GEOMECHANICAL FEASIBILITY EVALUATION

FOR THE ARANZAZU UNDERGROUND MINE

Prepared for

AURA MINERALS, INC.

By

P. F. Cicchini
D. E. Nicholas
R. W. Cook
J. A. Beck
M. J. Thomasson
B. K. Nock

November 2017

CALL & NICHOLAS, INC.

TABLE OF CONTENTS

Appendices:

LIST OF TABLES

LIST OF TABLES (Continued)

LIST OF FIGURES

LIST OF FIGURES (Continued)

LIST OF FIGURES (Continued)

1.0 EXECUTIVE SUMMARY

As requested by Aura Minerals, Inc. (AMI), Call & Nicholas, Inc. (CNI) performed a feasibility-level geomechanical evaluation for the Aranzazu Underground mine located in Zacatecas, Mexico.

These recommendations are the results of Call & Nicholas, Inc.'s (CNI) stability and ground support analyses, as supported by historical core and data collected from the site between May and July, 2017. A geotechnical model, laboratory testing, and stability analyses were performed in support of the conclusions made in this study. The following subsections present a concise summary of CNI's recommendations for the Aranzazu Underground mine. Included in this chapter are the following:

1. Mine excavation dimensions for long hole open stoping
2. Minimum pillar distances (including sill pillar thickness) and sequencing
3. Backfill requirements
4. Ground support recommendations
5. Estimated mine in-flow of water

1.1 <u>Long Hole Open Stope Dimensions</u>

Table 1-1 presents the recommended long hole open stoping dimensions for Aranzazu mine. These dimensions are based on a 30-meter fixed height. AMI has selected the 30-meter fixed height to minimize the development required for level accesses at shorter level intervals. CNI did perform stope stability analyses at 20-meter heights for comparative purposes (Table 1-2). The results indicate only a marginal gain in stability can be expected from the shorter stope heights in rock quality with GMT less than 4.

A majority of mining at Aranzazu will be conducted in the transverse mining direction. Consequently, stope stability is controlled by the stope width, in which the stope end wall is within the Glory Hole Hanging Wall Fault contact and is typically a zone of lesser quality. To mine a greater volume of their ore reserve, AMI plans to mine at 10-meter widths in stopes which are surrounded by GMT (Geomechanical Material Type) 4 material or better. The lengths will not exceed 20 meters. Stopes that cannot be mined at the 10-meter width (GMT categories 1, 2, and 3) will not be mined.

While AMI had initially planned for stopes of 15-meter width, the analyses performed indicate that this may be too wide in areas of poor quality rock (GMT categories 4 or less). In a later phase of study, CNI believe that AMI can increase their production rates and maintain stability by increasing stope widths to 12-meters at GMT categories 4 or greater.

1.1.1 Overbreak Estimates

At the request of AMI, CNI have provided overbreak estimates for mining stopes of 10, 12.5, and 15 meters wide in GMT categories 2, 3, 4, 5, and 6. Mining of these widths in GMT categories 2, 3, and 4 will incur some amount of undesirable overbreak due to the insufficient ground quality to maintain stability. These overbreak and slough estimates are presented in Tables 1-3A, 1-3B, and 1-3C. CNI have delineated 2 types of overbreak:

1. Equivalent length of estimated overbreak – which is breakage beyond the blast line
2. Equivalent length of additional slough – which is a nominal 50% of the maximum depth of collapse due to poor rock quality

CNI recommend that AMI design their stopes to anticipate the initial estimated overbreak (i.e. include these estimated lengths as offsets in production blast hole designs). By accepting this initial overbreak, the total amount of undesirable dilution can be minimized to the additional slough. AMI are investigating the potential to mine particular stopes at widths beyond their stable configuration and to accept the nominal amount of dilution that will occur. This approach will be evaluated by AMI on an economic basis. However, it is important to note that the total amount of additional slough is difficult to estimate and further dilution from what CNI have provided will be likely in some cases.

1.1.2 Hanging Wall Scab Pillars

Poor rock quality is most common at the hanging wall contact, which when mining in the transverse direction, will be the end wall of the stopes. To mitigate additional overbreak and control the stability of the stopes when being mined 10 meters wide, CNI recommend that a 2-meter sacrificial “scab” pillar be left against the hanging wall. This will only apply when the hanging wall is of a GMT quality of 3 or less. The scab pillar will be of a nominal 2 meters thickness, established fully within the rock that is GMT 4 or greater.

1.2 <u>Pillar Stability and General Sequencing</u>

Aranzazu will be mined using a primary/secondary stoping sequence. As part of this mining method, primary stopes will be filled with cemented rock backfill (CRF), leaving a full width (10 meter) rock pillar between CRF filled primary stopes. The backfilled pillars will become the side walls of subsequent secondary stopes mined between the primary stopes. The secondary stopes can be filled with uncemented rock or run-of-mine waste (uneconomic rock). Typically, two primary stopes will be mined (and filled) in vertical alignment before a secondary stope is mined between the two lowermost primary stopes. A generalized primary/secondary stope layout is presented in Figure 1-1.

Using this sequence, pillars will be established between open stopes. To meet the production rates at Aranzazu, there might be times when two stopes will be mined simultaneously with a singular rock pillar (of 10-meter width) between, or even at times, only a singular CRF Pillar between them. The following subsections detail these scenarios.

1.2.1 Rock Pillars between Open Stopes

Rock pillars between primary stopes are expected to remain stable when pillars have RQDs exceeding 55 percent. Based on CNI's ground quality block model, less than 10 percent of the stopes at Aranzazu have an average RQD of less than 55 percent, and as a result may be unstable when left as a pillar between two open stopes. AMI plan to manage this risk during the operational planning phase. Should a wider stoping width be pursued in the future, such as at 12 meters, pillar stability will improve.

1.2.2 CRF Pillars between Open Stopes

Mining two secondary stopes with only a singular CRF pillar between them should be avoided when possible. AMI should attempt to schedule their stopes so that this scenario is avoided. However, CNI has recommended a CRF mixture which should remain stable provided that no more than a single CRF-filled pillar is stacked atop the active pillar (as presented in Figure 1-2).

1.2.3 Sill Pillar Thickness

AMI plans to leave a 10-meter thick sill pillar between the 1840-meter and 1850-meter elevations. This will be so that mining can take place in stopes above the 1850 level while development is still being established for mining at the lower elevations.

Based on CNI's rock quality model, the sill pillar will be comprised of the following GMT categories:

1. GMT 4 – 10%
2. GMT 5 – 47%

3. GMT 6 – 43%

CNI's evaluations indicate that the 10-meter sill pillar should remain stable when composed of GMT category 6 material (Figure 1-3). In cases where a substantial amount of the planned sill pillar is less than GMT 6, the 10-meter thickness may still be adequate because the sill pillar evaluation does not consider the additional support provided by the installed ground support. As-built sill pillar thickness less than 10 meters is not recommended. Where ground conditions are worse than anticipated, additional support will be required to maintain stability.

1.3 Backfill Requirements

To achieve nearly full ore recovery of mineable resources at Aranzazu, cemented rock backfill (CRF) will be used to fill primary stopes following their excavation. Minimum backfill strengths, their corresponding cement contents, and aggregate criteria are detailed below.

1. The CRF should achieve a minimum 2.75 MPa compressive strength (UCS).
   a. CNI estimates a 5 percent Portland cement binder requirement.
2. The water should be of potable quality.
3. The source aggregate will be unaltered and sulfide-free and have a UCS strength greater than or equal to 40 MPa.
4. The aggregate should be screened so that the material used is less than 2 inches (5 cm) but not less than 0.5 inches (1.25 cm). To achieve this:
   a. First screen the 2 inch (5 cm) passing material
   b. Then screen out the 0.5 inch (1.25 cm) passing material

Pillars composed of CRF with the criteria listed above are expected to remain stable provided that no more than one additional CRF-filled primary stope is stacked atop the active CRF pillar (Figure 1-2). If two CRF-filled stopes are stacked atop the active CRF pillar (Figure 1-2), a higher-strength CRF mixture of a minimum 8.3 MPa strength (~10 percent Portland cement content) will be required.

1.4 Ground Support Recommendations

Tables 1-4 and 1-5 present a summary of ground support recommendations for development access and production (stoping) access, respectively. The support for development/access drifting varies depending on the Q' rating (or GMT category) at a fixed width of 4.5 meters, whereas the support required in stope accesses (top and bottom cuts) varies based on both rock quality (GMT) at a 10 meter width.

Ground support for development drifting is considered to be permanent ground support and consequently is more substantial than what is installed in the stoping accesses, which are considered to be temporary.

Other support considerations include:

- When advancing secondary stope accesses alongside CRF, some spot bolting will still be needed to support zones of lesser quality CRF.
- While cable bolting is included in the support recommendations for stoping (Table 1-5), CNI questions the necessity plus second-pass cable bolting may cause unnecessary delays in production. CNI has included the cable bolt support at the request of AMI.
- In development accesses of extremely poor quality ground (Q' < 0.06), advance should include in-cycle fibercrete (20 cm thickness), lattice girders, and spiling should be considered to pre-support the face.

1.5 Estimated Mine Infiltration

Recent measured volumes of infiltrated water from 2015 to 2017 suggest a current infiltration rate between 10 and 20 liters per second. Estimated infiltration rates based upon regional precipitation and calculated recharge range up to 45 l/s and are provided in Figure 1-4.

As mining depth increases and localized depressurization continues, the hydraulic gradient relative to the regional water table will increase and may intensify the rate of infiltration. Expected annual variation in precipitation and its effect on infiltration should also be considered. Estimates of these effects are also described in Figure 1-4.

Significant short-lived infiltration events may occur when saturated fracture and fault zones are intercepted. Figure 1-5 outlines a range of estimated peak inflow rates based upon estimated fault zone geometry and hydraulic conductivity. Additional estimates of inflow duration and volume based upon these estimated geometries and porosity values are provided in Table 1-6.

Specific considerations regarding peak inflows include:

- The range of peak expected flow rates from a fault zone is approximately 5 to 35 l/s.
- The flow duration is estimated to range between 30 and 60 days for a 12 meter wide fault zone.

Based upon these calculations, CNI recommends the maintenance and installation of at least two (2) pumps, each with 50 l/s capacity in order to:

- Capture groundwater inflow from the estimated maximum 99th percentile average inflow rate, as shown in Figure 1-4.

- Capture groundwater inflow from highly permeable fault zones, as described above and in Figure 1-5.
- Maintain redundancy in case of pump failure.

1.6 Recommendations and Conclusions Going Forward

The conclusions and recommendations presented in this report are based on empirical methods that relate rock quality to observed performance in a variety of differing ground conditions. These correlations are inherently inexact as the variability of all controlling factors cannot realistically be fully accounted for. The application of these methods have neither been overly conservative nor overly aggressive but represent the best central estimates at the time of the study. Consequently, stope performance can be expected to have some variation as do the ground conditions themselves. All stope performance (dilution, overbreak & underbreak and wall stability) should be carefully documented to determine if the predicted performance matches, on average, the actual performance. This experience will allow for effective calibration of the geotechnical model and future design modifications to optimize the mining method and ground support (including CRF), and better define and predict dilution going forward.

The predicted ground conditions are based on a block model which relies on projections and assumptions from known data points (drill holes) to define regions where there is no data, much like a resource model. As the mine is developed, it will be important to diligently map ground conditions so actual conditions can be compared to model predictions. This is an iterative process and that deserves the same level of attention as updates to the resource model. As new information becomes available it should be used to periodically update the model and improve it as a predictive tool.

Subsequent to the field work that was undertaken by CNI to audit the historical logged database before it was used as input to develop the rock quality block model, Aura geologists and a third party consultant performed a second audit on the historical data. The second audit involved re-logging of additional segments of the drill core and concluded that there was acceptable agreement between the historical logged character of the drill core and that obtained from the re-logging exercise. Where discrepancies were identified, they ranged from basic input errors to inaccurate logging. It is critical that this information is corrected to fine-tune the model. Periodic QA/QC audits of the data will be a necessary component of future database management.

As part of best practices in the industry, annual or bi-annual sites visits should be conducted to review ground conditions, support performance, and overall stope performance. Often these audits can quickly identify upside potential or solutions to problematic areas that do not get the warranted attention due to the demands on resources to support day-to-day operations. An important goal is to develop proactive strategies rather than a reactive ones.

Table 1-1. Stable Stope Dimensions at 30m Heights
Aranzazu Mine, Aura Minerals, Inc., 2017

Q - Prime	GMT	Transverse		Longitudinal	
		Width (m) [1]	Length (m) [2]	Width (m) [1]	Length (m) [2]
< 0.6	1	Not Stope-able (Requires Widths Less Than 5m)		Not Stope-able (Requires Widths Less Than 5m)	
0.6 - 1.0	2	5.5	6.5	6.5	5.5
1.0 - 2.0	3	7	8	8	7
2.0 - 4.0	4	10	11.5	11.5	10
4.0 - 6.0		15	17	17	15
6.0 - 8.0	5	18	20	21.5	18
8.0 - 10.0		21.5	20	26.5	20
> 10.0	6	25	20	31	20

[1] Dimension Controlled by Stability of the Hanging Wall
[2] Dimension Controlled by Stability of the Side Wall

Table 1-2. Stable Stope Dimensions at 20m Heights
Aranzazu Mine, Aura Minerals, Inc., 2017

Q - Prime	GMT	Transverse		Longitudinal	
		Width (m) [1]	Length (m) [2]	Width (m) [1]	Length (m) [2]
< 0.6	1	Not Stope-able (Requires Widths Less Than 5m)		Not Stope-able (Requires Widths Less Than 5m)	
0.6 - 1.0	2	6	7	7	6
1.0 - 2.0	3	8	10	10	8
2.0 - 4.0	4	12	14.5	14.5	12
4.0 - 6.0	5	19	24	24	19
6.0 - 8.0		26	32	32	26
8.0 - 10.0		28	34	34	28
> 10.0	6	28	36	36	28

[1] Dimension Controlled by Stability of the Hanging Wall
[2] Dimension Controlled by Stability of the Side Wall

Table 1-3A. Overbreak & Slough Estimates at Stope Widths of 10 meters
Aranzazu Mine, Aura Minerals, Inc., 2017

GMT	Q - Prime	Empirical Estimation of Overbreak & Slough For Unsupported Hangingwall		
		Stope Width (m)	*Equivalent Length of Estimated Overbreak (m)	++Equivalent Length of Additional Slough (m)
1	< 0.6	Not Stope-able		
2	0.6 - 1.0	10.0	2.0	1.5
3	1.0 - 2.0	10.0	2.0	0.5
4	2.0 - 4.0	10.0	1.0	< 0.5
5	4.0 - 10.0	10.0	< 0.5	< 0.5
6	> 10.0	10.0	< 0.5	< 0.5

*Breakage Beyond the Blast Line
++ Nominal 50% of the Maximum Depth of Collapse

Table 1-3B. Overbreak & Slough Estimates at Stope Widths of 12.5 meters
Aranzazu Mine, Aura Minerals, Inc., 2017

GMT	Q - Prime	Empirical Estimation of Overbreak & Slough For Unsupported Hangingwall		
		Stope Width (m)	*Equivalent Length of Estimated Overbreak (m)	++Equivalent Length of Additional Slough (m)
1	< 0.6	Not Stope-able		
2	0.6 - 1.0	12.5	2.0	2.0
3	1.0 - 2.0	12.5	2.0	0.5
4	2.0 - 4.0	12.5	1.0	0.5
5	4.0 - 10.0	12.5	< 0.5	< 0.5
6	> 10.0	12.5	< 0.5	< 0.5

*Breakage Beyond the Blast Line
++ Nominal 50% of the Maximum Depth of Collapse

Table 1-3C. Overbreak & Slough Estimates at Stope Widths of 15 meters
Aranzazu Mine, Aura Minerals, Inc., 2017

GMT	Q - Prime	Empirical Estimation of Overbreak & Slough For Unsupported Hangingwall		
		Stope Width (m)	*Equivalent Length of Estimated Overbreak (m)	++Equivalent Length of Additional Slough (m)
1	< 0.6	Not Stope-able		
2	0.6 - 1.0	15.0	2.0	3.0
3	1.0 - 2.0	15.0	2.0	1.0
4	2.0 - 4.0	15.0	1.0	0.5
5	4.0 - 10.0	15.0	< 0.5	< 0.5
6	> 10.0	15.0	< 0.5	< 0.5

*Breakage Beyond the Blast Line
++ Nominal 50% of the Maximum Depth of Collapse

Table 1-4. Access Ground Support Requirements (4.5m Width)
Aranzazu Mine, Aura Minerals, Inc., 2017

GMT	Q - Prime	Support	Note
1	< 0.6	2.4m #5 Rebar on 1.2m Spacing & 200mm Fibercrete; Fully Encased Lattice Girders on 1.5m Centers	Ribs and Back; Lattice Girders and Spiling as Needed
2	0.6 - 1.0	2.4m #5 Rebar on 1.2m Spacing & 75mm Fibercrete	Ribs and Back
3	1.0 - 2.0	2.4m #5 Rebar on 1.2m Spacing & 75mm Fibercrete	Ribs and Back
4	2.0 - 4.0	2.4m #5 Rebar on 1.2m Spacing & 50mm Fibercrete	Ribs and Back
5	4.0 - 10.0	2.4m #5 Rebar on 1.4m Spacing & 10cm / 6Ga. Welded Wire Mesh	Ribs and Back
6	> 10.0	2.4m #5 Rebar on 1.8m Spacing & 10cm / 6Ga. Welded Wire Mesh	Back Only

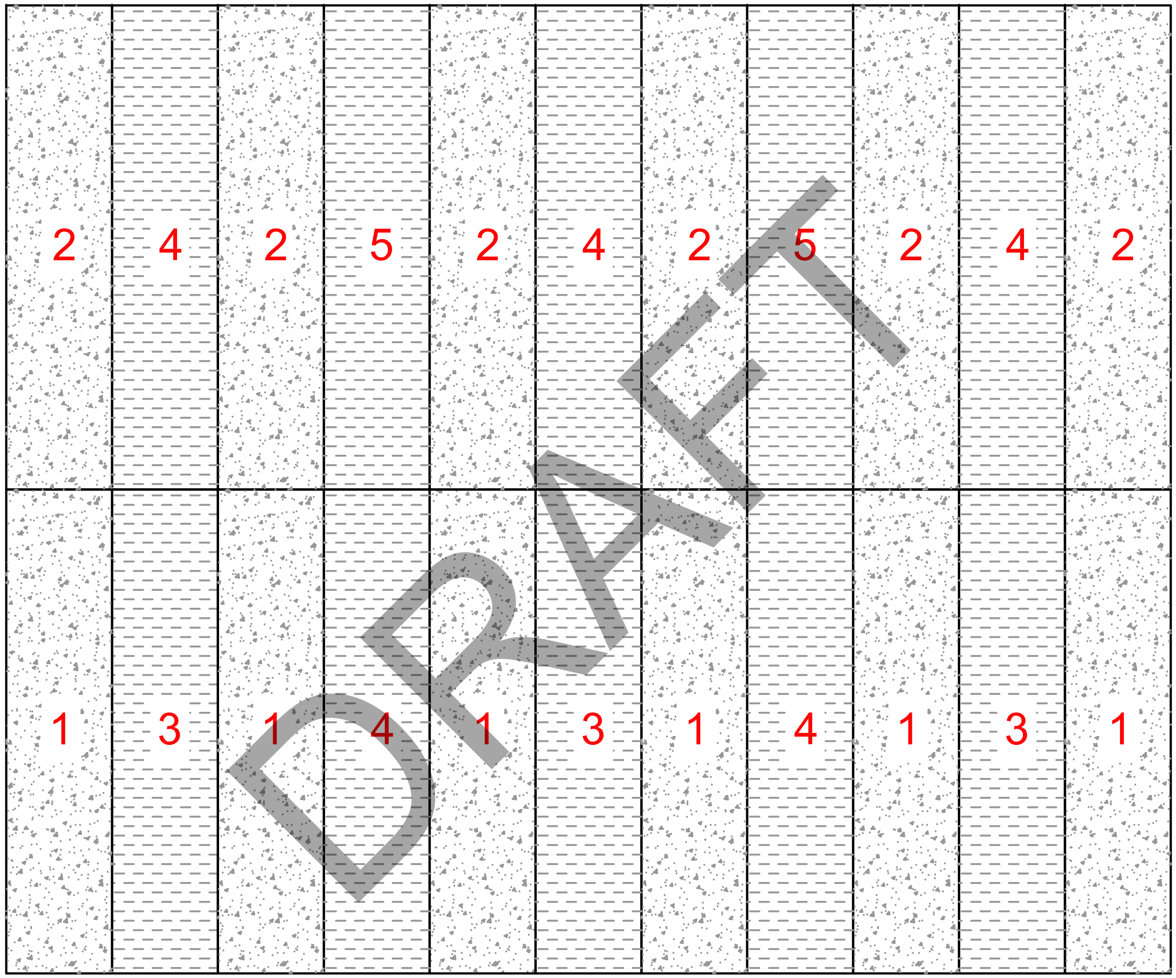
Table 1-5. Stoping Ground Support Requirements
Aranzazu Mine, Aura Minerals, Inc., 2017

GMT	Q - Prime	Stope Ground Support Summary	
		Width (m)	Support
1	< 0.6	Not to be Stoped	
2	0.6 - 1.0	Not to be Stoped	
3	1.0 - 2.0	Not to be Stoped	
4	2.0 - 4.0	10.0	2.4m Rebar / Std. Swellex on 1.2m Spacing & 5m cable bolts on 2.5m Spacing
5	4.0 - 10.0	10.0	3.2m Rebar / Std. Swellex on 1.6m Spacing & 5m cable bolts on 2.5m Spacing
6	> 10.0	10.0	3.2m Rebar / Std. Swellex on 1.6m Spacing & 5m cable bolts on 2.5m Spacing

*All Bolting is Pattern Bolted with 10cm / 6Ga. Welded Wire Mesh

Table 1-6. Estimated Peak Inflow Duration and Volume
Aranzazu Mine, Aura Minerals, Inc., 2017

		Flow Duration (days)			Total Inflow Volume (m3)		
		500 m Fault Length			500 m Fault Length		
		Porosity			Porosity		
		5%	7.5%	10%	5%	7.5%	10%
Fault Width (m)	2	3	4	6	1,500	2,250	3,000
	7	6	9	12	5,250	7,875	10,500
	12	29	43	58	9,000	13,500	18,000



LEGEND

MINING SEQUENCE

PRIMARY STOPE - CRF FILL

SECONDARY STOPE - WASTE FILL

CALL & NICHOLAS, INC.

