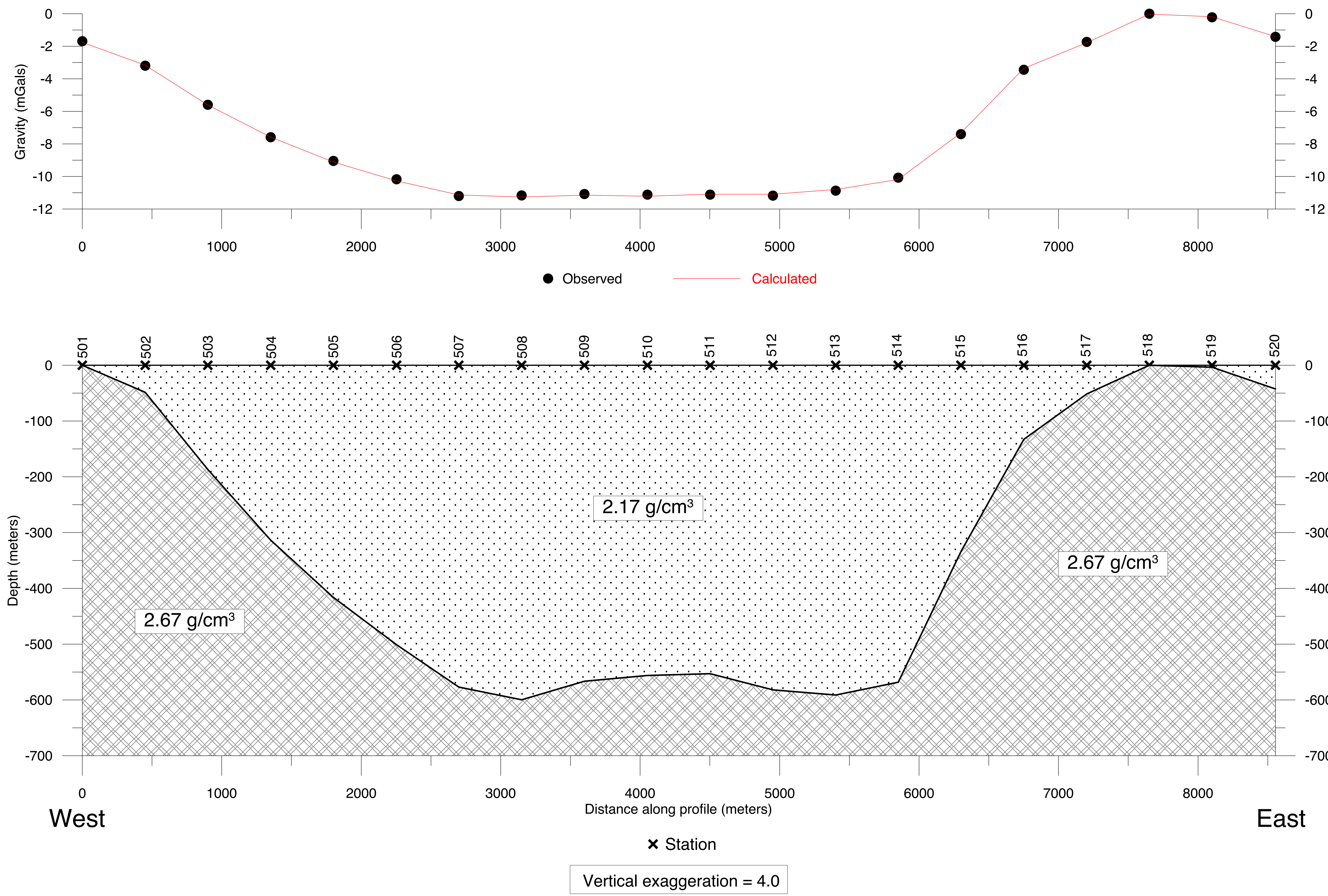
Figure 6

Lithium Energy Products Inc.
Jackpot Lake Gravity Survey
Line 5 Complete Bouguer Gravity Anomaly and Modeled Depth