TUCSON, ARIZONA USA

DRAWN	DATE	REVISED
RWC	10/17	10/12/2017 2:29 PM

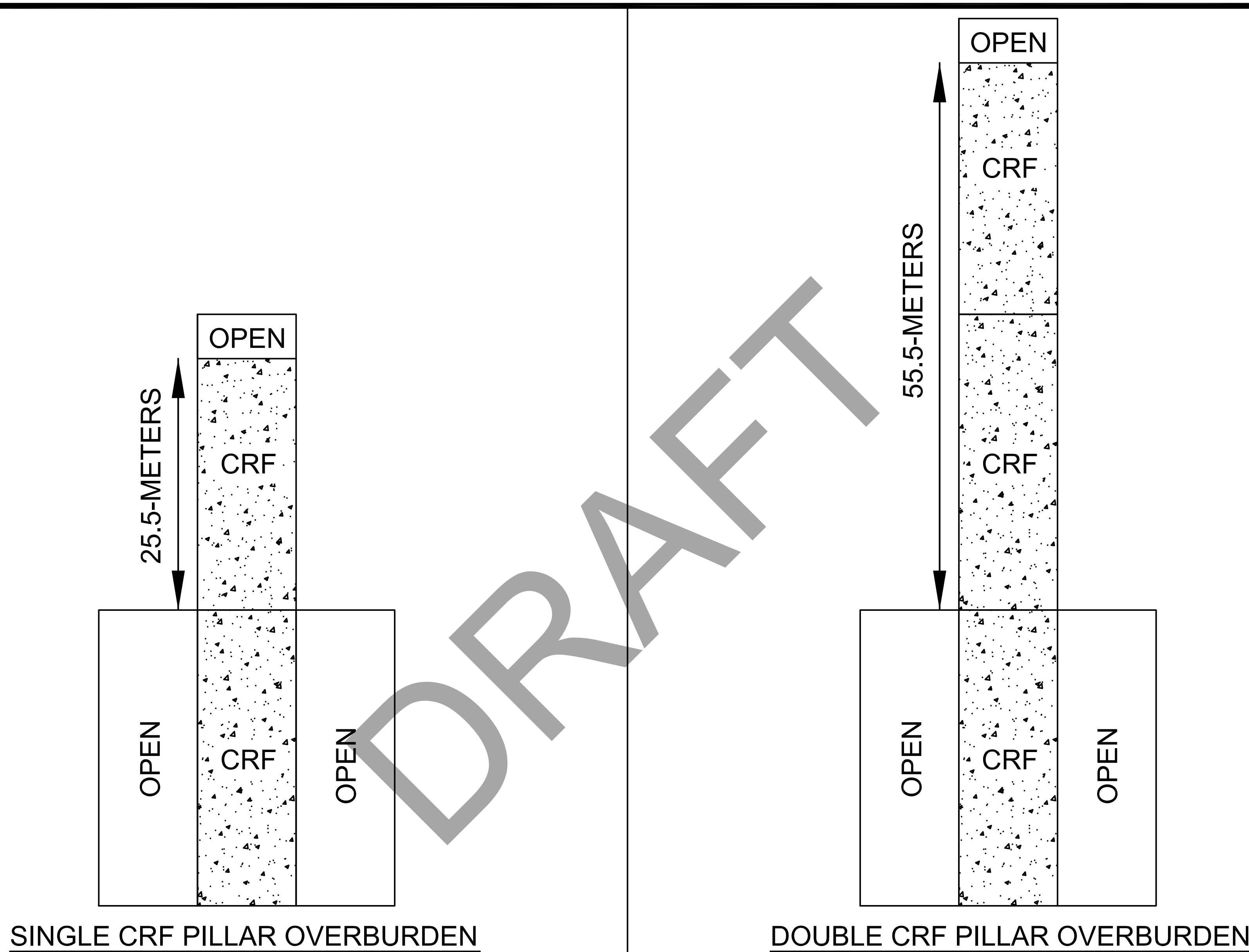
\2017_REPORT\FIGURES\FIG1-1_STOPELLAYOUT.DWG

GENERAL PRIMARY / SECONDARY STOPE LAYOUT

ARANZAZU

SCALE N.T.S.

FIGURE 1-1



LEGEND

CALL & NICHOLAS, INC.
TUCSON, ARIZONA USA

DRAWN RWC | DATE 10/17 | REVISED 10/12/2017 1:51 PM

\2017_REPORT\FIGURES\FIG1-2_CRF_PILLARS.DWG

CRF PILLAR LOADING SCENARIOS

ARANZAZU

SCALE N.T.S. | FIGURE 1-2

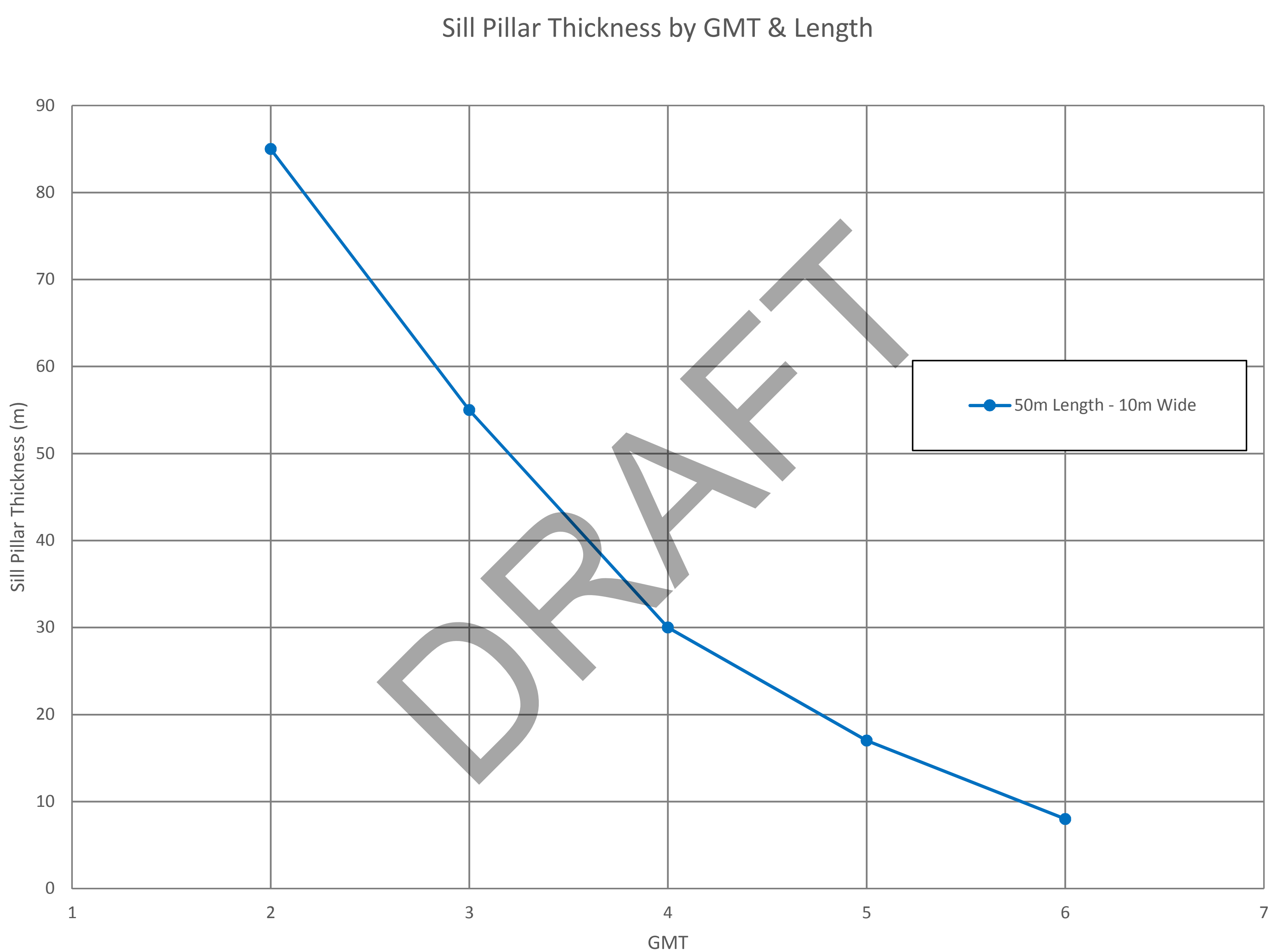


Figure 1-3. Sill Pillar Thickness by GMT
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

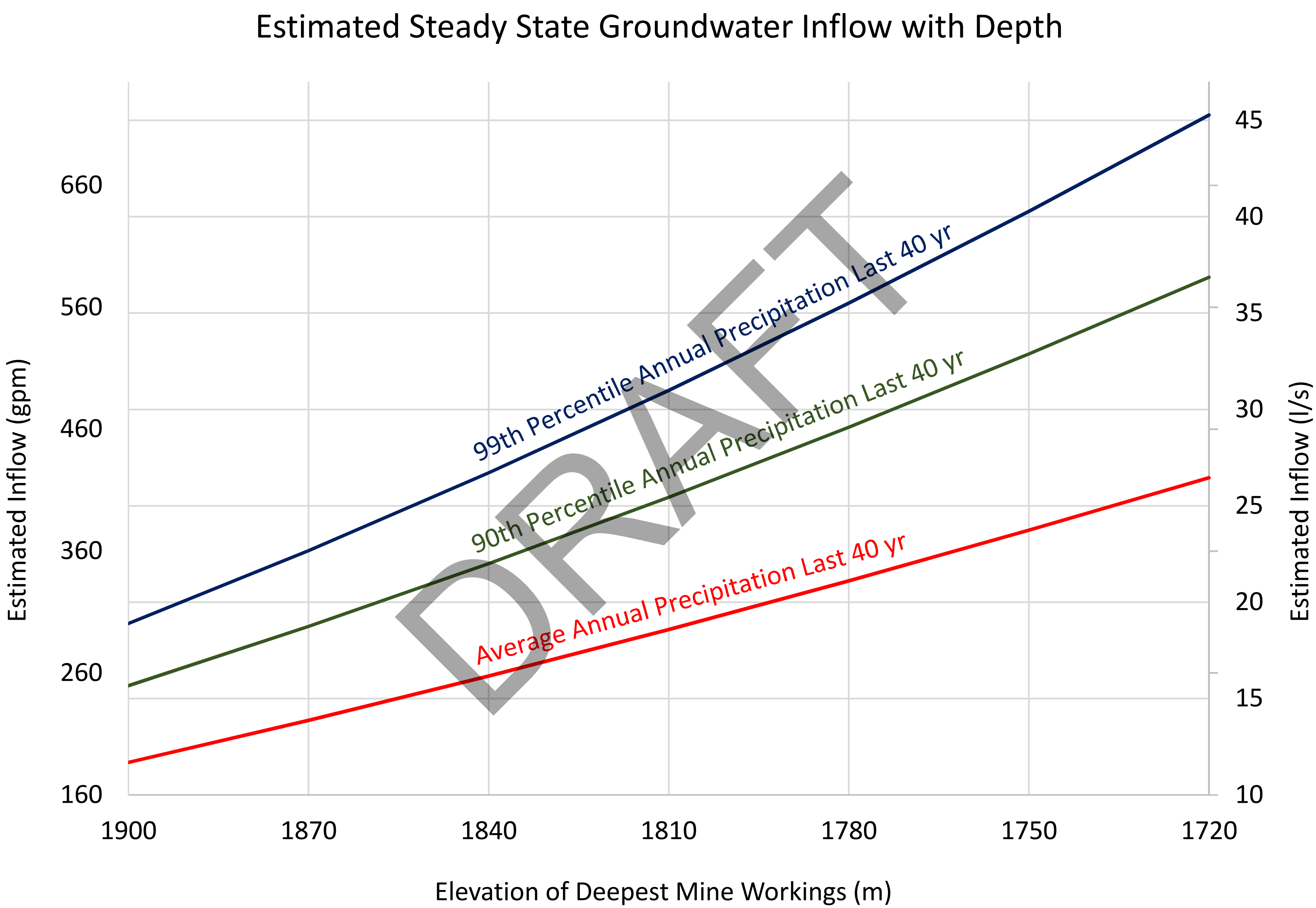


Figure 1-4. Estimated Steady State Groundwater Inflow with Depth
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

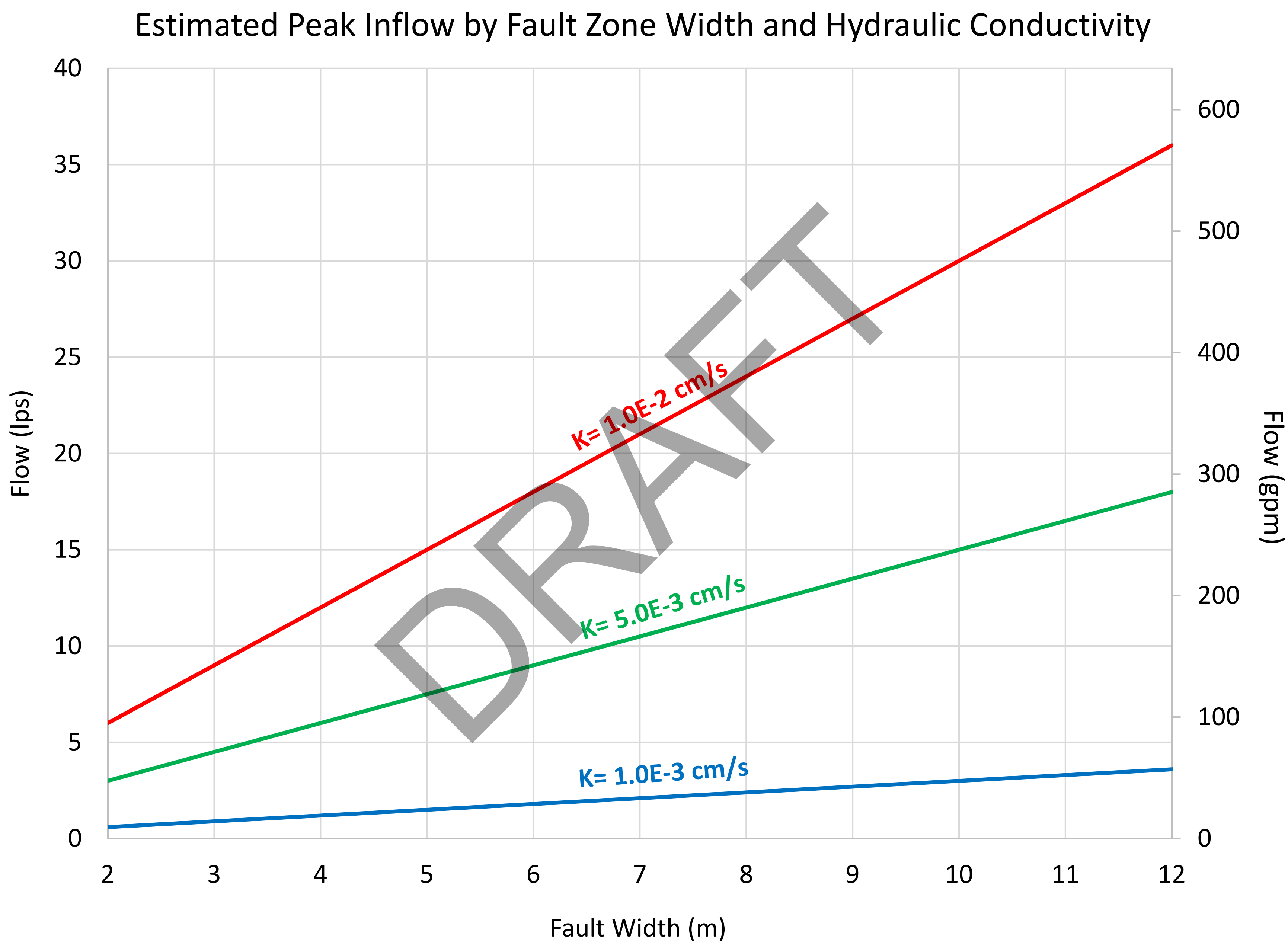


Figure 1-5. Estimated Peak Inflow by Fault Zone Width and Hydraulic Conductivity
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

2.0 INTRODUCTION

This report presents the results of Call & Nicholas, Inc.'s (CNI) geotechnical study for the feasibility-level evaluation for Aura Minerals Inc.'s (AMI) Aranzazu Underground mine located in the town of Concepcion Del Oro in Zacatecas, Mexico. The purpose of this study is to generate design guidelines that include:

1. Stable mining dimensions and their required ground support (length and type of support) to achieve stability
2. Backfill requirements
3. General pillar and sequencing criteria
4. Hydrogeology infiltration estimates

As part of this project, drilling was conducted and geomechanical and oriented core logging was performed by both CNI engineers and geologists, as well as AMI staff geologists. Laboratory testing was conducted on core samples collected from geotechnical drill holes. Site visits were performed to evaluate ground conditions and to oversee the drilling program.

2.1 Memoranda

In addition to this report, the following memoranda were published regarding the evaluation:

- *Aranzazu Mine July 2017 Site Visit*
- *Aranzazu Geomechanical Drill Hole Database Validation* (July 2017)

Furthermore, CNI provided preliminary stope dimension recommendations in the following memo which was used as part of a scoping study for Aranzazu:

- *Aranzazu Stope Dimension Analysis July 2015*

3.0 ENGINEERING GEOLOGY

The Aranzazu Underground deposit is located in the Sierra Madre Oriental geologic terrain, which is characterized by Jurassic and Cretaceous carbonates and clastic sediments intruded by Laramide-age magmatism and northeastern-oriented compression related folding (Sedlock, 1993). The Aranzazu deposit consists of near vertical northeasterly dipping tabular skarn ore bodies striking approximately 900 meters, a width of 40 meters, and a height of 300 meters. The deposit is sub-divided into 5 primary targets: 1) Glory Hole – Hanging Wall, 2) Glory Hole – Footwall, 3) Mexicana South, 4) Mexicana, and 5) BW. Transverse faults have been interpreted by Aura Minerals as offsetting the mining targets.

3.1 Rock Types

The modeled rock types of the Aranzazu deposit are as follows:

1. Skarn – Massive sulfide ore body consisting of endoskarn to exoskarn alteration proximal to intrusive bodies.
2. Hornfels –Metasomatic clastic rocks with variable amount of carbonates present, often intermixed with porphyritic intrusions and massive sulfide skarns.
3. Marble – Skarn altered, thickly bedded Cretaceous age limestones. The Marble is stratigraphically younger than Hornfels rock types and forms the northern-most hanging wall of the deposit.
4. Intrusive – Modeled intrusive solid was observed as two separate intrusive occurrences: 1) Granodiorite forming southern-most footwall rocks referred to as Intrusive in report and 2) Quartz monzonite porphyry (locally referred to as Porphido Norte) which occurs interior to the intrusive and marble boundaries and referred to as Porphyry in report.

Reference cross section locations are shown in Figure 3-1. Cross section and plan view of interpreted geology and faults are presented in Figures 3-2 and 3-4. Interpretation of geology wireframes were not updated since the CNI's 2015 study and a geologic block model was coded from the provided rock type wireframes. Rock types are subdivided into geotechnical rock types based on site observations and geostatistical analysis described in Chapter 4.

3.2 Major Structures

Fault surfaces remain unchanged since the CNI's 2015 study. Generally, there are two main structure systems modeled in Aranzazu deposit (Dip Direction/Dip): 1) Bedding sub-parallel (025/70), and 2) Transverse (325/85). Transverse faults are modeled as cross-cutting bedding parallel faults with a sinistral (left-lateral) sense of displacement (Figure 3-5). A fault breccia associated with a fall of ground in a transverse dead-end drift on the 2020 level, observed during CNI's August 2017 site visit, was interpreted as associated with bedding-parallel faulting. The fault breccia was comprised of strongly chloritically-altered clasts of hornfels and limestone. Interpretations and implications of these observations are discussed below in Section 4.2.1.

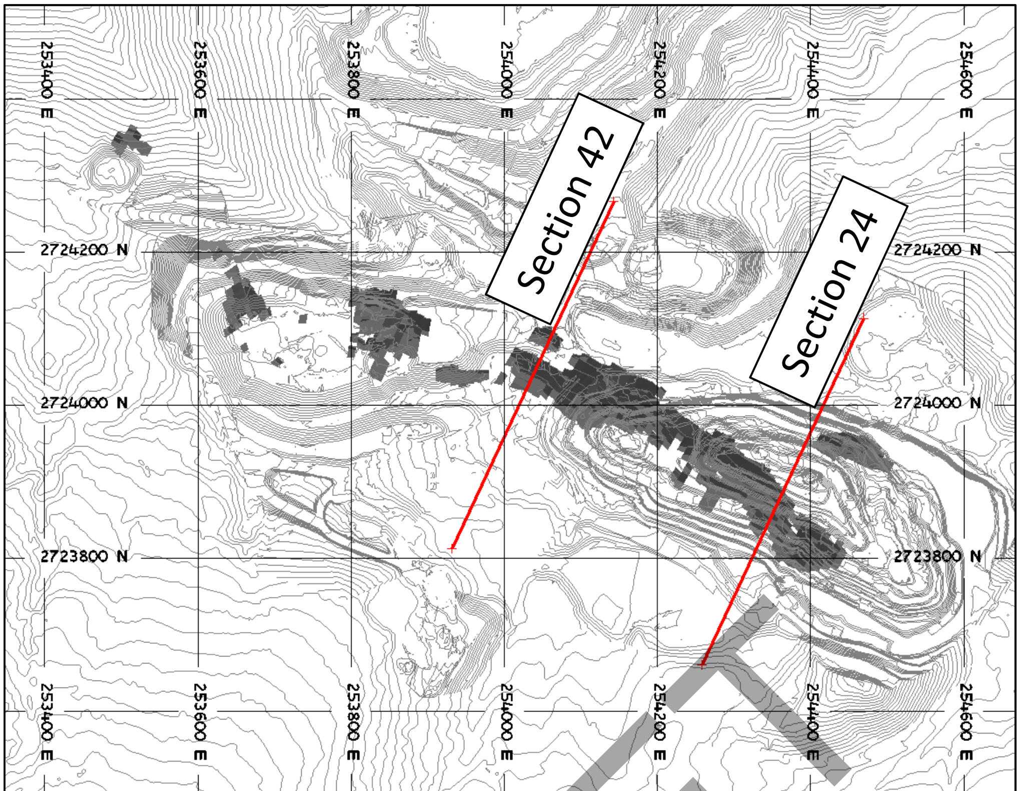


Figure 3-1. Report Cross Section Locations Relative to 10 Meter Stope Shapes (Grey) and Current Pit Topography

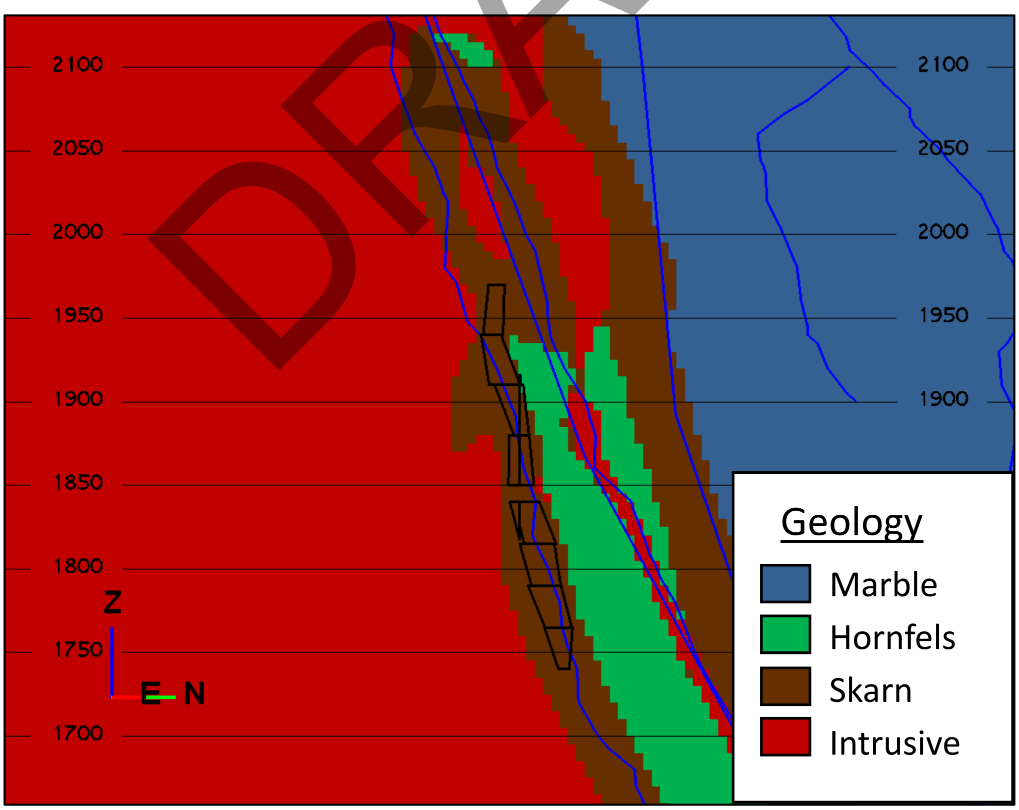


Figure 3-2. Cross Section (24) Presenting Interpreted Geology Boundaries, Fault Traces (Blue), and 10 Meter Stope Shapes (Black) (Looking Northwest).

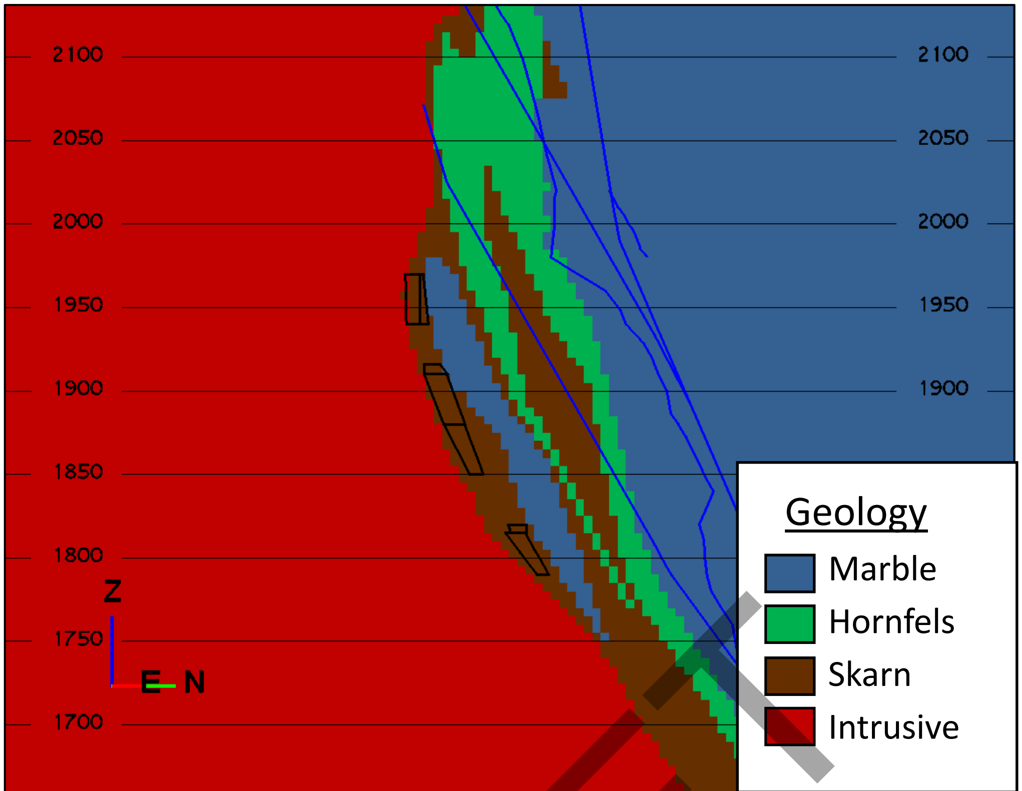


Figure 3-3. Cross Section (42) Presenting Interpreted Geology Boundaries, Fault Traces (Blue), and 10 Meter Stope Shapes (Black) (Looking Northwest).

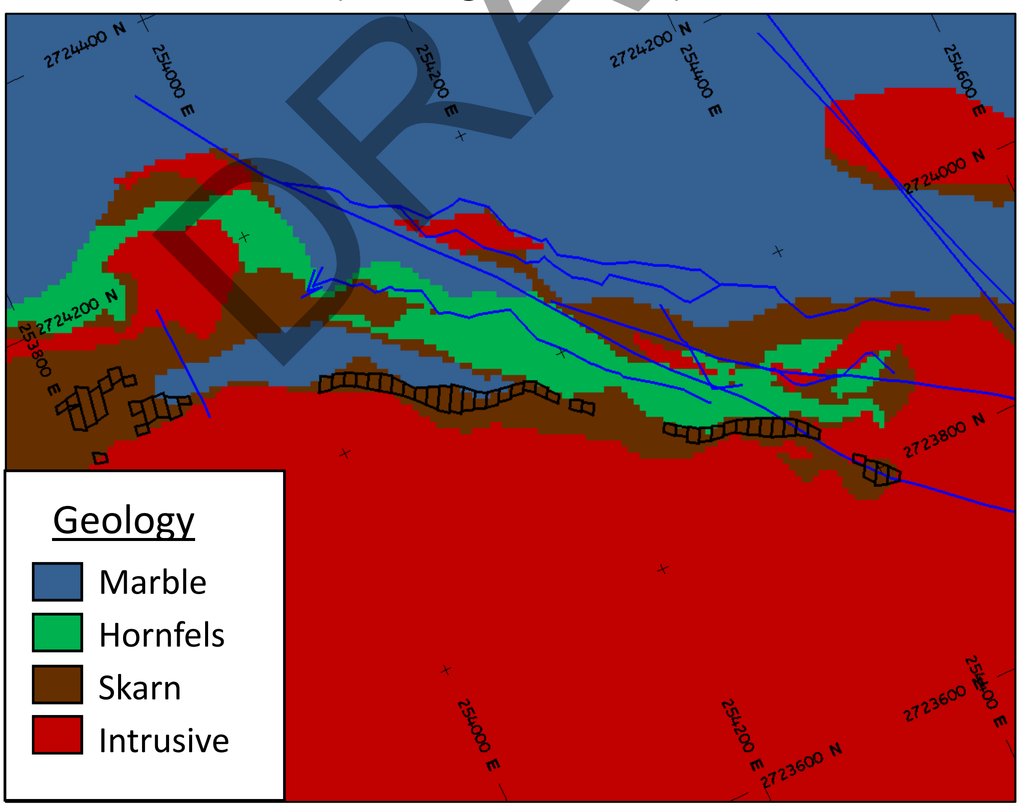


Figure 3-4. Plan View (1875L) Presenting Interpreted Geology Boundaries, Fault Traces (Blue), and 10 Meter Stope Shapes (Black).

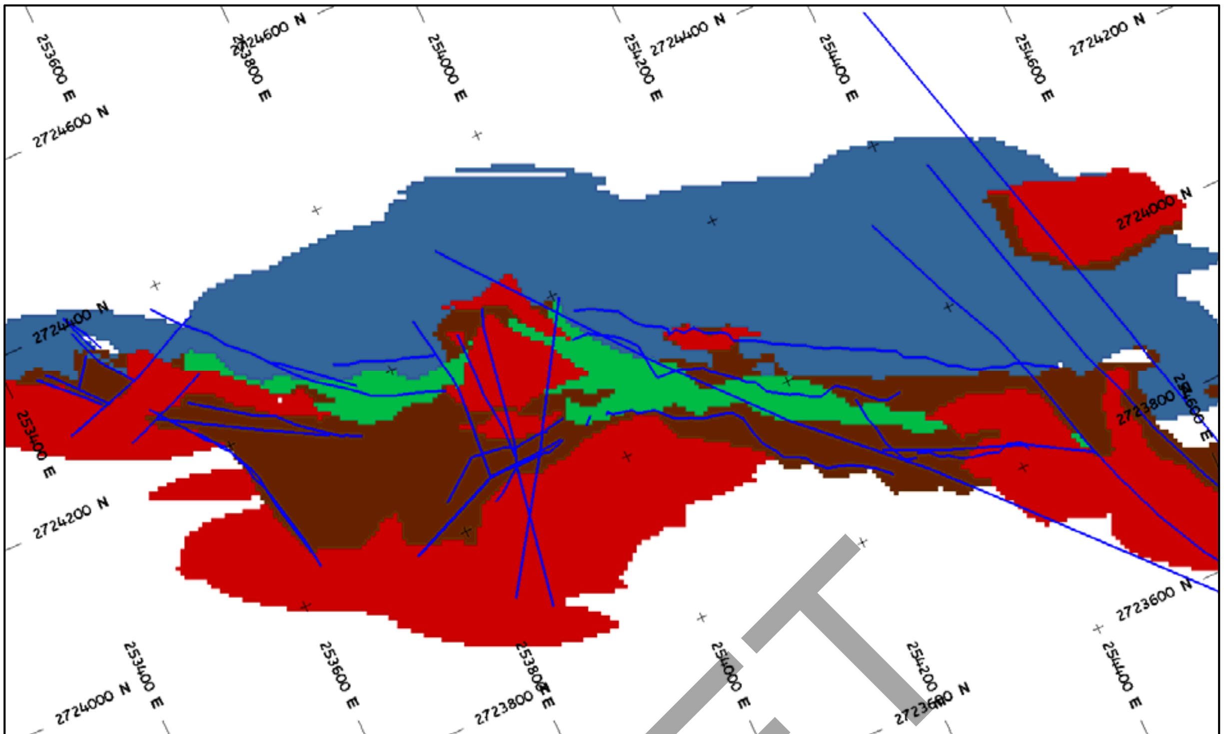


Figure 3-5. Fault Traces (Blue) in Plan View (2040 L) Showing Cross Cutting Relationships of Transverse and Bedding Parallel Faults

4.0 GEOTECHNICAL BLOCK MODEL

A geotechnical block model was generated as a tool for predicting rock quality. The modeling process includes the following tasks:

1. Construct drill hole database, and perform data quality control
2. Determine geotechnical domains using visual, statistical, and modeling methods
3. Develop estimated Jn values based on RQD correlation
4. Determine search parameters from domain variography
5. Estimate RQD, Jr, Ja, and Jn for each block
6. Generate a Q' block model based on interpolated RQD, Jr, Ja, and Jn values

These tasks are discussed in detail below.

4.1 Drill Hole Database

Geomechanical data was collected for 410 drill holes totaling approximately 91,000 meters throughout the Aranzazu deposit. CNI recommended an additional 7 holes totaling approximately 1,400 meters (Table 4-1) be drilled to fill in gaps in data coverage and for selecting samples for geomechanical testing. These holes were completed in July 2017. The final geomechanical data was received on 14 July 2017. Drill hole intervals were back-coded with rock type from the block model. All subsequent statistical analyses utilize modeled rock type boundaries not logged rock type boundaries.

4.1.1 Quality Control

As part of CNI's drill hole data validation work, a site visit was conducted by Mr. Robert Cook and Mr. John Beck of CNI on 28 June through 06 July, 2017, during which 15 drill holes (9 historic and 6 geomechanical) were re-logged for Q prime parameters. Cumulative frequency distributions of Jr/Ja ratios and RQD are compared in Figures 4-1 and 4-2 and show little difference between Aranzazu and CNI logging. However, unreliable Joint Number (Jn) data (Figure 4-3) required Jn to be estimated based on the relationship between RQD and Jn. These relationships were calculated for each rock type and are shown in Figures 4-4 through 4-9.

4.1.2 Compositing

Drill hole data were composited on fixed 3-meter intervals honoring modeled rock type boundaries. Composite intervals were reset at each downhole rock type boundary. Short composite intervals were not combined with adjoining composites.

4.2 Geotechnical Domain Determination

Geotechnical domains are spatial zones which have similar geotechnical behaviors due to a combination of geology, alteration, structure, and geomechanical properties. Geotechnical domains are used to constrain block model estimations, guide geotechnical design, and flag geological uncertainty/anomalies.

Statistical distributions were compiled to determine controlling factors of the deposit's rock properties. Evaluation of RQD distributions of modeled rock type (as shown in Figure 4-10) concluded that rock type provided a good initial indicator of RQD domains. However, additional domain subdivision was indicated from visual and statistical evaluations (see section 4.2.1). The final geotechnical domains include:

1. Marble – Rock type boundary defined
2. Hornfels – Rock type boundary defined
3. Skarn – Rock type boundary defined
4. Porphyry – Rock type boundary defined where modeled intrusive occurred interior to footwall and hangingwall
5. Intrusive – Rock type boundary defined where modeled intrusive defines footwall
6. Fault – Wireframe of bedding parallel fault zone approximately 20 to 40 meters thick

Table 4-2 and Figure 4-11 show the drill hole RQD statistics by geotechnical domain. Cross section and plan view of geotechnical domains are presented in Figures 4-12 through 4-14.

4.2.1 Fault Domain

A bedding-parallel band of low RQD within the drill hole composites was identified based on visual evaluation. This band of low RQD corresponded with fault surfaces interpreted by Aura Minerals geologists. The fault surfaces were extrapolated along strike terminating at modeled transverse faults and a wireframe of the fault zone of influence was created (Figure 4-15 and Figure 4-16). Cumulative distributions of RQD by rock types within the fault zone were compared to distributions outside the fault zone, as shown in Figure 4-11. Based on this comparison, the interpolation of geomechanical values were constrained by rock type and by fault zone. Because of uncertainty regarding the position and nature of the fault boundary, a soft boundary was used in the interpolation process. This technique allows composites within the fault domain to be used in the estimation of blocks outside of the fault domain, however the reverse was restricted.

4.3 Block Model RQD Estimations

Model limits and extents provided by Aura Minerals outlined in Table 4-3 were used to create a 3D block model in MineSight®. Rock type wireframe solids provided by Aura Minerals' exploration department were coded to the block model. Block model items were initialized in the block model to store the RQD, Jr, Ja, and Jn values, number of composites used, number of holes used, and average distance for all composites used. The spatial distributive nature of Jr, Ja, and Jn were assumed to be similar to RQD. Therefore, CNI defined modeling parameters (i.e. variography, composite selection, etc.) based on RQD.

4.3.1 Variography

Variography is a geostatistical tool to describe the relationship between two composites based on variance and distance. A variogram is a regression function fit to cumulative variances at different lag distances. Components of the variogram include: 1) Nugget: short-scale variability and sample error, 2) Range: distances in which data is correlated, and 3) Sill: total variance of the data set. Interpolation search parameters are determined from the range of the variogram regression. If data is poorly correlated or sparse, variogram modeling may not be possible.

Global variography of composited RQD data for each geotechnical domain was run to determine search ranges. Isotropic variography was conducted and modeled as shown in Figures 4-17 through 4-20. Insufficient data was available to separate Fault and Non-Fault sub-domains therefore the data was not subdivided during variography. Final search parameters used in block model estimation based on the variogram modeling are tabulated in Table 4-4. The intrusive variogram was not able to be modeled due to low data density and as a consequence search parameters from the porphyry variogram model were used for the intrusive domain.

Cursory directional variography was conducted; however, time was not sufficient to refine anisotropic trends, and therefore anisotropy was assumed in the orientation of the bedding

(DDR: 030 DIP: 70), and the search distances of the two major axes were assumed to be equal to the isotropic variogram range.

4.4 Estimations Techniques

Two techniques were evaluated for the geotechnical block model estimation: nearest neighbor and inverse distance weighting (IDW).

4.4.1 Nearest Neighbor Estimate

The polygonal or nearest neighbor estimate projects a single closest composite to the blocks without averaging, which produces a pixelated interpolation. The nearest neighbor estimate is used for distribution comparison purposes.

4.4.2 Inverse Distance Weighting Estimate

The inverse distance weighting (IDW) model estimation assumes data continuity is inversely related to distance (raised to a user-defined power) from the block being estimated. One advantage of IDW estimation technique is the user's ability to adjust weighting by changing the distance power: the higher the power, the closer the estimate is to nearest neighbor estimate; the lower the power, the closer the estimate is to a local average. This allows the user to adjust the amount of smoothing produced by the block model estimation. Clustering of drill hole data is a concern when using the IDW estimation technique; however, besides a few locations where underground fan drill hole patterns were completed, the data distribution appears evenly distributed throughout the project area.

4.5 Block Model Estimate

Each estimation technique was visually and statistically evaluated to determine which method best preserved the drill hole data distribution. The inverse distance weighting (IDW) estimation technique raised to the second power was considered the best for the Aranzazu dataset. Components of Q prime were estimated in the block model with this methodology, using the search parameters defined by the RQD variography.

A three-pass estimation technique was used for this study, as outlined in Table 4-5 with estimation search strategy detailed in Table 4-6. The initial pass used a search radius equivalent to the variogram range and does not include the fault boundary. The second pass was constrained to within the fault sub-domain. The final pass used an indicator to preserve the low-end RQD distributions within the Fault domain. All estimation passes were restricted by geotechnical domains and required that composites have the same geotechnical domain code as the block being estimated. Comparisons of the RQD distribution of block model estimation and the composited RQD drill hole data for each domain is shown in Figures 4-21 through 4-25. Cross section and plan views of final RQD estimates are presented in Figures 4-26 through 4-28.

4.5.1 Estimation Discussion

Because the block model estimation is sensitive to the interpretation of the fault domain, estimated Q prime should be reviewed as access is established and updated when additional drilling data are available. In the intermediate, the fault domain interpretation would improve if reconciled with geologic level maps of current drifts. Also, quick logging core photos of drill holes which intersect interpreted wireframes would aid in constraining the interpretation.

In addition, the block model estimation may improve with additional work in defining the anisotropic spatial variance. Initial indications suggest rock quality is spatially correlated along bedding.

4.6 Q Prime Block Model Calculations

Q' is a modification of Q, defined by Barton (1974). Q is the Rock Tunneling Quality Index, and is calculated by:

$$Q = \frac{RQD}{Jn} \times \frac{Jr}{Ja} \times \frac{Jw}{SRF}$$

where: RQD = ∑(Length ≥ 10 cm)/Drilled Interval
Jn = joint set number
Jr = joint roughness number
Ja = joint alteration number
Jw = joint water reduction factor
SRF = stress reduction factor

Q' is the same as Q, except joint water and stress reduction factors are not included, as those are individual stress parameters and not inherent properties of the rock. Barton recommends RQD values of less than 10 be given a nominal value of 10. CNI considers this to be overly optimistic at the low end and instead gave RQD values less than 5 a nominal value of 5. CNI calculated Q Prime (Q') values for each block from the modeled RQD values and Barton joint condition parameters. Cross section and plan views of final Q' estimates are presented in Figures 4-29 through 4-31. Distributions of Q prime by Domain are presented in Figure 4-32.

4.7 Rock Quality Stope Evaluation – Transverse Stoping

The purpose of the stope Q prime block model was to provide an estimation of the ground conditions within the hanging wall, sidewall and footwall for each of the proposed stopes. To communicate these generalized ground conditions, a method was developed to identify individual stope lower quartile (hanging wall and footwall) and median (stope) values of Q prime to the block model. The lower quartile was used for the hanging wall and footwall evaluations because rockmass is generally controlled by the lower 25 percent of the rock quality. Median Q prime occurrences were used to evaluate both stope sidewalls which results in an effective 25th percentile for an individual stope sidewall. Block model item WALL was initialized to identify hangingwall, stope, and footwall zone and model item QPPCT was initialized for calculated Q prime values. The hanging wall and footwall WALL zones were defined based on the block immediately adjacent to the stope; the stope WALL zone includes all blocks within the stope wireframe. Figure4-33 shows a plan view of the WALL item relative to stope wireframes. Block Q prime values within these WALL zones were dumped from the block model and lower quartile (hanging wall and footwall) and median (stope) values were calculated. These values were loaded to the block model QPPCT item. Figure 4-34 shows an oblique view of the footwall blocks comparing QCNI and the loaded QPPCT.

Matrices of these values are provided in Figures 4-35 through 4-37. The provided matrices are a generalized west-east representation of all designed stopes by level; however, they do not include gaps between stopes. Also, the Glory Hole Hanging Wall deposit and the previously sterilized stopes (stopes with GMT values below stability cutoff) were included in separate matrices due to their spatial distribution within the block model.