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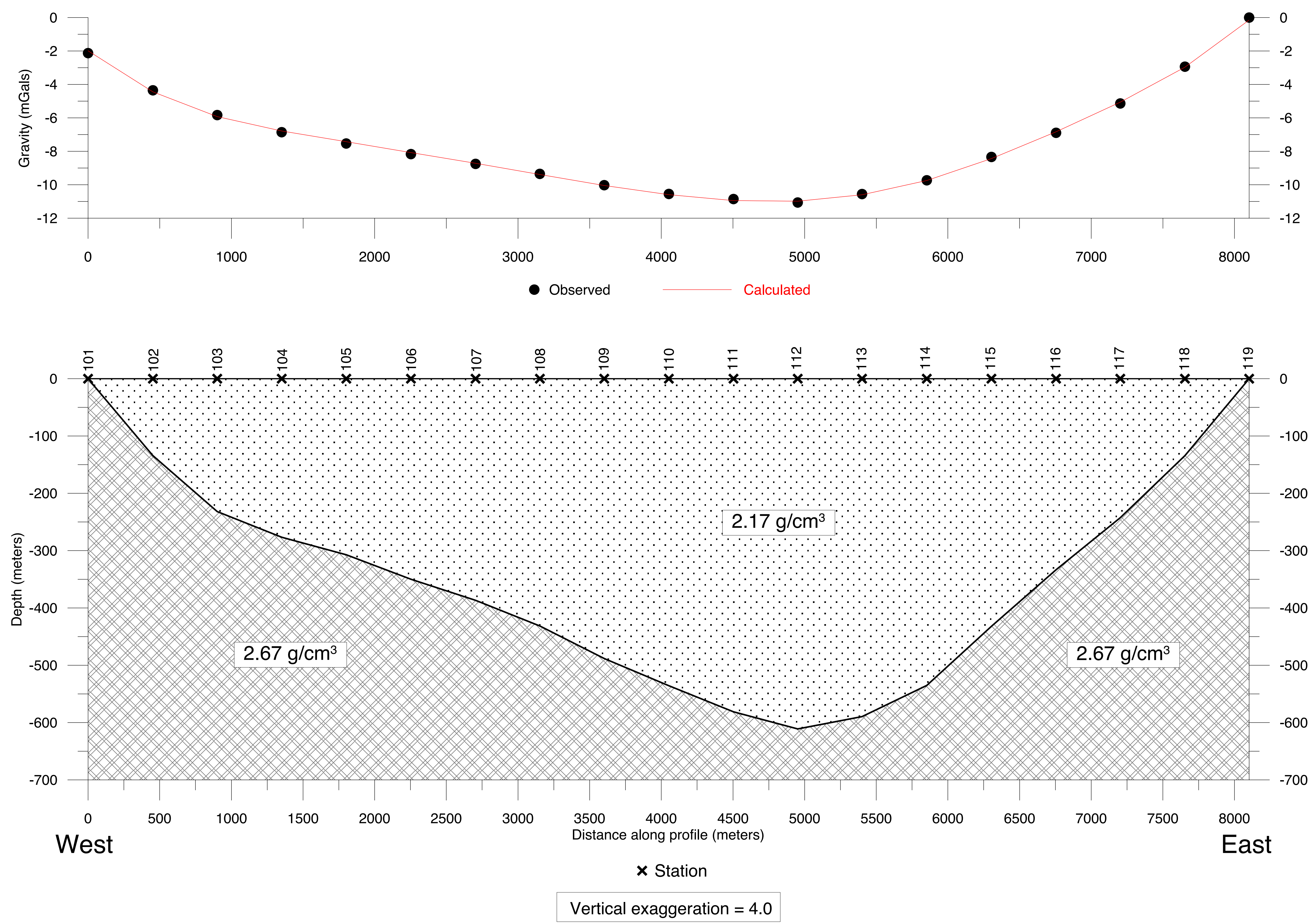