Table 4-1. 2017 Geotechnical Drill Plan for Glory Hole Deposit
Aranzazu Mine, Aura Minerals, Inc., 2017

Drill Hole ID	Collar Location			Azimuth (deg)	Dip (deg)	Length (m)
	Northing	Easting	Elevation			
GHP_GMX01	2,723,914	254,514	2003	205	-25	70
GHP_GMX02	2,723,928	254,436	2004	205	-45	250
GHP_GMX03	2,723,951	254,383	2003	205	-40	180
GHP_GMX04	2,723,977	254,339	2003	205	-70	315
GHP_GMX05	2,724,018	254,250	2012	205	-60	230
GHP_GMX06	2,724,023	254,118	1998	205	-50	140
GHP_GMX07	2,724,023	254,118	1998	280	-65	200

TOTAL: **1,385**

Table 4-2. Drill Hole Statistics by Geotechnical Domain
Aranzazu Mine, Aura Minerals, Inc., 2017

Domain	Fault Domain				Non-Fault Domain			
	Num. of Intervals	Mean RQD (%)	STD. Dev. RQD (%)	Coeff. Variation	Num. of Intervals	Mean RQD (%)	STD. Dev. RQD (%)	Coeff. Variation
Marble	546	52	27	0.52	10015	81	21	0.26
Hornfels	1072	40	30	0.73	2088	78	25	0.32
Skarn	1547	42	31	0.72	8610	79	24	0.30
Porphyry	700	46	28	0.63	2270	80	25	0.32
Intrusive	185	49	34	0.70	3065	85	22	0.25

Table 4-3. Block Model Extents and Rotation
Aranzazu Mine, Aura Minerals, Inc., 2017

	Model Limits				
	Minimum	Maximum	Block Size (m)	Number of Blocks	Model Origin
Easting	0	2200	5	440	252,850
Northing	0	1300	5	260	2,723,660
Elevation	1400	2400	5	200	0

Rotation Axis*	Model Rotation
X	25
Y	0
Z	0

* GSLIB Rotation Convention

Table 4-4. Isotropic Variogram Model by Geotechnical Domain
Aranzazu Mine, Aura Minerals, Inc., 2017

Domain	Structure Model	Range (m.)	Sill	Nugget
Marble	Exponential	150	437	172
Hornfels	Spherical	170	624	159
Skarn	Spherical	250	557	175
Porphyry	Exponential	150	637	173
Dump[+]	--	--	--	--
Intrusive*	--	--	--	--

[+] Insufficient data for calculations
* Non-interpretable variogram model

Table 4-5. RQD Block Model Composite Selection and Estimation Strategy
Aranzazu Mine, Aura Minerals, Inc., 2017

Run	Estimation Method		Estimation Constraints		Composite Selection Parameters		
	Procedure	Power	Primary	Secondary	Minimum № Comps	Maximum № Comps	Maximum № Comp/DH
1	Inverse Distance	2	Domain	None	2	8	1
2	Inverse Distance	2	Domain	Fault	2	8	1
3	Indicator Inverse Distance*	2	Domain	Fault	2	8	1

* Indicator of 60 pct. probability of 0 -20 pct. RQD

Table 4-6. RQD Block Model Search Strategy
Aranzazu Mine, Aura Minerals, Inc., 2017

Domain	Search Distance (m)			Rotation*		
	X	Y	Z	X	Y	Z
Dump	150	150	150	0	-70	0
Marble	150	150	50	0	-70	0
Hornfels	170	170	50	0	-70	0
Skarn	250	250	100	0	-70	0
Intrusive	150	150	50	0	-70	0
Porphyry	150	150	50	0	-70	0
Fault	150	150	25	0	-70	0

* Rotation GSLIB convention relative to model orientation

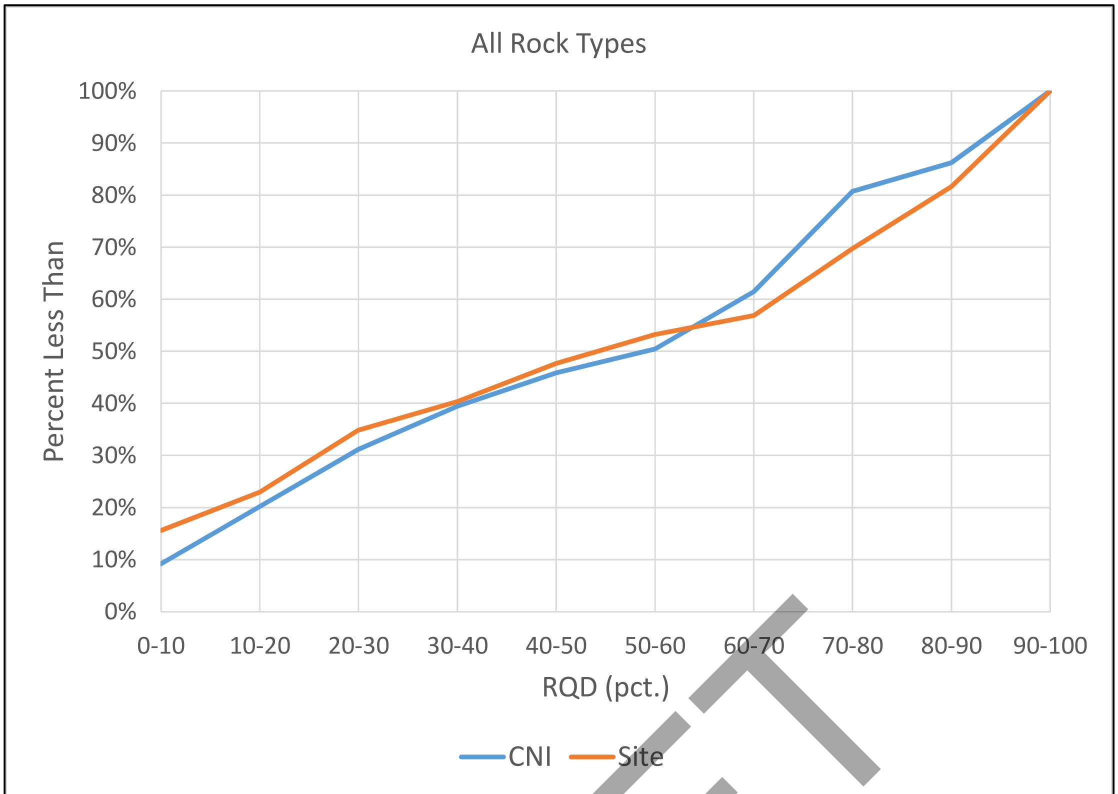


Figure 4-1. Cumulative Distribution of Drill Hole Composite Comparing CNI and Site Logged RQD Data.

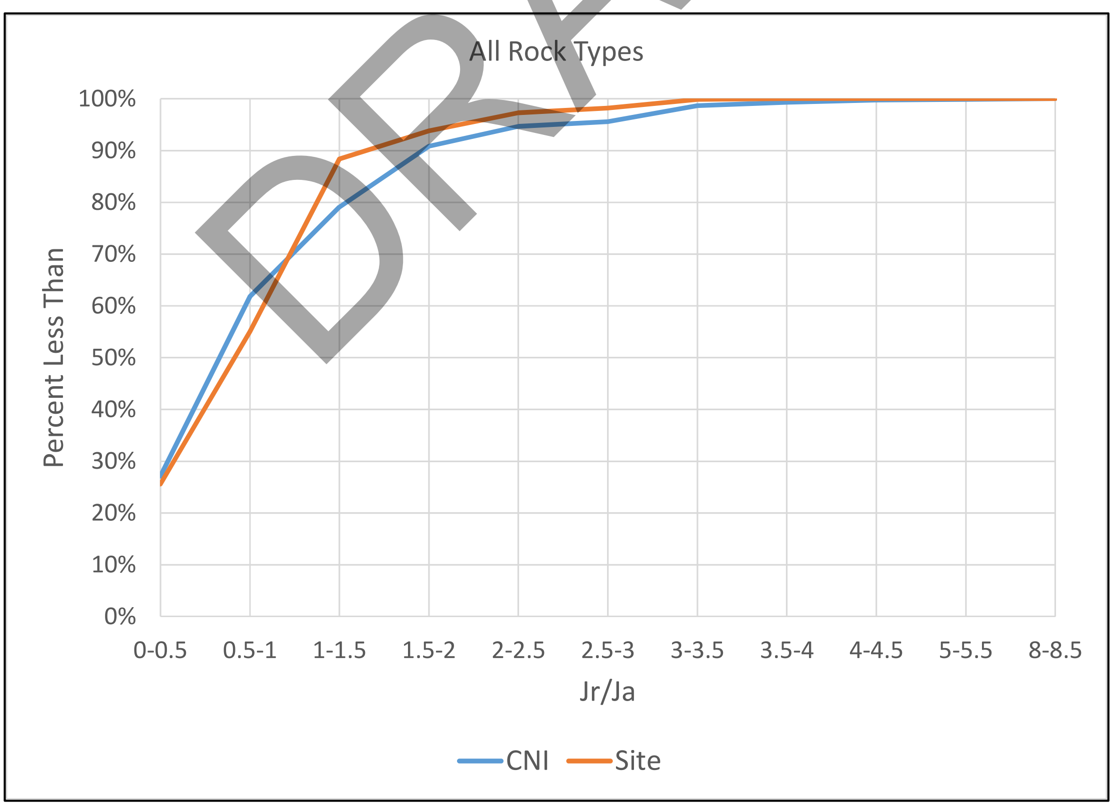


Figure 4-2. Cumulative Distribution of Drill Hole Composite Comparing CNI and Site Logged Jr/Ja Ratio Data.

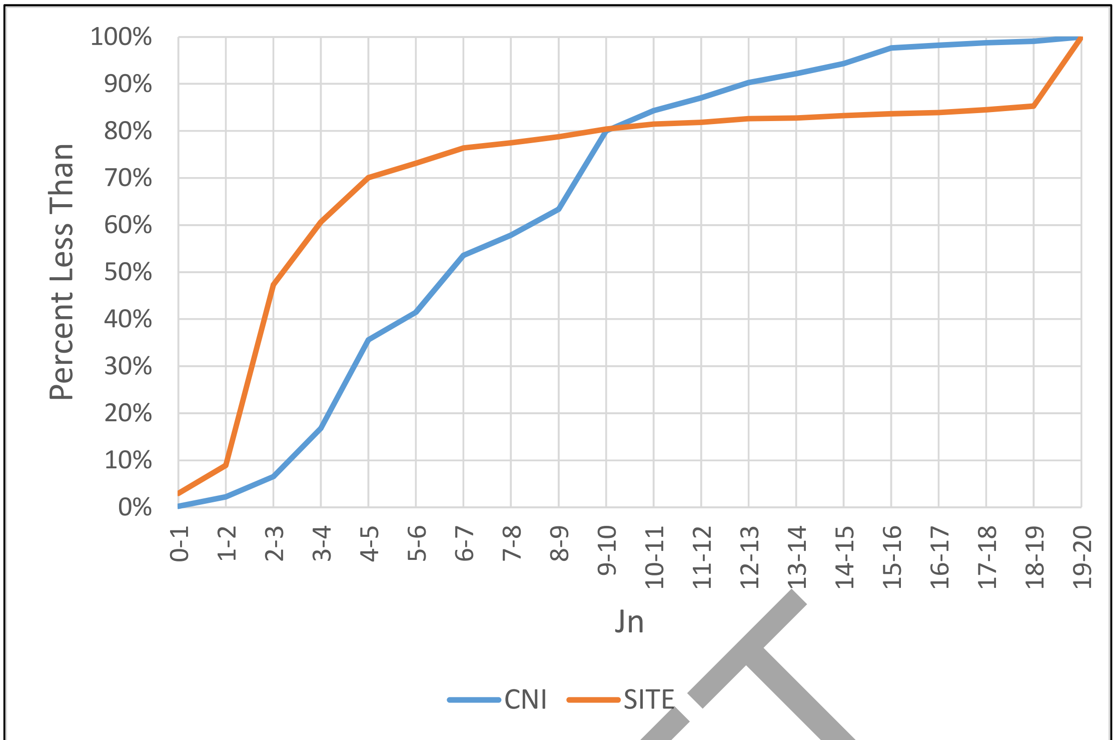


Figure 4-3. Cumulative Distribution of Drill Hole Barton Jn Parameter Logged by Site and CNI. Note That 70 Percent of Site-Logged Intervals Have a Jn Value of 5 or Less.

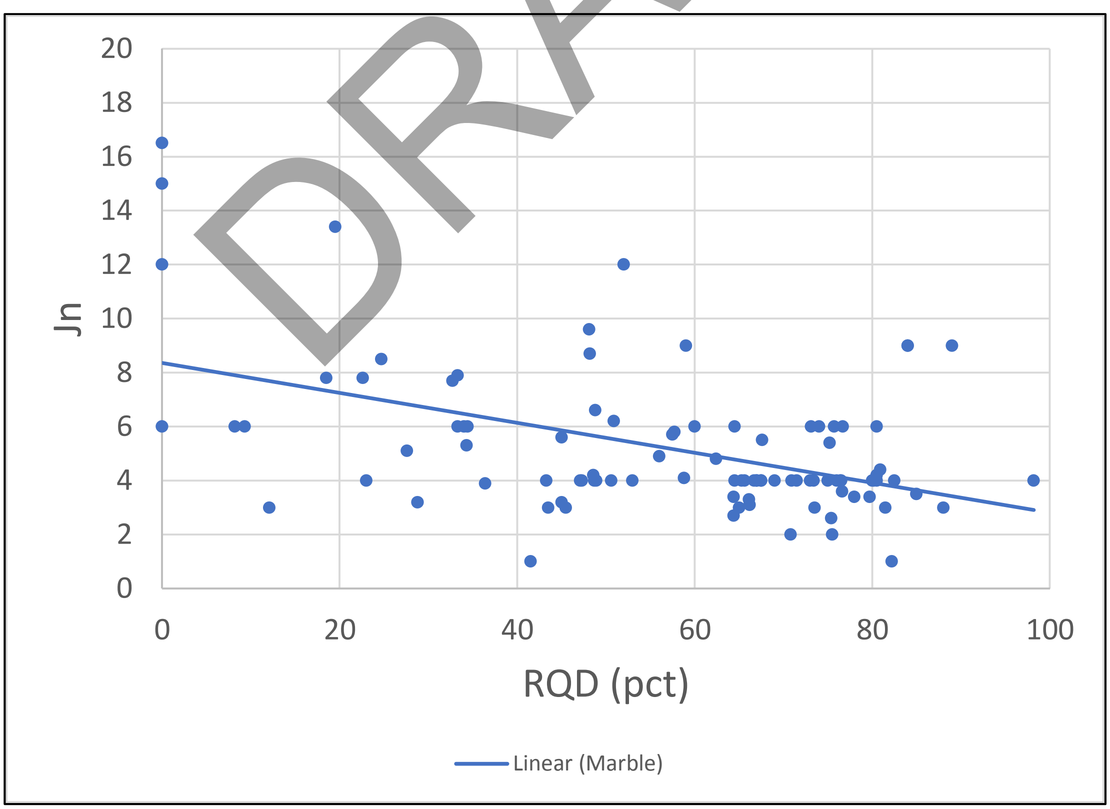


Figure 4-4. Drill Hole Comparison Between Logged RQD and Barton Jn Parameter for Marble Domain.

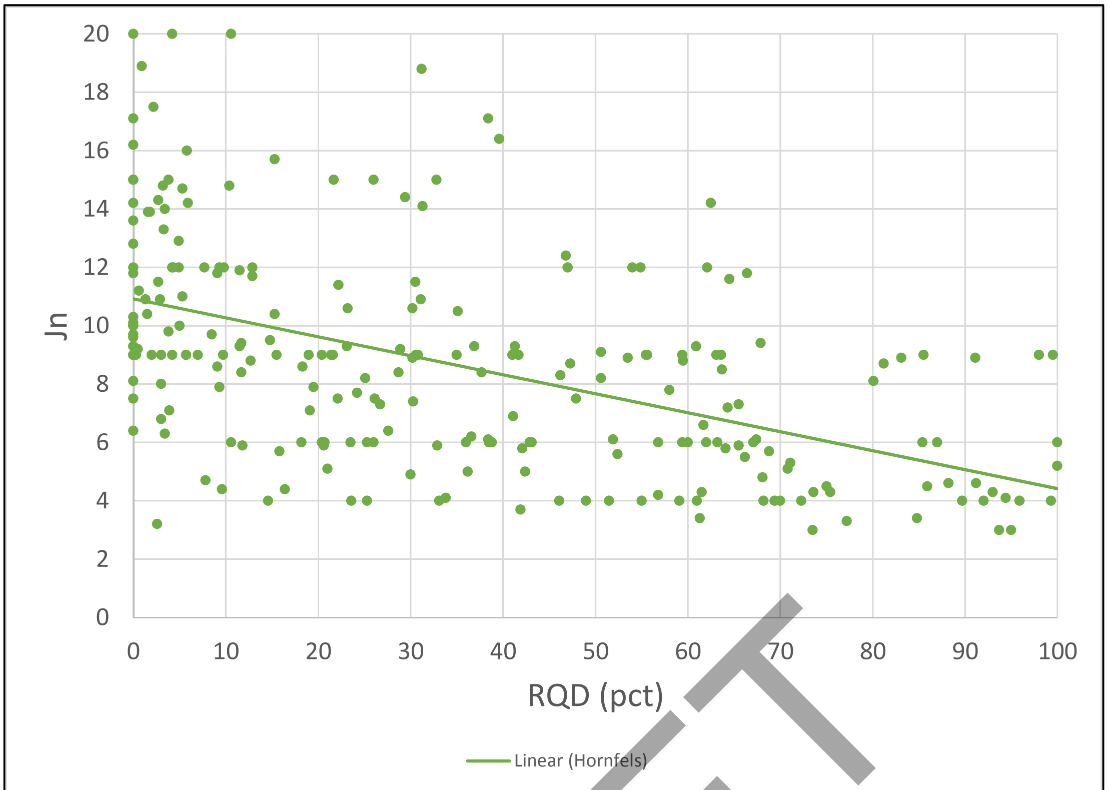


Figure 4-5. Drill Hole Comparison Between Logged RQD and Barton Jn Parameter for Hornfels Domain.

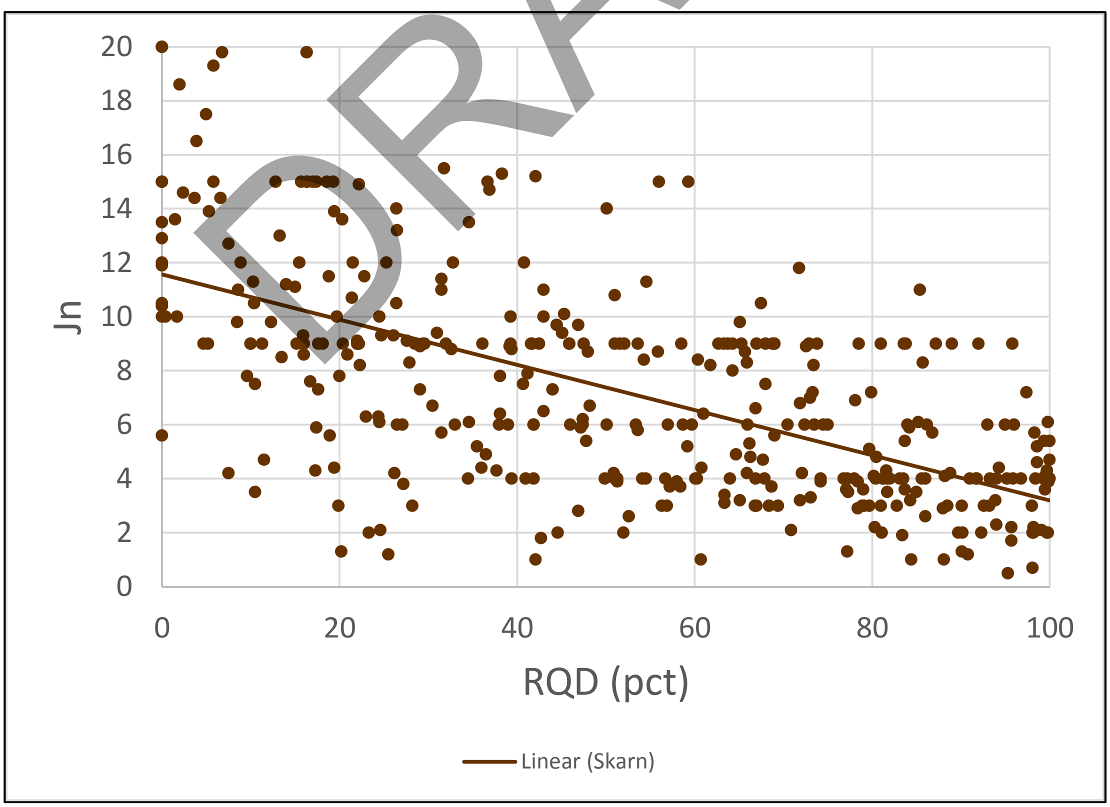


Figure 4-6. Drill Hole Comparison Between Logged RQD and Barton Jn Parameter for Skarn Domain.

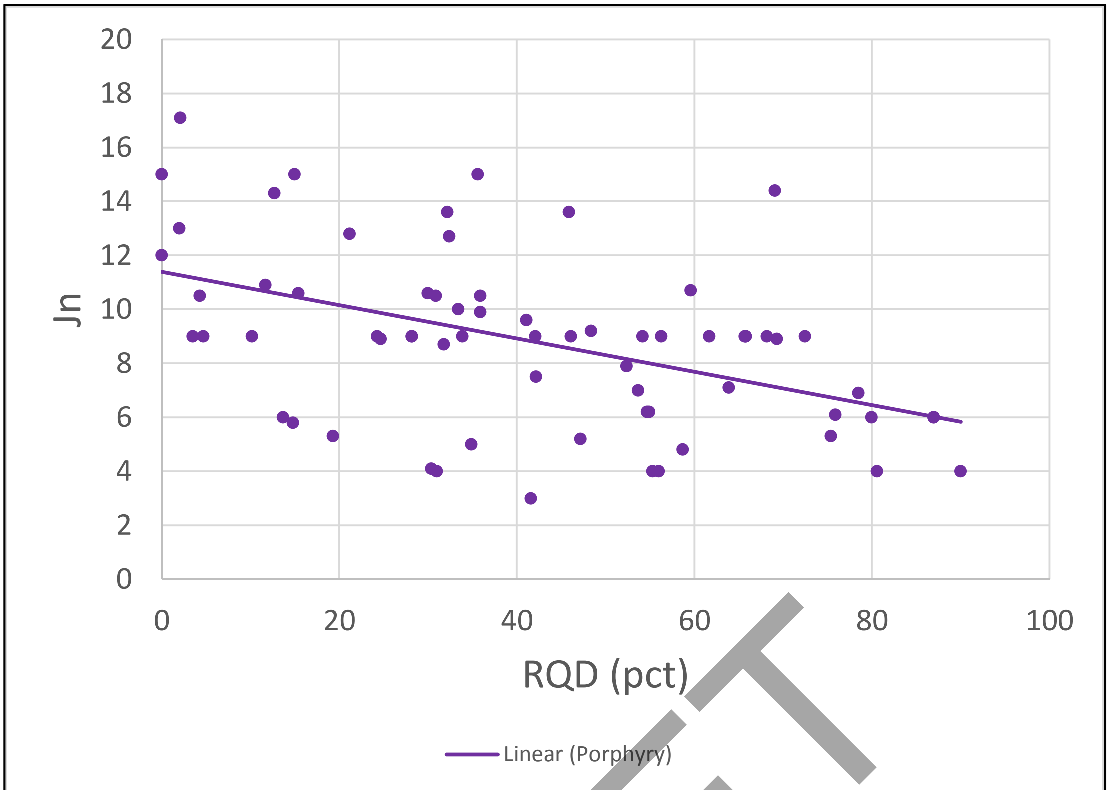


Figure 4-7. Drill Hole Comparison Between Logged RQD and Barton Jn Parameter for Porphyry Domain.