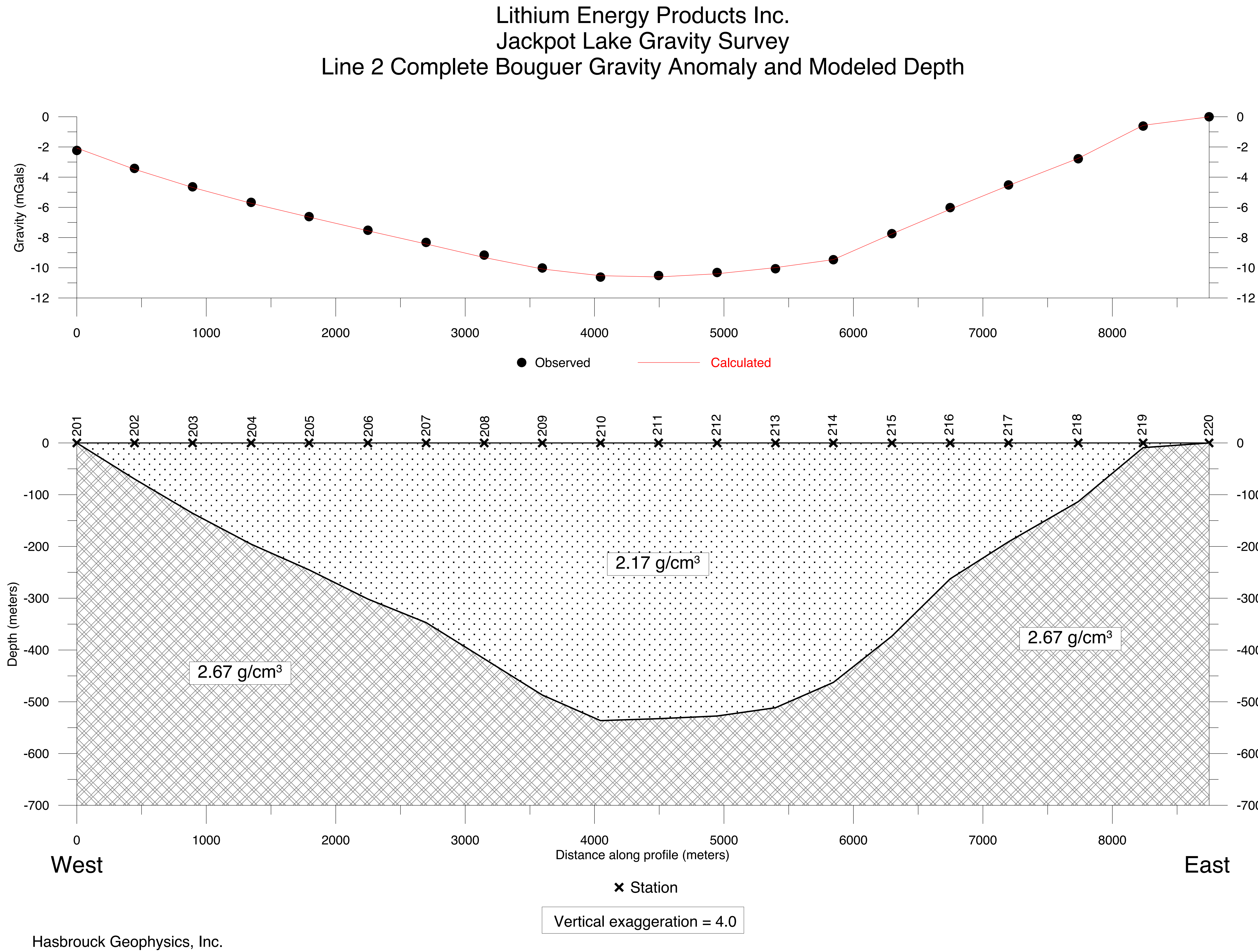
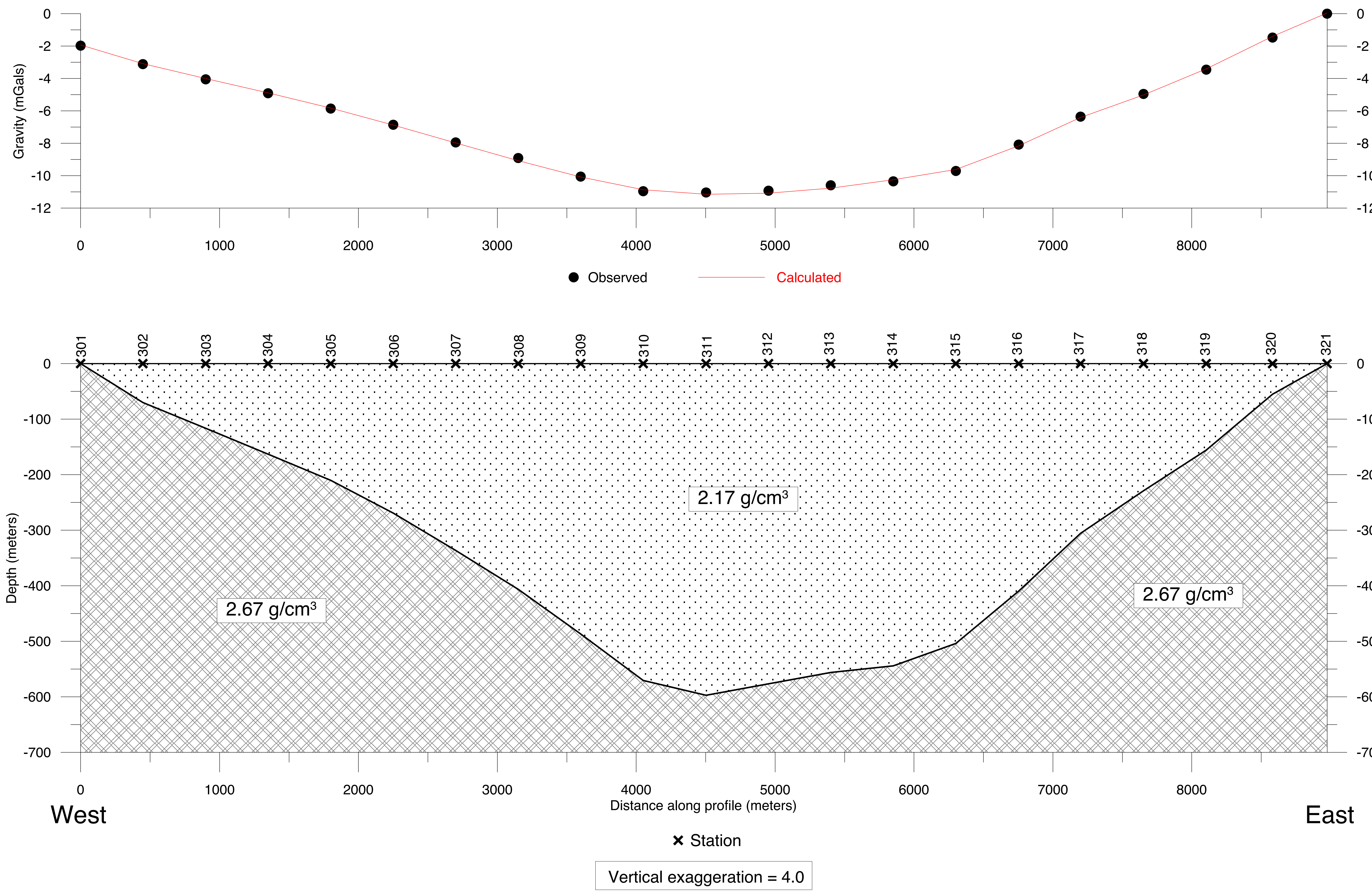
Lithium Energy Products Inc.
Jackpot Lake Gravity Survey
Line 1 Complete Bouguer Gravity Anomaly and Modeled Depth