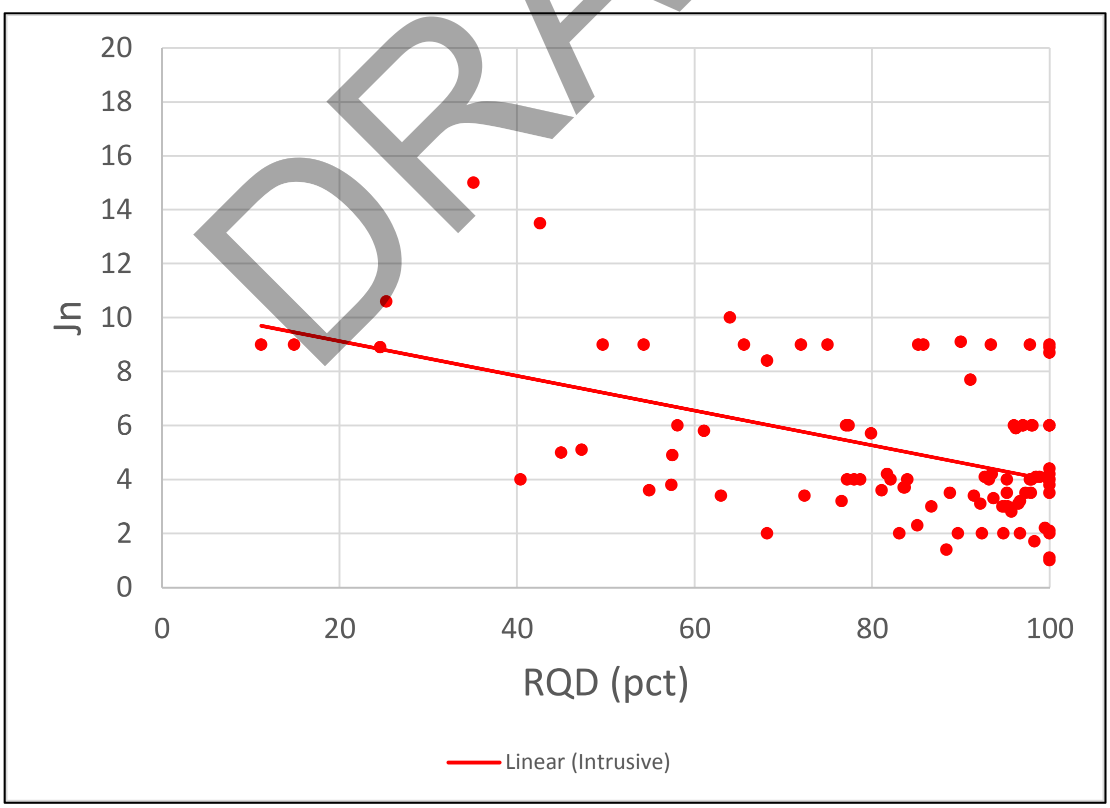


Figure 4-8. Drill Hole Comparison Between Logged RQD and Barton Jn Parameter for Intrusive Domain.

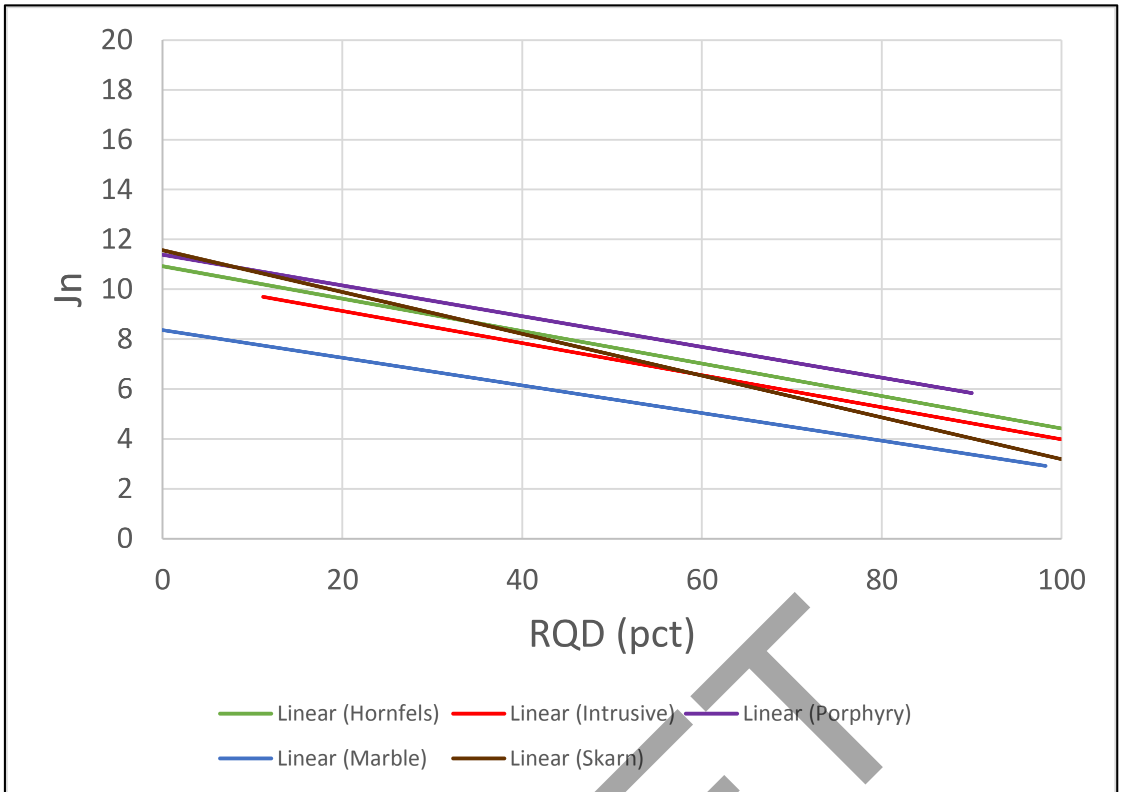


Figure 4-9. Regressions of RQD – Jn Relationships by Domain

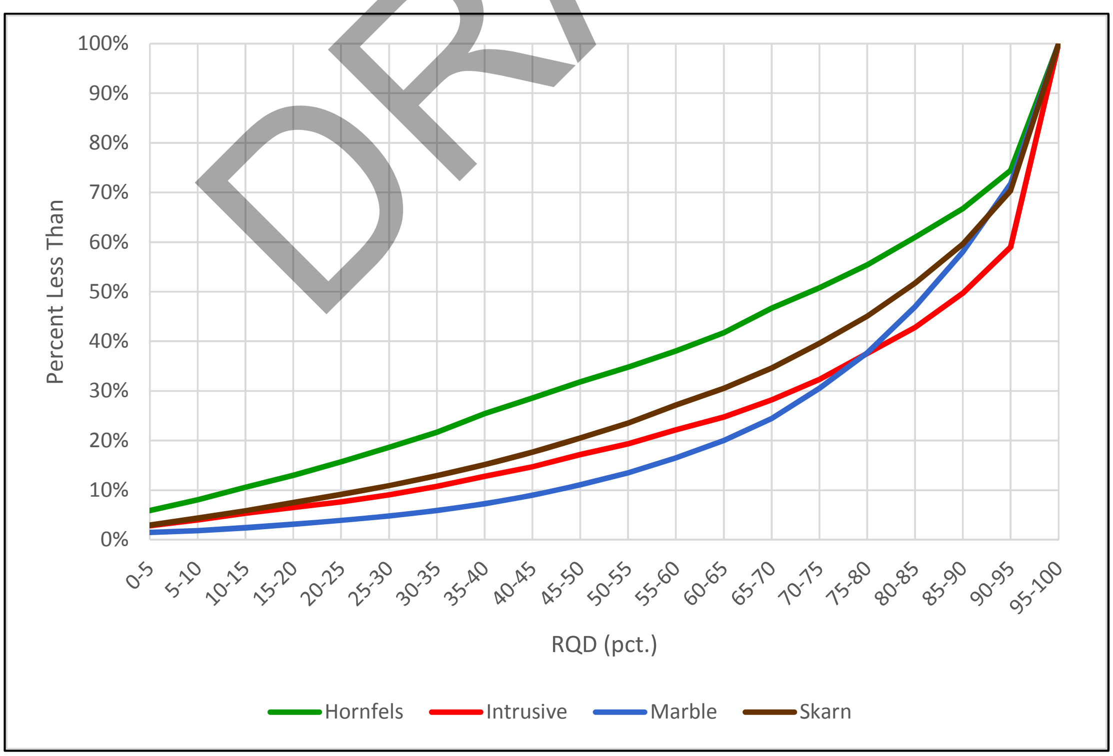


Figure 4-10. Cumulative Distribution of Drill Hole Composite RQD by Rock Type

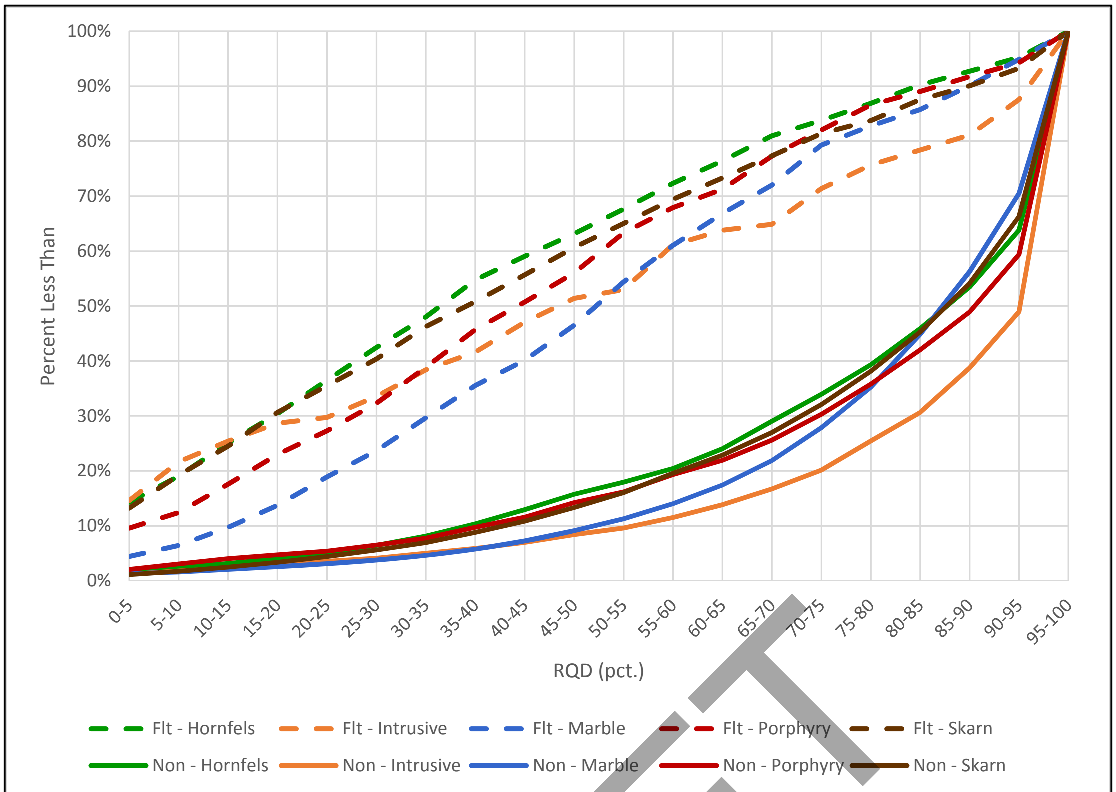


Figure 4-11. Cumulative Distribution of Drill Hole Composite RQD by Geotechnical Domain

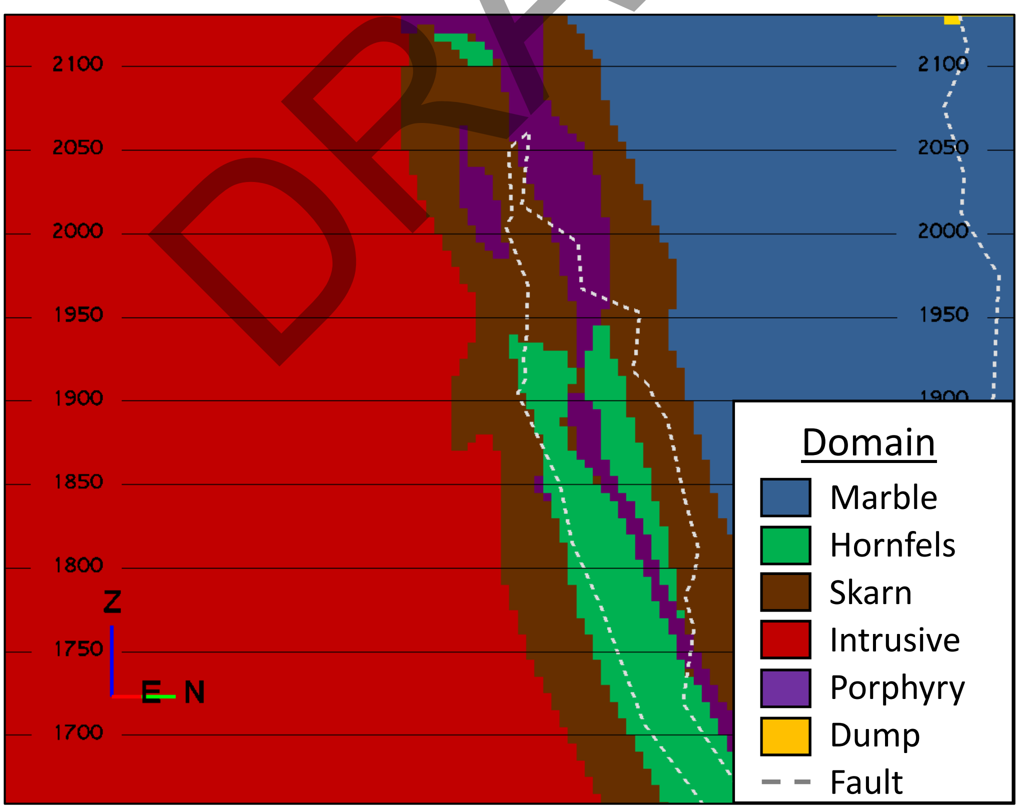


Figure 4-12. Cross Section (24) Presenting Geotechnical Domain Boundaries, Fault Domain Boundary Sub-divides All Block Model Domains.

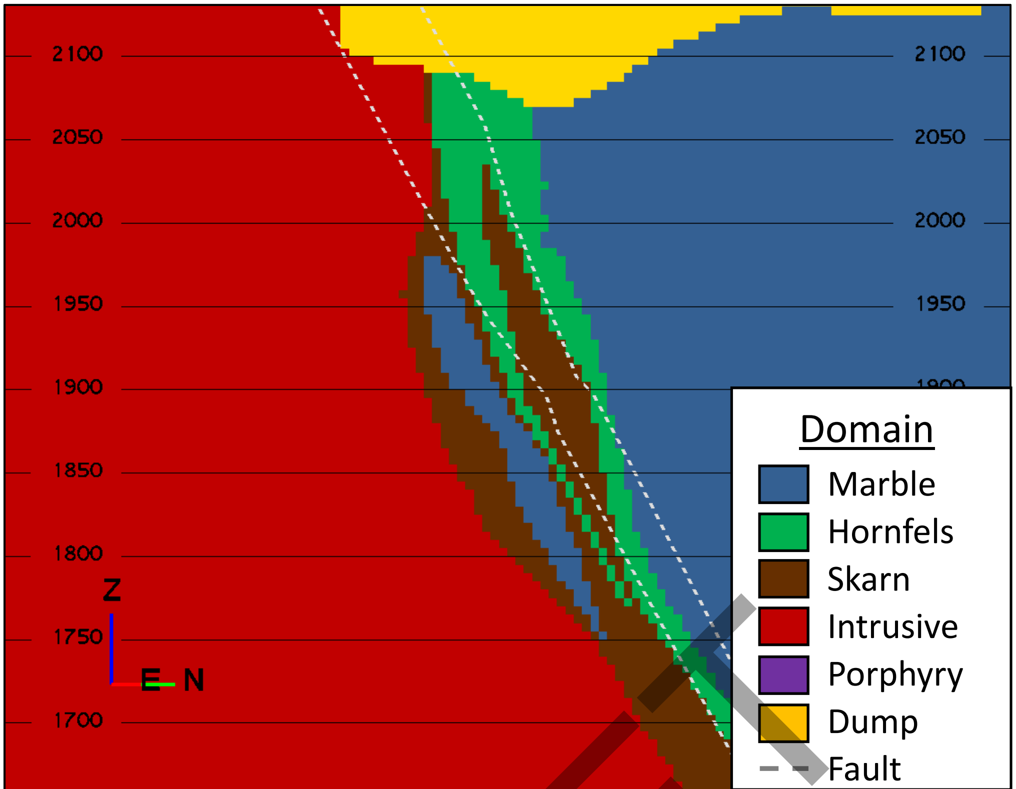


Figure 4-13. Cross Section (42) Presenting Geotechnical Domain Boundaries, Fault Domain Boundary Sub-divides All Block Model Domains.

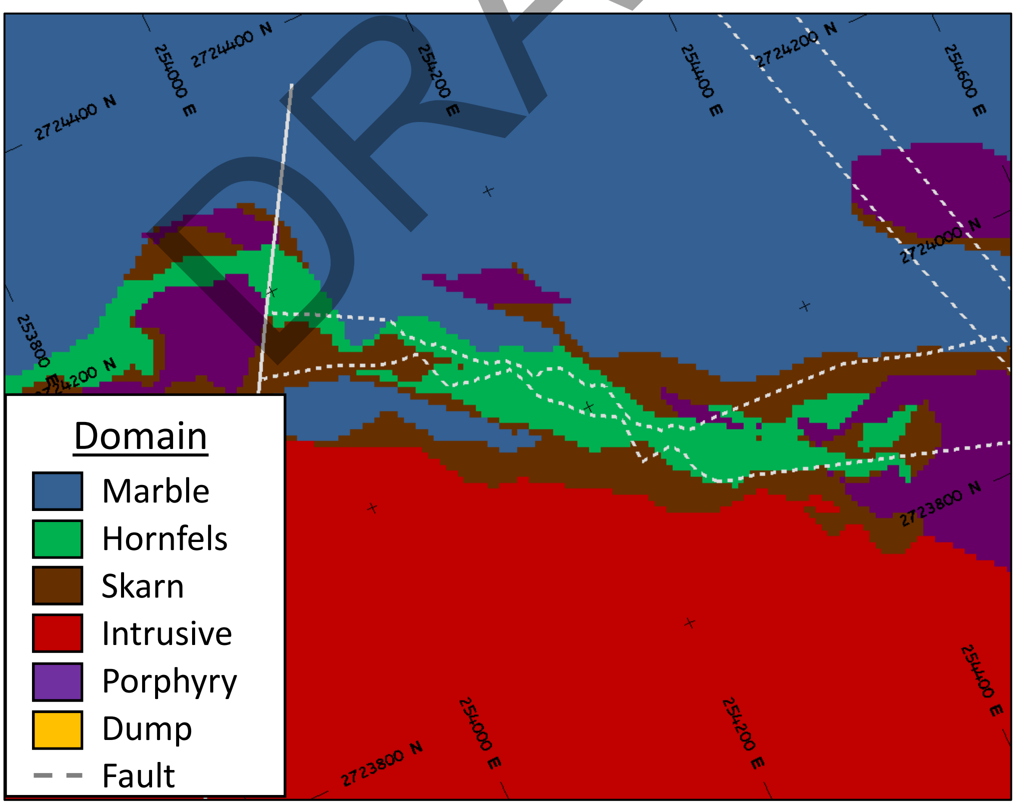


Figure 4-14. Plan View (1875 L) Presenting Geotechnical Domain Boundaries, Fault Domain Boundary Sub-divides All Block Model Domains.

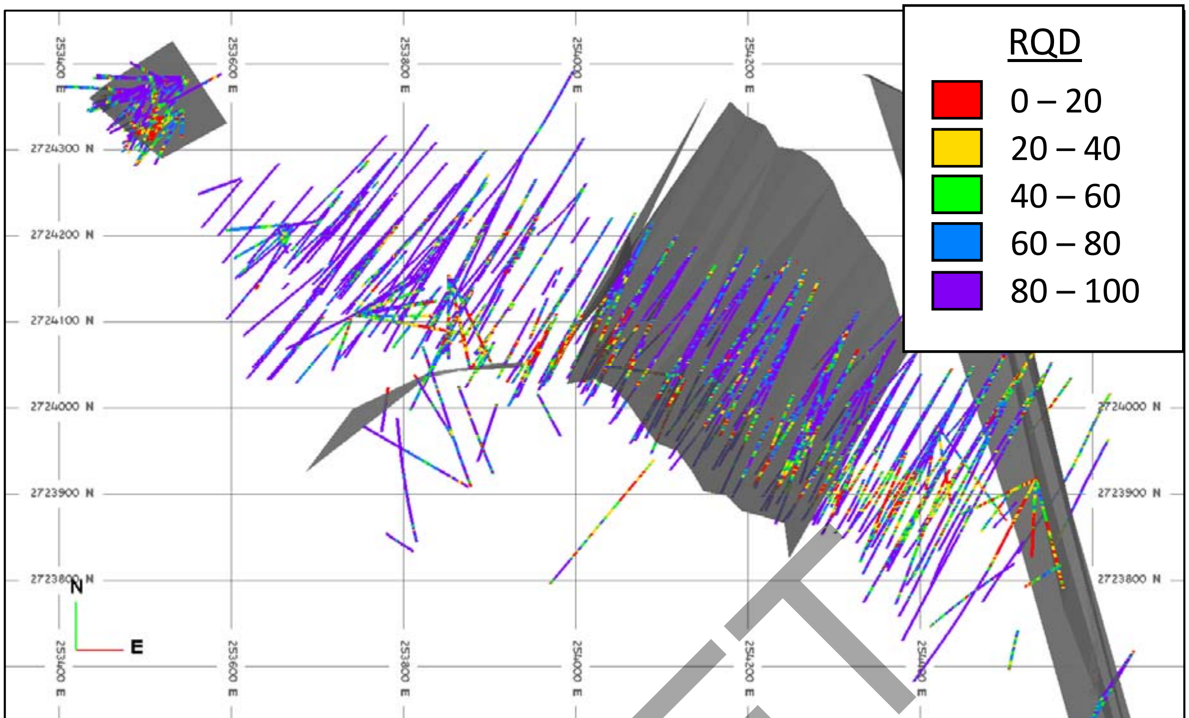


Figure 4-15. Oblique View (Plan View) of Aranzazu Modeled Faults (Grey) and Low RQD Composite Intervals (RED).

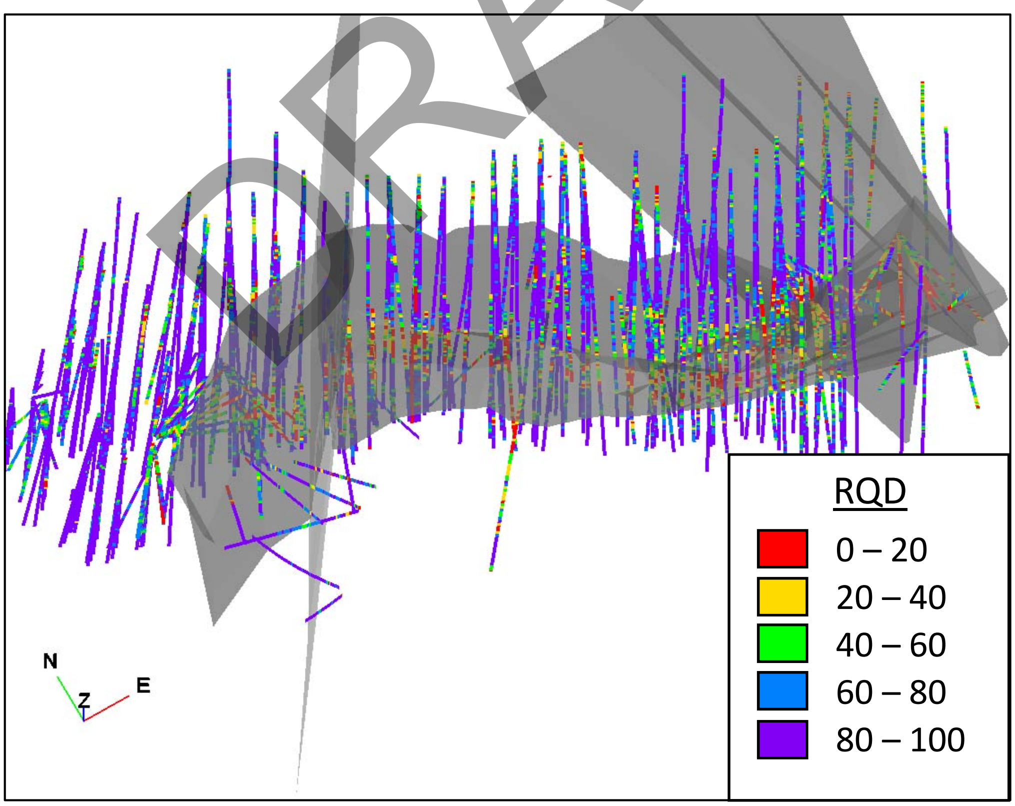


Figure 4-16. Oblique View (Looking Northeast) of Fault Domain Wireframes (Grey) and Low RQD Composite Intervals (RED).

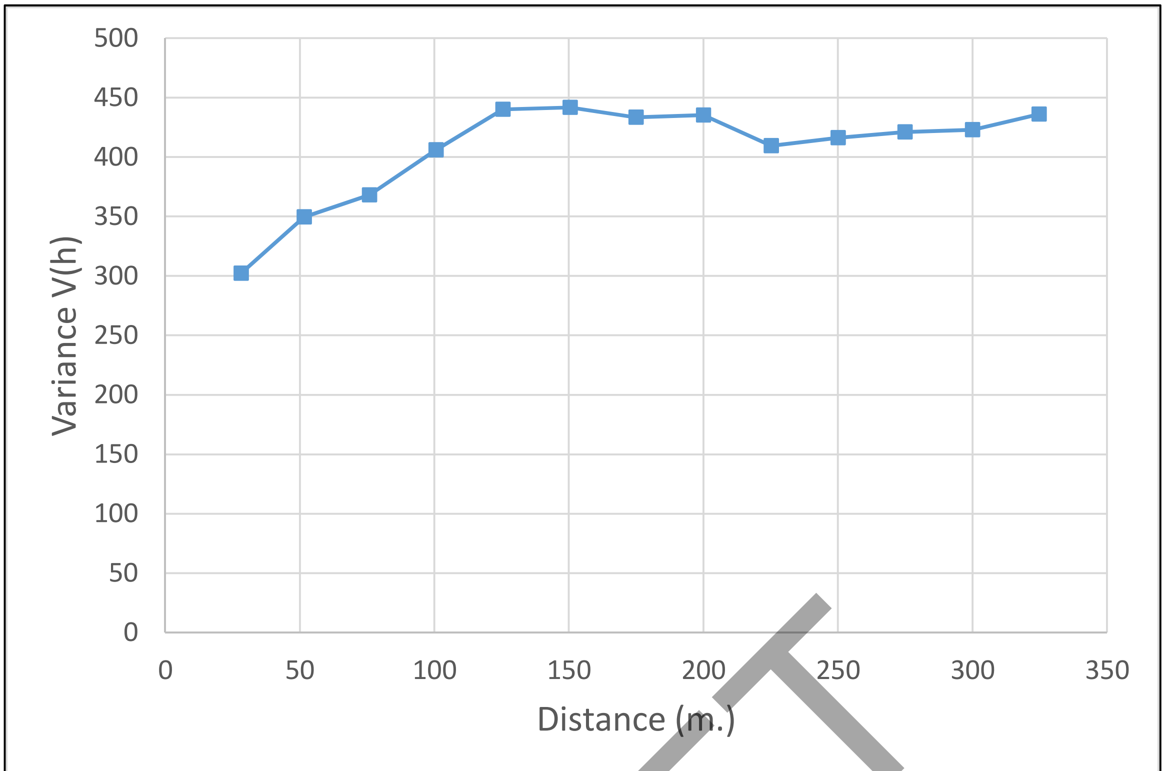


Figure 4-17. Experimental Isotropic Variogram of Marble Domain.

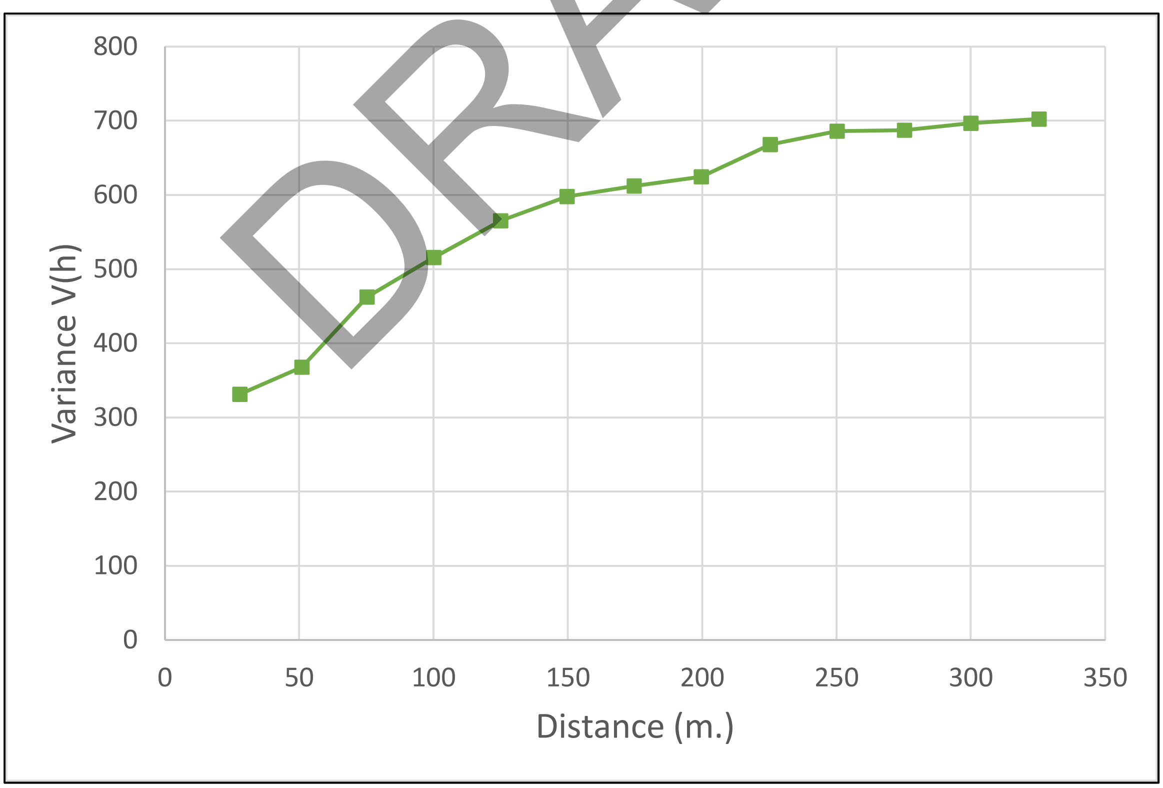


Figure 4-18. Experimental Isotropic Variogram of Hornfels Domain.

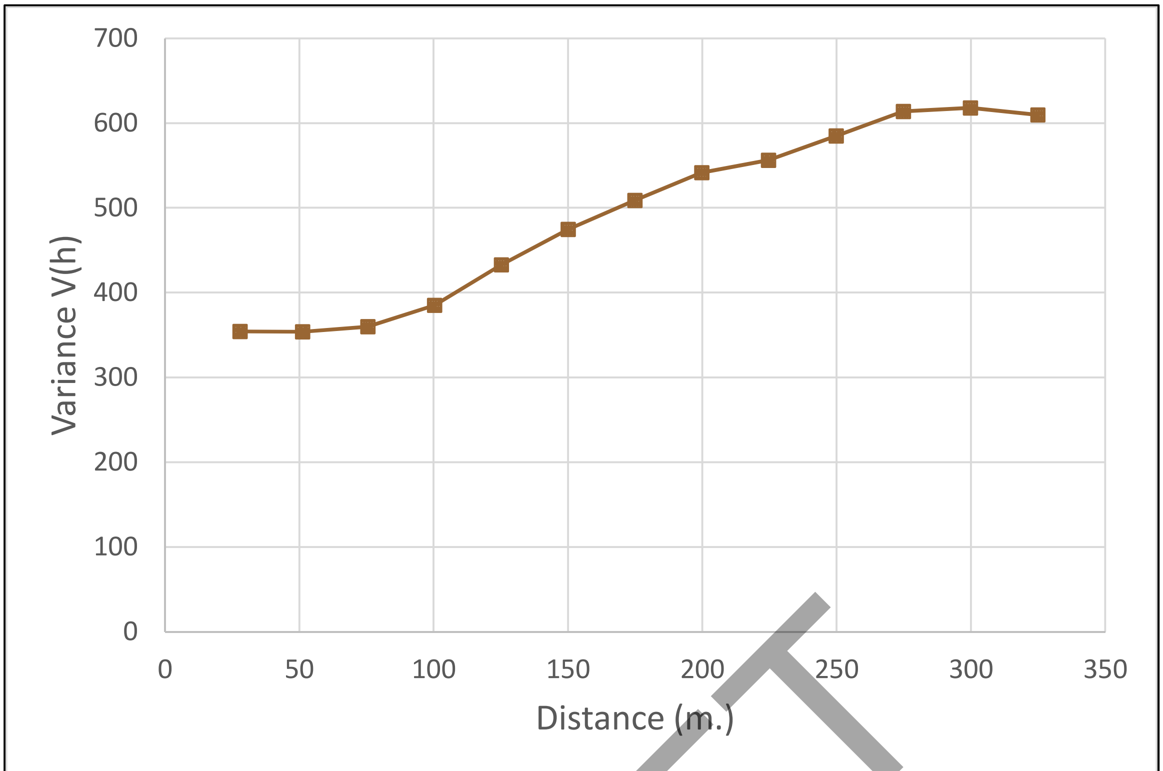


Figure 4-19. Experimental Isotropic Variogram of Skarn Domain.

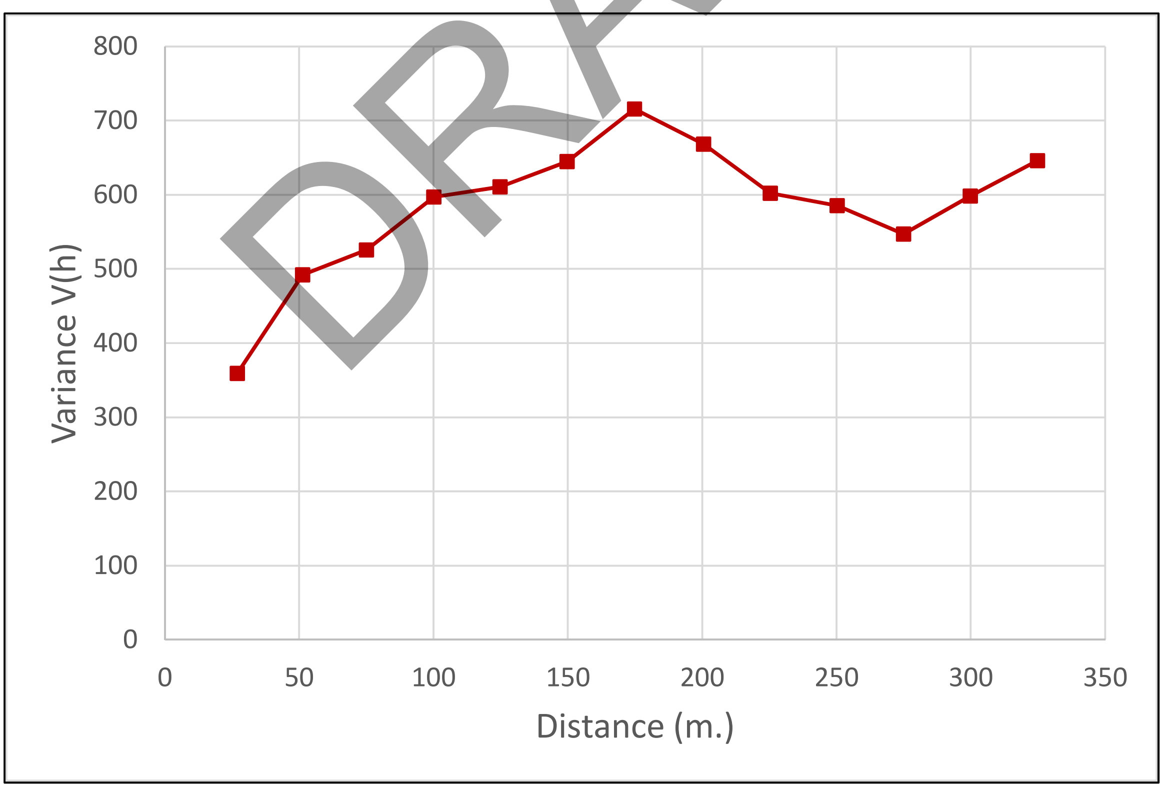


Figure 4-20. Experimental Isotropic Variogram of Porphyry Domain.

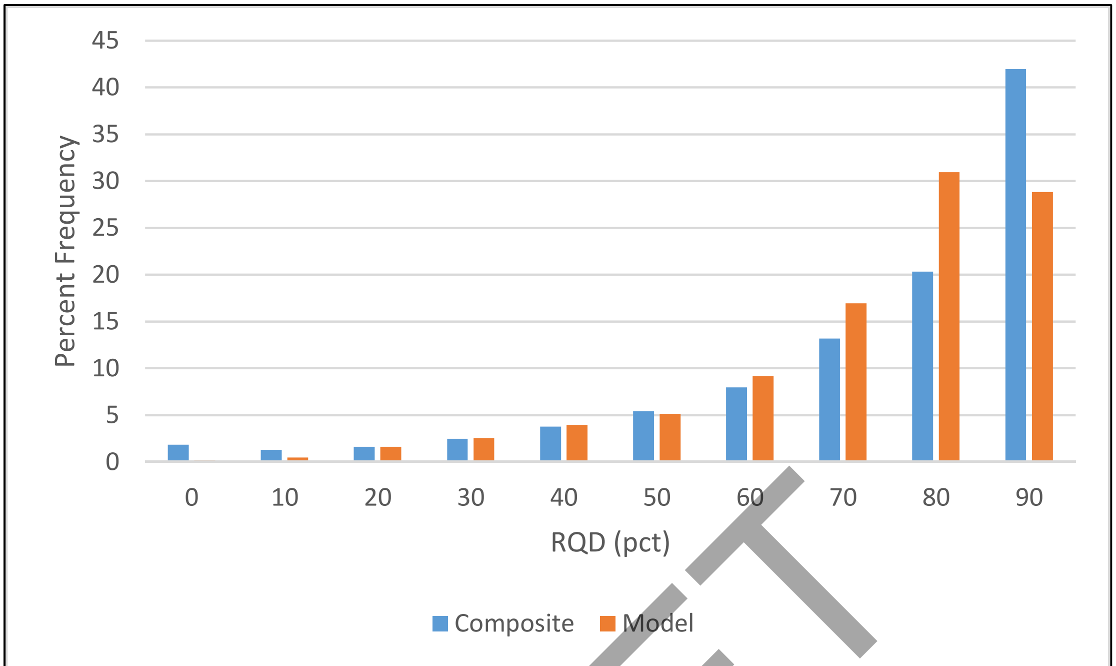


Figure 4-21. Comparison of RQD Distributions of Drill Hole Composites and Block Model RQD Data for Marble Domain

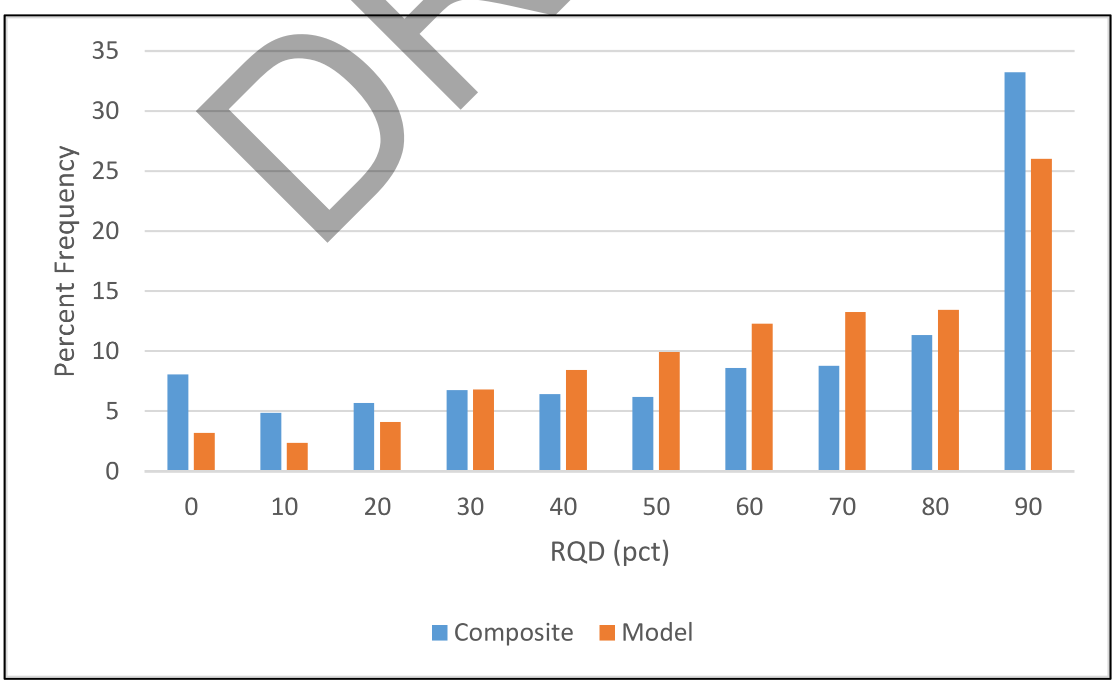


Figure 4-22. Comparison of RQD Distributions of Drill Hole Composites and Block Model RQD Data for Hornfels Domain

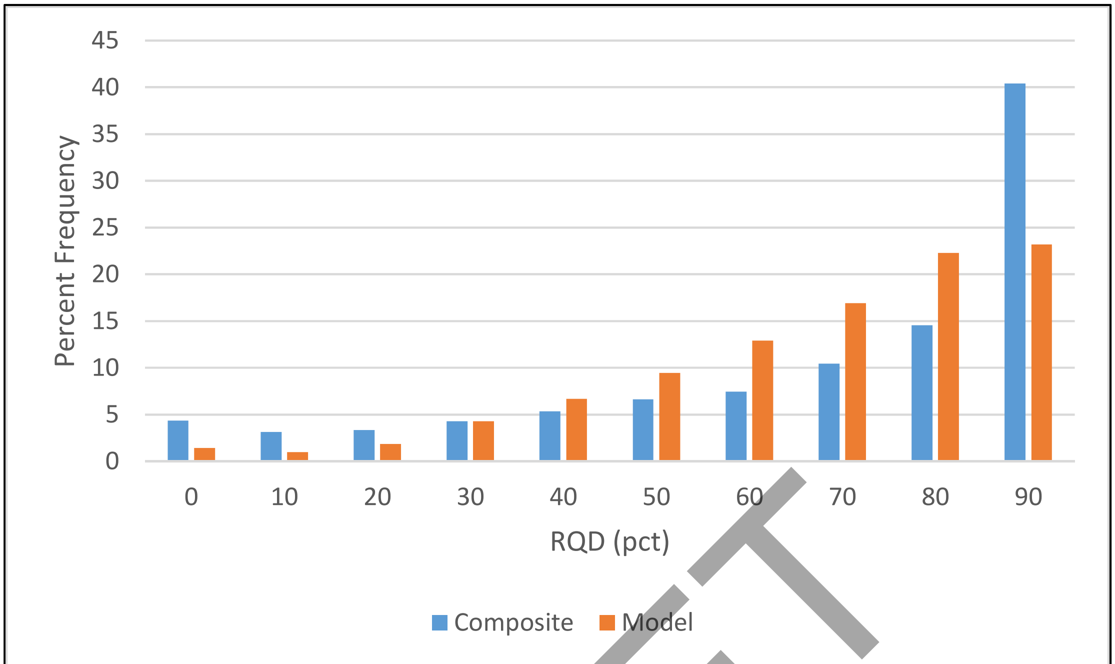


Figure 4-23. Comparison of RQD Distributions of Drill Hole Composites and Block Model RQD Data for Skarn Domain