Hasbrouck Geophysics, Inc.

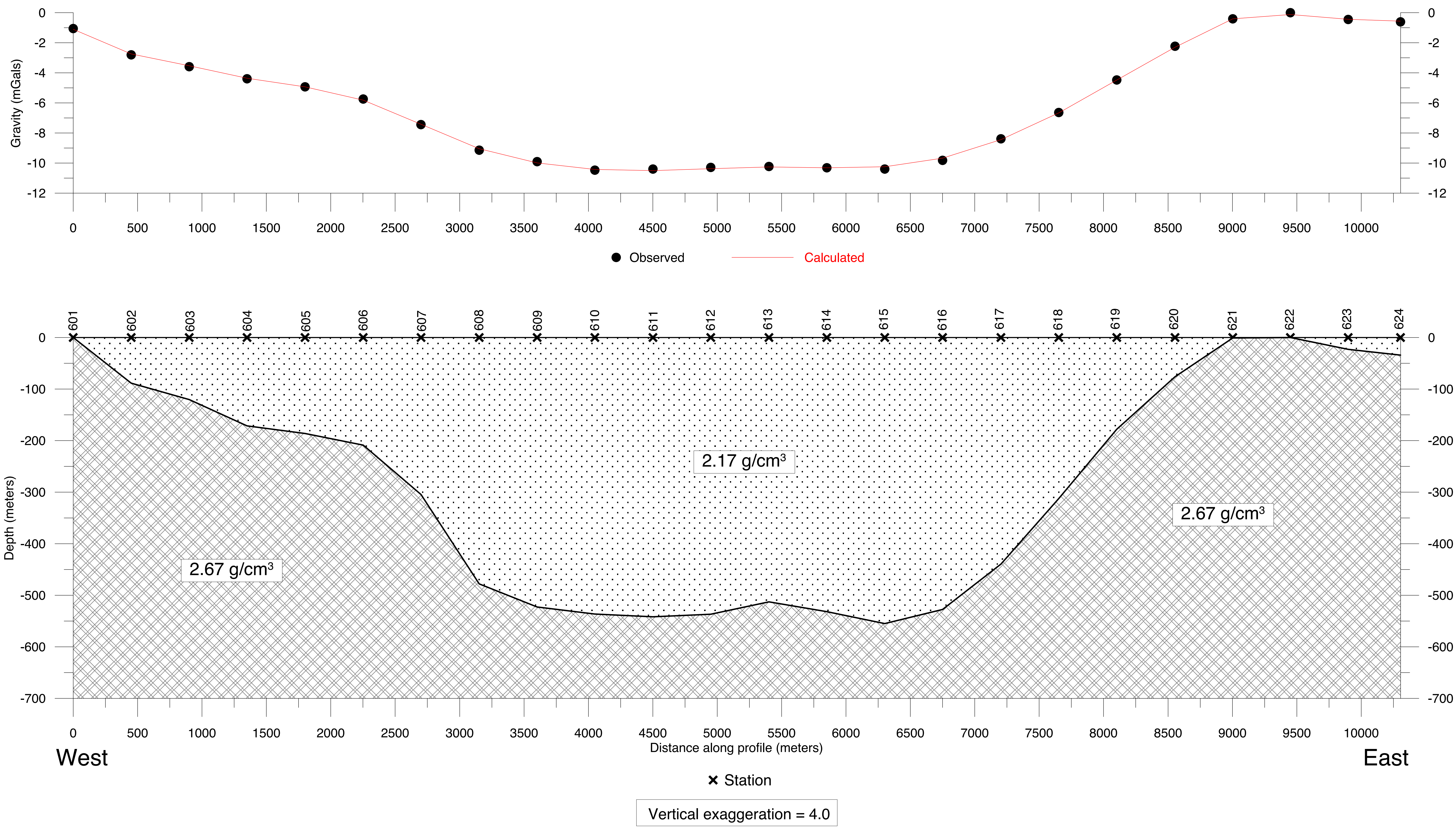

Lithium Energy Products Inc.
Jackpot Lake Gravity Survey
Line 2 Complete Bouguer Gravity Anomaly and Modeled Depth
Gravity (mGals)
0
-2
-4
-6
-8
-10
-12
0
1000
2000
3000
4000
5000
6000
7000
8000
Observed
Calculated
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
Depth (meters)
0
-100
-200
-300
-400
-500
-600
-700
2.17 g/cm³
2.67 g/cm³
2.67 g/cm³
Distance along profile (meters)
West
East
Station
Vertical exaggeration = 4.0
Hasbrouck Geophysics, Inc.

Lithium Energy Products Inc.
Jackpot Lake Gravity Survey
Line 3 Complete Bouguer Gravity Anomaly and Modeled Depth



Hasbrouck Geophysics, Inc.

Lithium Energy Products Inc.
Jackpot Lake Gravity Survey
Line 6 Complete Bouguer Gravity Anomaly and Modeled Depth



Hasbrouck Geophysics, Inc.