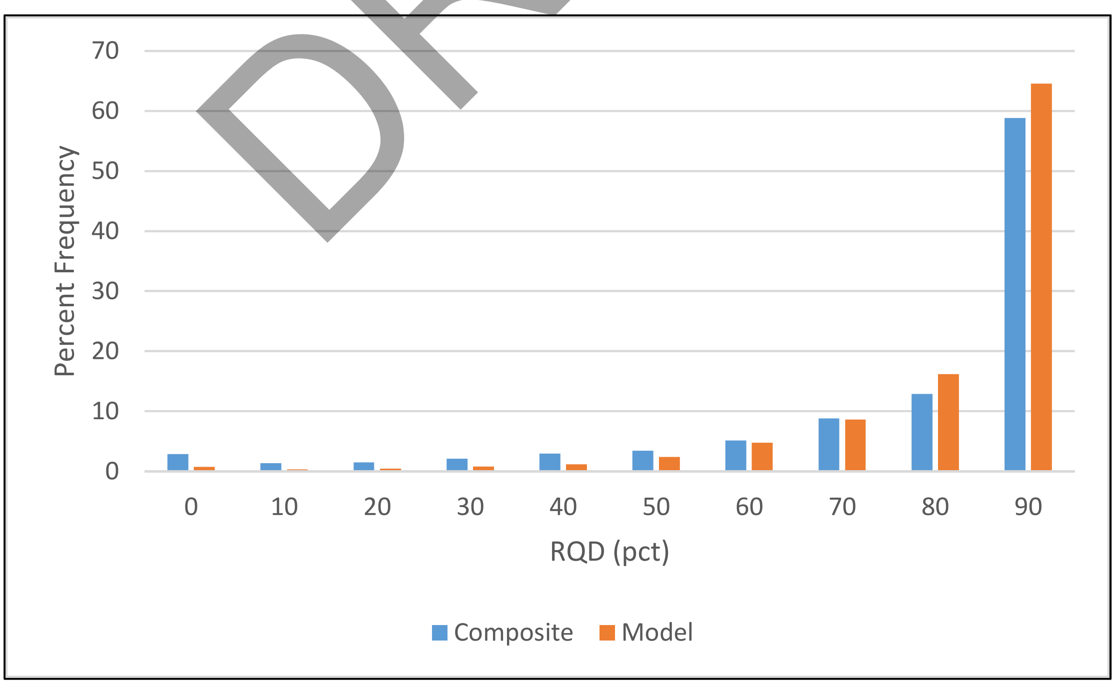


Figure 4-24. Comparison of RQD Distributions of Drill Hole Composites and Block Model RQD Data for Intrusive Domain

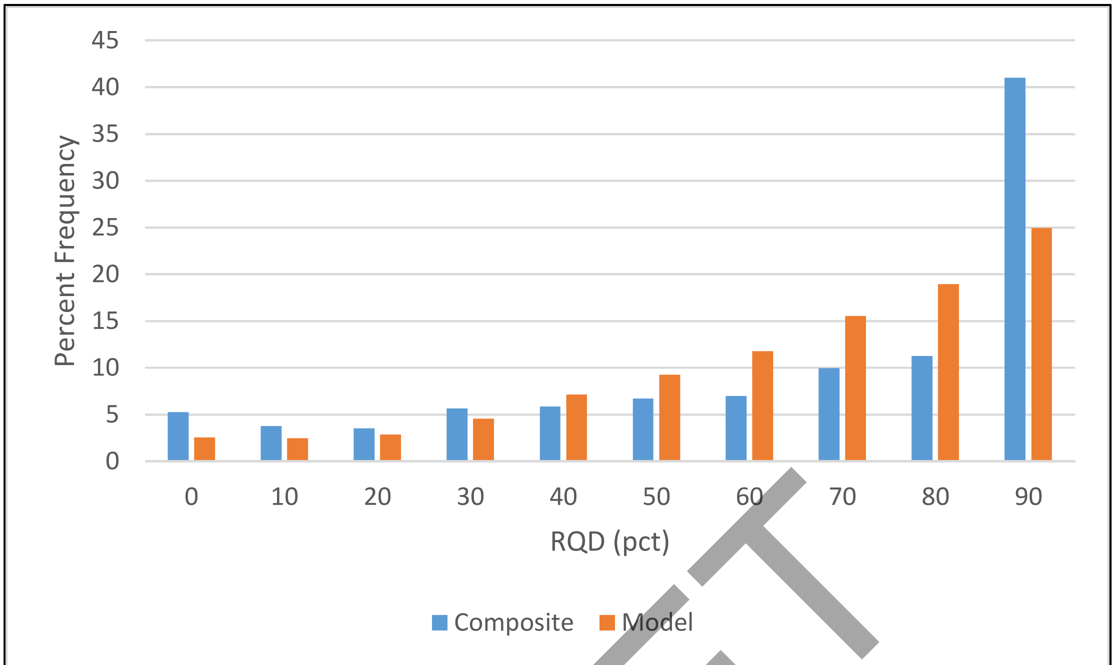


Figure 4-25. Comparison of RQD Distributions of Drill Hole Composites and Block Model RQD Data for Porphyry Domain

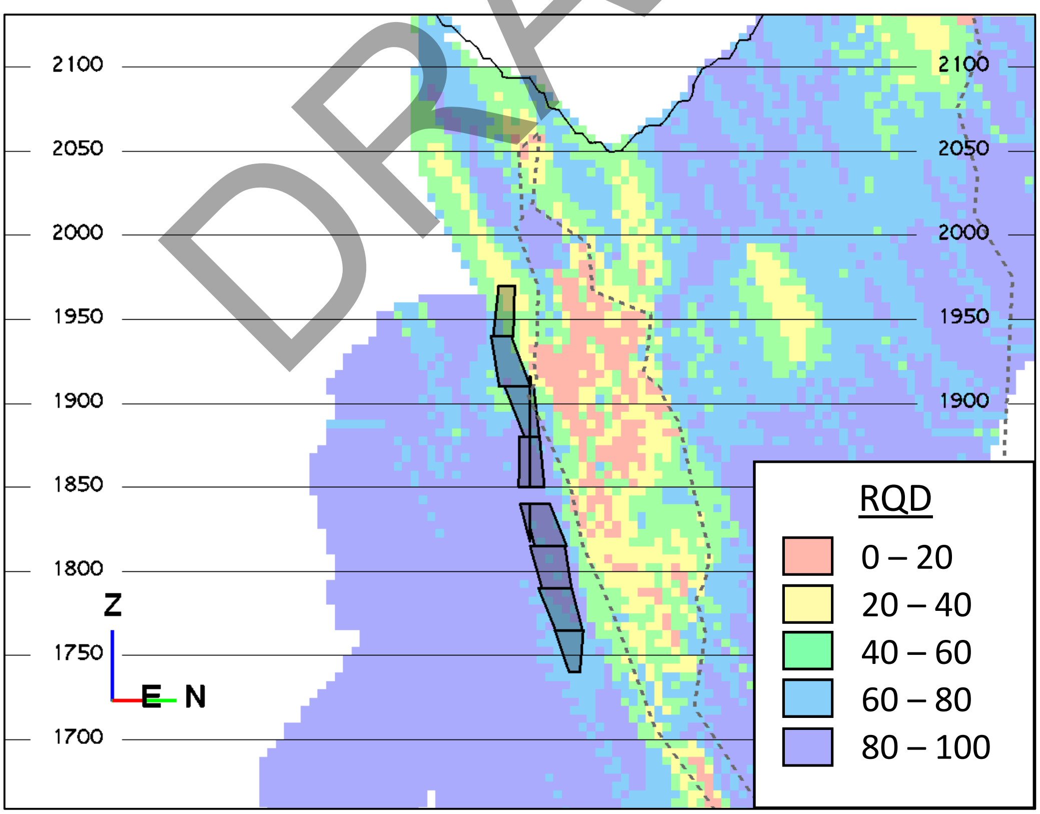


Figure 4-26. Cross Section (24) Presenting Estimated RQD with Fault Boundaries (Dashed) and 10 Meter Stope Design (Black).

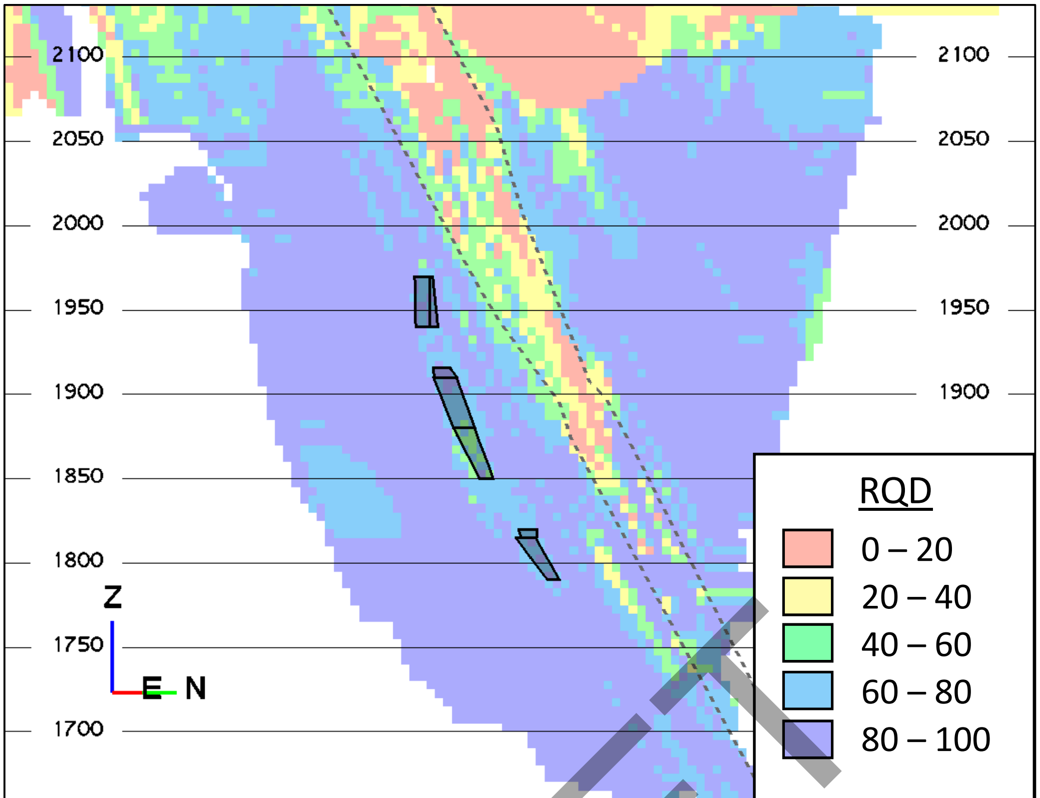


Figure 4-27. Cross Section (42) Presenting Estimated RQD with Fault Boundaries (Dashed) and 10 Meter Stope Design (Black).

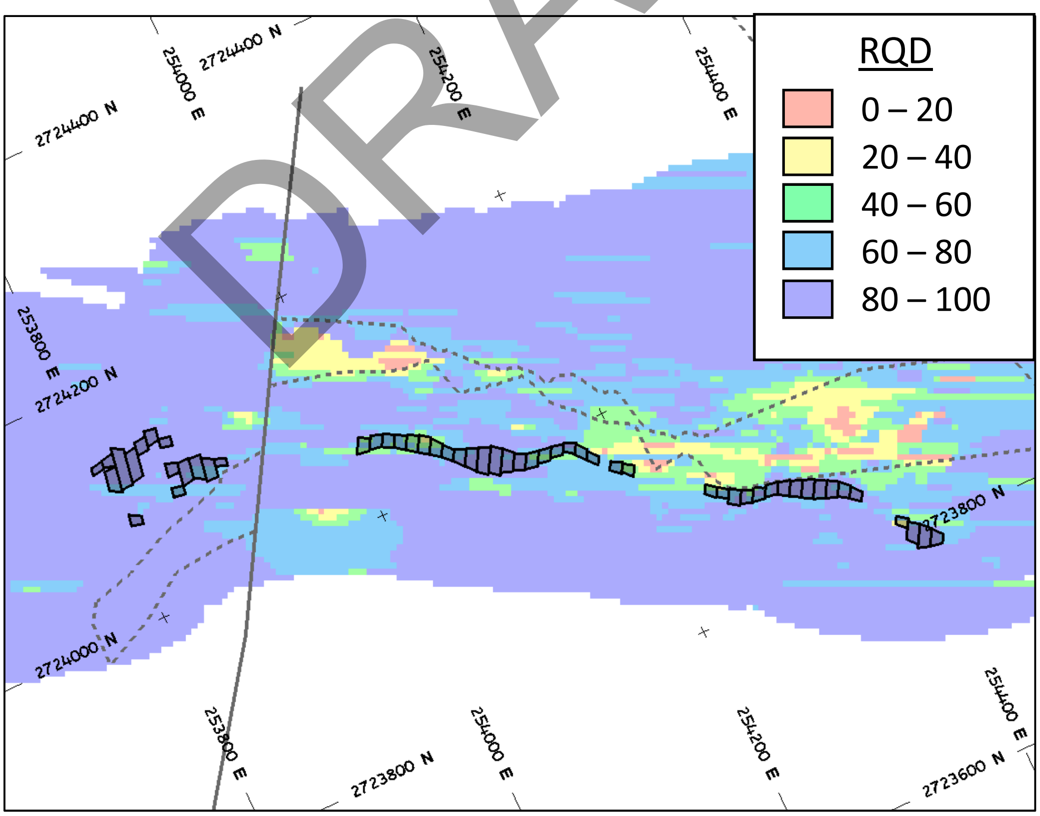


Figure 4-28. Plan View (1875) Presenting Estimated RQD with Fault Boundaries (Dashed) and 10 Meter Stope Design (Black).

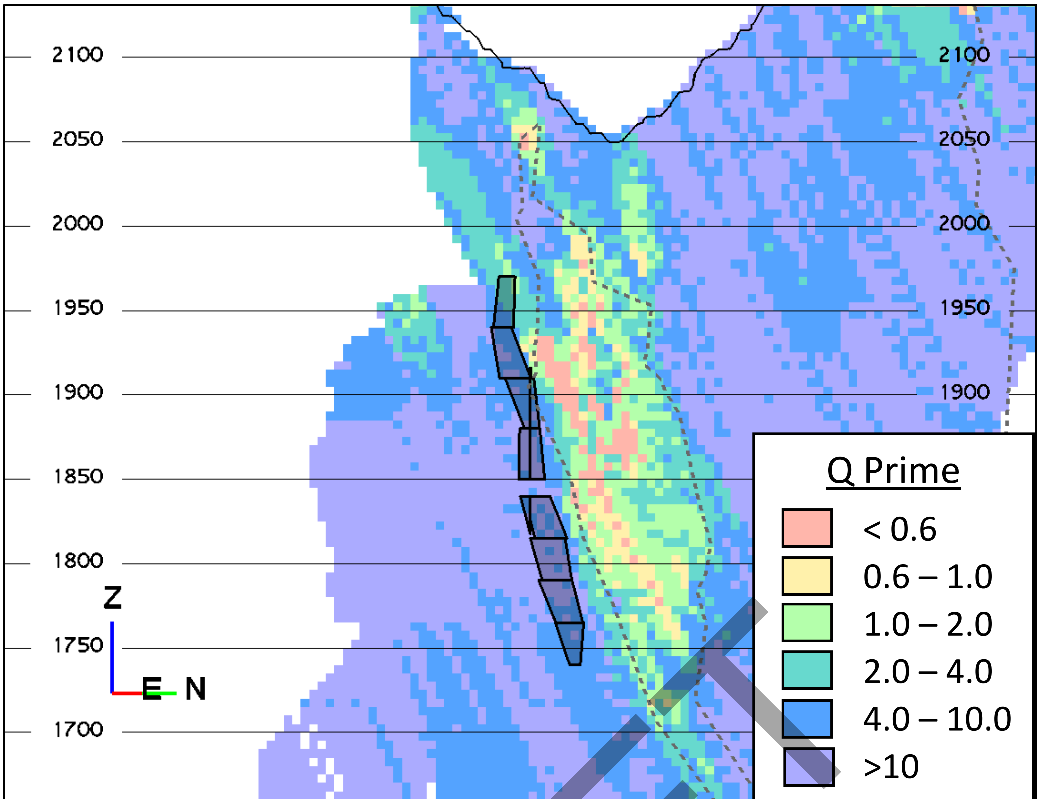


Figure 4-29. Cross Section (24) Presenting Estimated Q Prime with Fault Boundaries (Dashed) and 10 Meter Stope Design (Black).

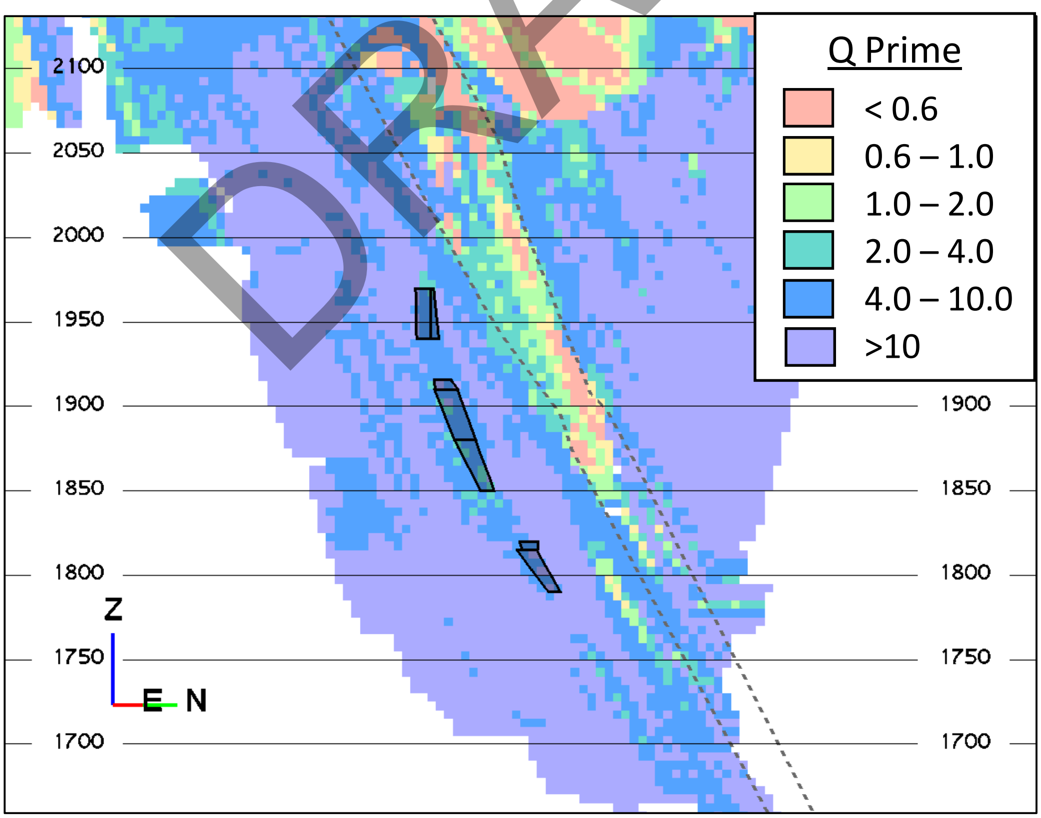


Figure 4-30. Cross Section (42) Presenting Estimated Q Prime with Fault Boundaries (Dashed) and 10 Meter Stope Design (Black).

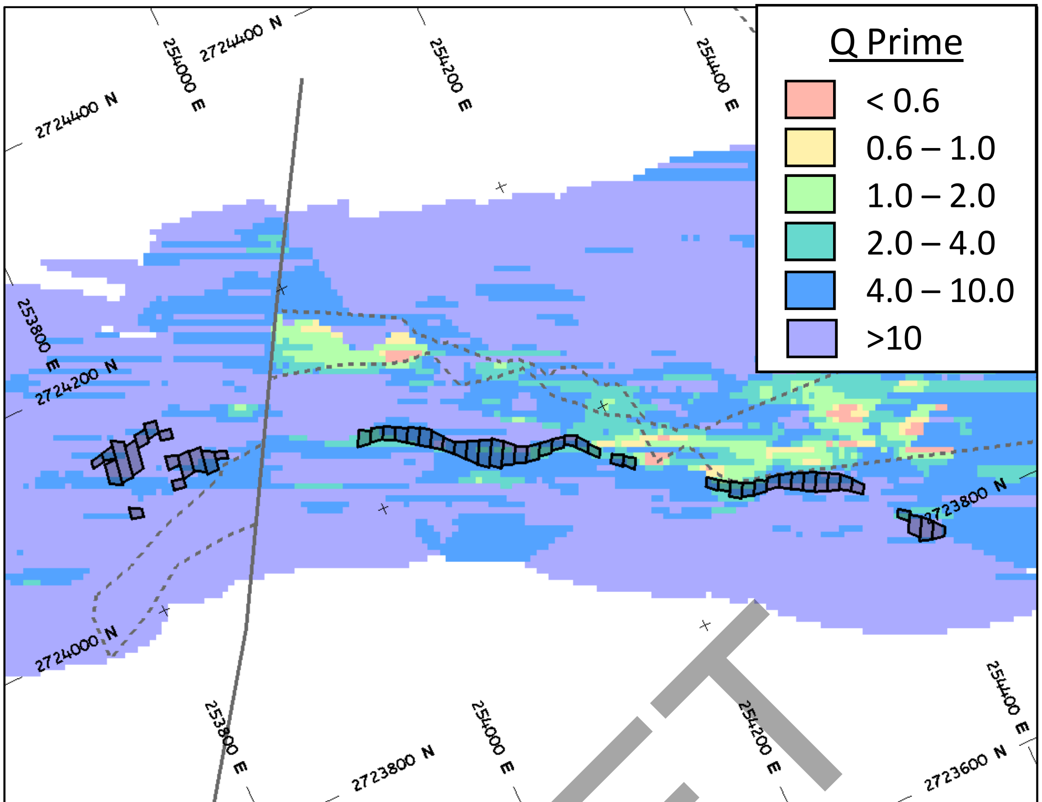


Figure 4-31. Plan View (1875 L) Presenting Estimated Q Prime with Fault Boundaries (Dashed) and 10 Meter Stope Design (Black).

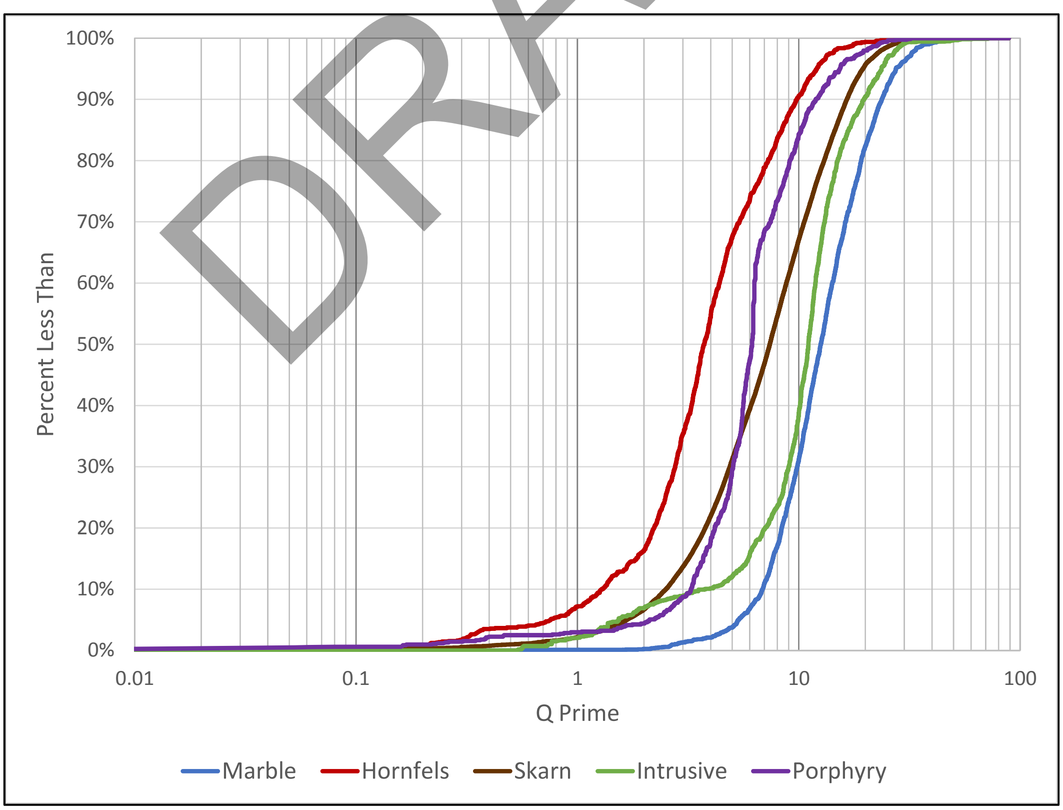


Figure 4-32. Cumulative Distribution of Estimated Q Prime by Domain

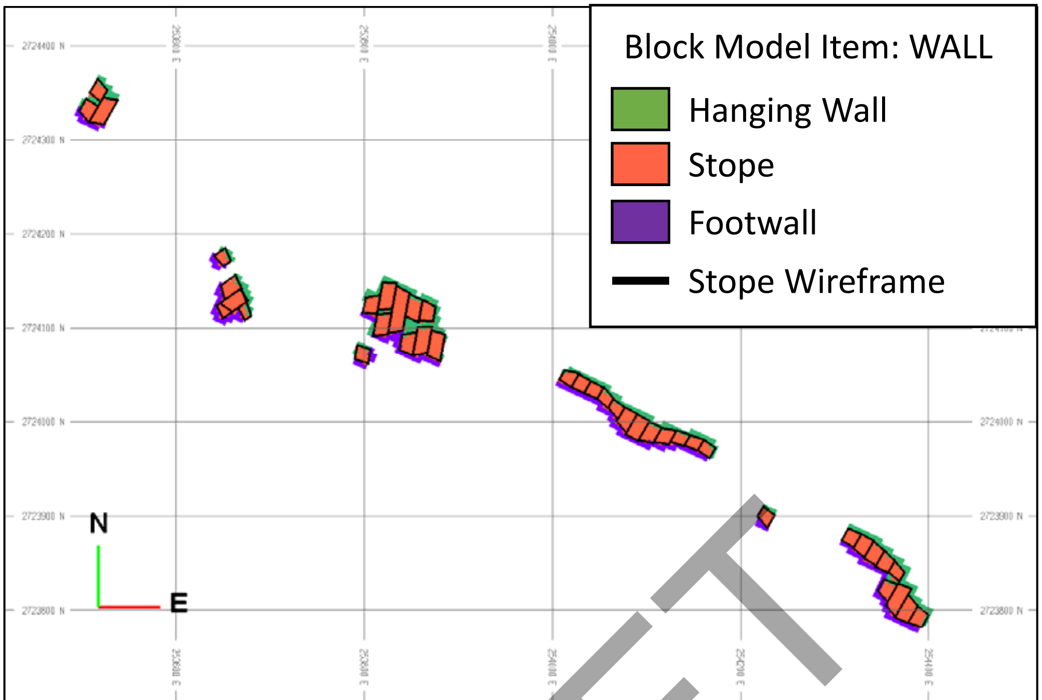


Figure 4-33. Plan View of 1905 Level Showing Stope Wireframes and WALL Model Codes

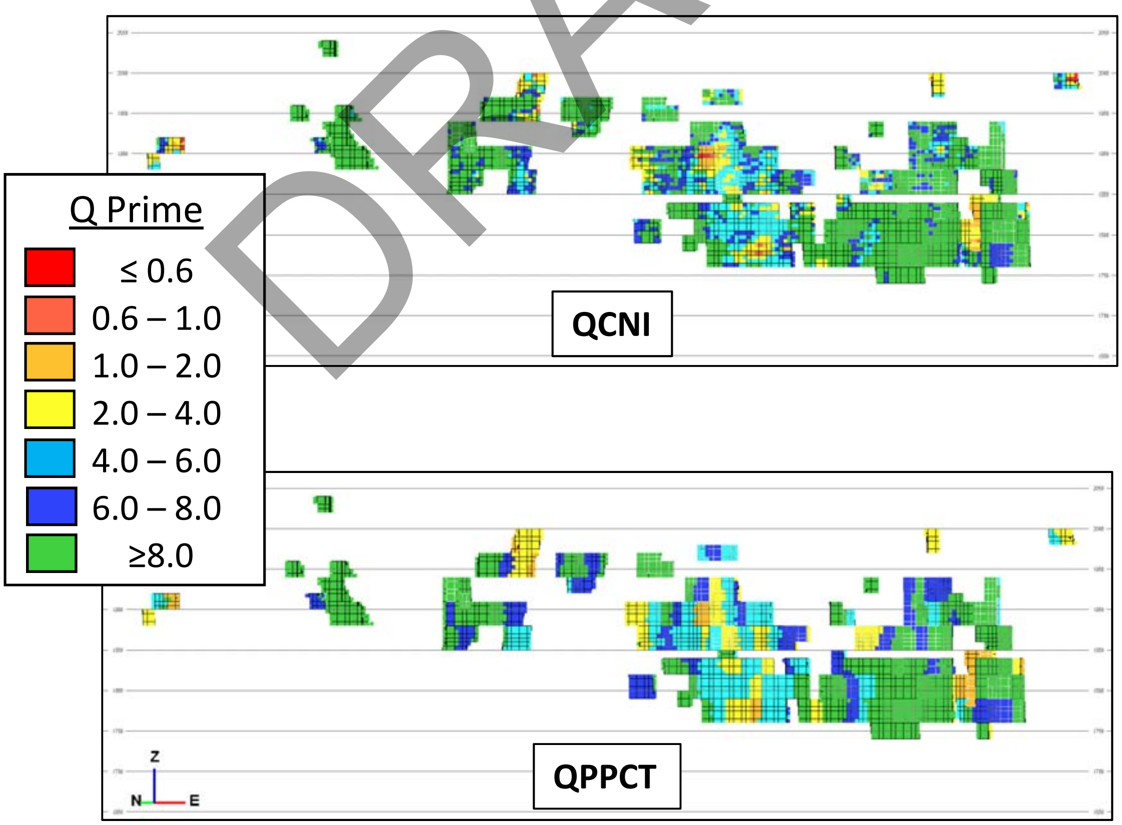


Figure 4-34. Oblique View of Deposit Footwall Blocks Comparing Q Prime Values (QCNI) and Q Prime Percentile Values (QPPCT).

STOPE	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20
LEVEL	HANGINGWALL																			
2000																				
1940																				
1910																				
1880	5.1	4.3	24.1	11.9	36.0	23.8	25.6	16.4	26.0	9.5	9.1	10.7	9.0	15.6	10.3	12.8	12.4	11.5	10.5	7.8
1850											13.3	16.5	14.2	8.9	10.9	10.1	8.2	7.9	7.7	11.6
1820																9.0	9.6	8.1	6.1	6.9
1790														19.8	13.3	8.5	10.0	11.1	16.3	24.5
1760															8.8	11.0	13.7	17.8	22.8	7.7
1730																				
	STOPES																			
2000																				
1940																				
1910																				
1880	10.1	3.4	20.8	28.1	24.7	28.8	21.3	17.5	21.9	15.4	14.2	16.0	12.2	17.2	17.6	9.7	17.1	10.0	9.3	7.8
1850											14.2	16.7	22.8	10.0	9.8	5.0	5.0	6.1	6.9	5.3
1820																13.8	11.9	9.0	7.4	5.5
1790														10.9	9.9	12.1	10.0	6.5	7.4	8.2
1760															15.6	15.6	12.0	12.8	11.2	8.7
1730																				
	FOOTWALL																			
2000																				
1940																				
1910																				
1880	1.6	1.9	7.1	21.8	14.7	18.9	18.2	15.2	19.8	7.3	16.0	9.0	8.8	9.6	12.8	12.2	11.5	6.4	6.2	5.7
1850											8.4	7.9	18.5	5.7	4.4	3.7	5.1	7.4	5.8	4.4
1820																11.6	12.9	7.2	5.4	4.8
1790														6.5	7.2	11.2	5.5	5.0	4.8	5.1
1760															20.9	18.9	5.4	3.8	2.8	1.2
1730																				

STOPE	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
LEVEL	HANGINGWALL																			
2000																				13.4
1940				15.7	21.8	10.0	5.1	7.8	4.5	3.9	6.8	3.9	6.9	9.0	8.8	10.7	10.8	12.9	6.4	5.4
1910			16.0	19.4	16.4	14.0	4.1	3.9	2.8	1.8	3.9	3.2	3.6	6.5	6.1	0.3	0.3	0.4	1.1	5.0
1880	8.0	6.3	5.8	8.0	11.0	13.4	12.1	9.4	4.1	3.4	0.7	1.5	0.7	1.6	3.9	5.6	6.0	7.0	6.0	4.3
1850	12.2	13.6	12.0	16.2	10.6	2.9	2.2	2.8	2.3	1.4	2.2	2.6	2.5	2.8	2.6	4.2	9.0	6.7	4.0	5.9
1820	5.2	13.1	16.9	9.6	8.6	3.8	3.8	4.2	2.7	2.4	1.1	1.6	2.1	1.9	2.4	4.9	7.6	13.8	14.5	14.3
1790	6.8	5.3	6.4	5.1	3.8	3.7	3.0	4.1	6.4	2.7	4.6	5.1	3.1	2.6	5.2	3.4	11.0	10.5	11.8	12.2
1760	6.5	7.6	4.8	3.8	3.9	4.5	5.0	5.9	2.5	4.0	3.7	3.5	3.1	4.5	3.4	4.3	5.1	7.5	9.5	9.4
1730																7.5	9.4	4.1	3.5	2.7
	STOPES																			
2000																				19.8
1940				19.0	18.3	10.6	8.7	6.1	2.9	2.5	6.3	5.0	5.3	9.3	5.7	6.2	7.1	4.4	6.4	5.2
1910			22.1	25.5	13.0	15.4	5.2	6.4	10.7	10.7	3.7	5.7	7.0	7.0	8.3	5.7	4.8	7.0	8.8	12.4
1880	9.3	7.9	6.4	5.2	5.3	5.8	5.1	8.3	6.4	8.3	5.9	6.1	7.9	8.9	8.8	8.9	11.0	12.5	12.7	14.9
1850	5.4	5.4	5.1	3.0	6.1	4.4	3.2	5.9	5.1	4.6	6.2	9.9	19.1	12.0	9.3	14.0	15.5	9.2	15.2	13.9
1820	12.3	5.3	5.3	6.7	4.6	3.9	6.4	6.8	8.6	9.0	15.2	15.4	14.7	9.4	7.8	9.1	10.9	19.0	15.3	15.8
1790	7.4	6.9	6.6	5.5	5.0	4.3	4.2	6.2	14.8	17.4	12.2	14.0	14.6	11.8	11.0	12.3	22.8	20.5	17.6	17.8
1760	8.2	7.5	4.0	3.8	3.7	4.2	5.8	7.3	11.3	13.9	13.4	13.4	13.8	12.1	8.7	6.6	10.5	14.4	15.3	15.6
1730																11.8	16.5	13.9	12.1	8.9
	FOOTWALL																			
2000																				18.3
1940				11.2	13.5	9.3	10.4	7.5	2.6	1.7	12.1	9.0	7.1	9.2	9.4	9.7	8.7	5.4	6.1	5.6
1910			21.1	19.8	13.1	13.0	7.8	7.6	8.2	8.0	6.5	3.5	7.2	5.3	10.5	6.7	8.9	6.1	6.1	12.8
1880	8.0	6.3	5.4	1.2	2.2	4.5	6.1	5.2	4.4	9.2	5.0	7.9	8.1	4.7	10.6	6.7	9.3	8.4	10.7	12.0
1850	4.0	4.1	3.8	4.3	2.4	3.5	5.8	7.5	6.4	3.4	3.7	7.5	13.4	8.3	7.9	8.9	9.1	14.5	10.6	14.5
1820	14.1	3.7	5.0	4.2	3.5	6.3	4.3	6.0	9.0	14.1	9.9	15.1	8.2	12.9	8.2	7.9	10.9	13.1	15.6	13.2
1790	3.8	4.6	5.2	5.9	10.6	11.5	8.9	8.0	5.8	5.3	14.2	9.0	10.8	8.6	13.5	11.4	11.8	10.6	11.0	11.6
1760	4.1	5.8	10.0	3.6	12.7	8.9	6.7	5.6	13.3	16.0	14.9	15.6	12.4	11.9	9.6	10.2	7.4	6.7	7.7	11.5
1730																12.5	13.2	14.5	12.2	9.9

Figure 4-35. Stope Q Prime Matrix for All Deposits Except Glory Hole Hanging Wall Showing Lower Quartile Values of Hanging Wall and Footwall Zones and Median Values of Stope Zones. Matrix is Spatially Generalizated and Does Not Include Gaps Between Stopes.

STOPE	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
LEVEL	HANGINGWALL																																							
2000																																								
1940																																								
1910																																								
1880																																								
1850																																								
1820														1.3	1.6																									
1790									3.8	4.0	2.2	3.0	3.2																											
1760											5.2	6.9	10.7	3.8																										
1730																																								
	STOPES																																							
2000																																								
1940																																								
1910																																								
1880																																								
1850																																								
1820														4.0	5.2																									
1790									2.3	2.1	1.9	2.5	3.2																											
1760											4.6	6.0	5.1	2.9																										
1730																																								
	FOOTWALL																																							
2000																																								
1940																																								
1910																																								
1880																																								
1850																																								
1820													3.1	3.8																										
1790									1.9	1.4	1.3	1.0																												
1760											4.4	1.9	0.7	0.6																										
1730																																								

Figure 4-36. Stope Q Prime Matrix of Glory Hole Hanging Wall Deposit Showing Lower Quartile Values of Hanging Wall and Footwall Zones and Median Values of Stope Zones. Matrix is Spatially Generalizated and Does Not Include Gaps Between Stopes.

STOPE	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
LEVEL	HANGINGWALL																																							
2000																																								
1970																																			1.4	1.7	1.5	0.7	2.5
1940																																								
1910																																								
1880																																				3.1	1.6	6.8	6.3
1850																																								
1820																																						1.3	2.5
1790																																								
1760																																							3.6
1730																																								
	STOPES																																							
2000																																								
1970																																			1.6	2.2	2.3	2.4	3.0
1940																																								
1910																																								
1880																																				3.2	1.2	4.6	5.5
1850																																								
1820																																						3.2	2.7
1790																																								
1760																																							2.6
1730																																								
	FOOTWALL																																							
2000																																								
1970																																			3.6	2.3	3.1	5.5	2.9
1940																																								
1910																																								
1880																																				2.6	5.1	2.5	3.0
1850																																								
1820																																						1.4	1.4
1790																																								
1760																																							0.5
1730																																								

Figure 4-37. Stope Q Prime Matrix of Previously Sterilized Stopes Showing Quartile Values of Hanging Wall and Footwall Zones and Median Values of Stope Zones. Matrix is Spatially Generalizated and Does Not Include Gaps Between Stopes.

5.0 GEOTECHNICAL INVESTIGATION

Between May and July 2017, CNI engineers and geologists conducted a field investigation which included geotechnical core drilling and sample collection to support the geomechanical evaluation. This chapter presents details regarding the geotechnical investigation.

5.1 Geotechnical Core Drilling Program

A geotechnical core drilling program consisting of 7 holes totaling 1385 meters was conducted to obtain geologic, geomechanical, and rock fabric data to support the evaluation. Collar coordinates and additional information regarding the geotechnical core drilling are presented in Table 5-1.

Figures 5-1 through 5-7 present section views of each drill hole as it intersects the orebody and bounding lithologies. Drill holes were selected by CNI to target the lithologies within the hanging wall, footwall, and ore zone of the Glory Hole Footwall deposit. Drilling was overseen by CNI personnel and conducted using the HQ3 triple-tube core recovery method. CNI personnel collected fracture orientation data at the drill rig in 12-hour/day shifts.

5.1.1 *Oriented Core Data*

Core orienting was performed on 5 of the 7 geotechnical holes to determine true fracture orientations at depth with the use of Reflex Instruments' ACT II tool and CNI's method of data collection. No fracture orientation data were collected from drill holes GHP_GMX01 and GHP_GMX02 due to the rock being of such poor quality that no measurements could be taken (GHP_GMX01), or because of scheduling constraints (GHP_GMX02). The ACT II tool utilizes electronic accelerometers to determine the in situ position of the core (i.e., top of hole), allowing for the determination of true fracture orientations.

The difference angle or angular difference between consecutive top-of-hole lines (TOH) from consecutive core runs was recorded to provide a means of quality control. A low difference angle implies a high degree of accuracy in the core orientation process and high confidence in the accuracy of calculated true fracture orientations. High difference angles resulting in low confidence can be due to several reasons, including difficulty in determining the top-of-hole, difficulty in piecing together a core run (i.e., highly fractured and/or spun core), or irregular fracture geometry. The core orientation data were reduced with the use of software developed by CNI to determine true fracture orientations.

Fracture orientations were arranged according to the following rock types: skarn, intrusive, hornfels, and marble. Contoured stereonet plots for each rock type are presented in Figures 5-8 through 5-11. Contoured stereonet plots for each rock type combined with historic data collected by SRK are presented in Appendix A.

In addition to the fracture orientation data, the following fracture characteristics were recorded at the rig:

1. Fracture location (distance from start of drill run)
2. Fill type
3. Fill thickness
4. Presence of slickensides
5. Natural or mechanical break

The oriented core data sheets are presented in Appendix B.

5.1.2 Geomechanical Logging and Drill Hole QA/QC

To validate the entirety of Aranzazu's drill hole database, a validation exercise was performed. Specified intervals of historical drilling, as well as drilling from the 2017 drill holes, were logged for the Q' parameters for comparison purposes. The validation exercise indicated that for the purposes of the analyses, there was very little difference in logging performed by CNI and AMI. Consequently, all drill hole data from Aranzazu was accepted and utilized in the evaluation. Details of the drill hole validation exercise are detailed in Chapter 4, section 4.1.1, and the CNI memo *Aranzazu Geomechanical Drill Hole Database Validation* (July 2017).

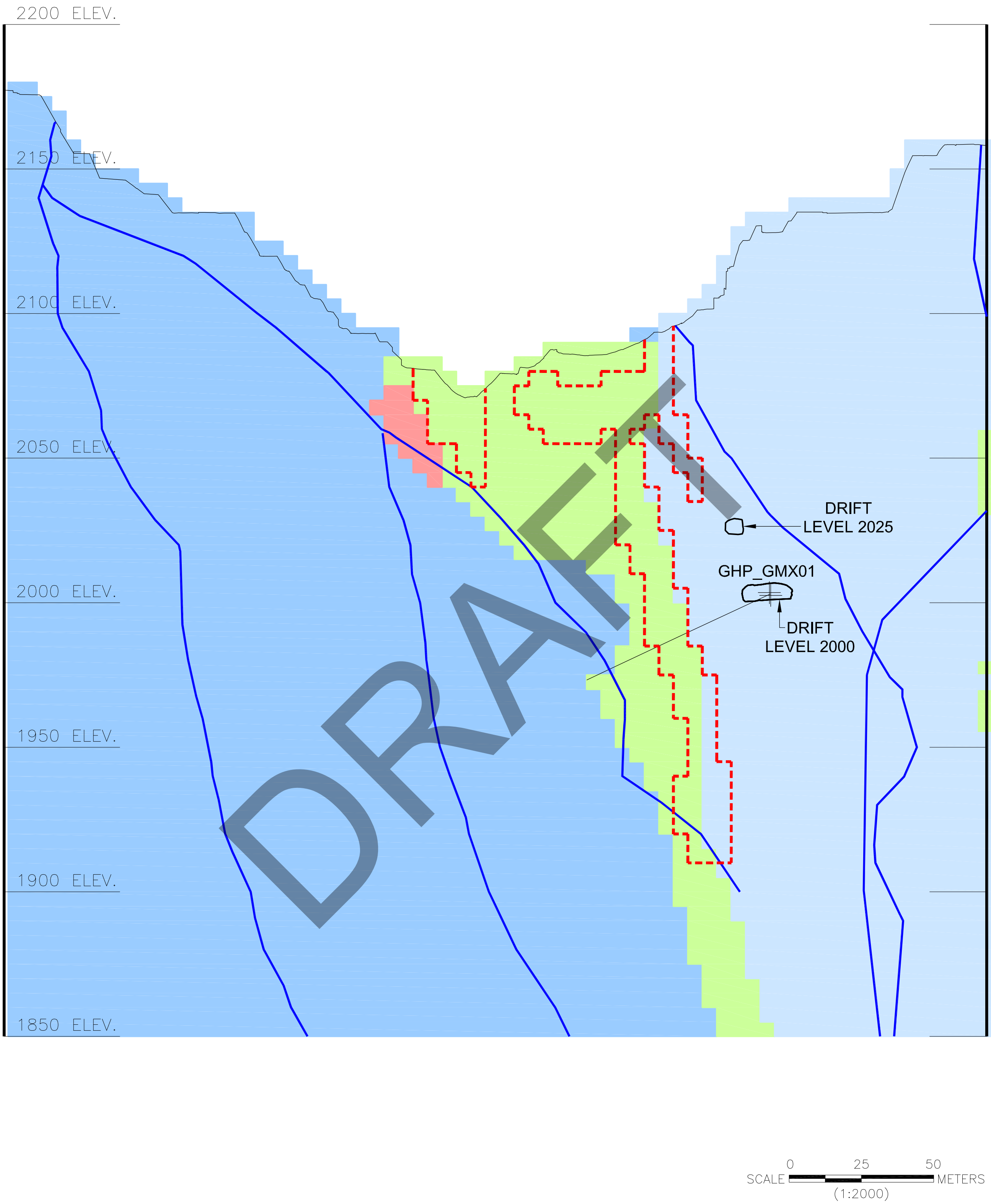
5.1.3 Sampling

Core samples were collected by CNI personnel for geomechanical laboratory testing. Intact sticks of core and fractures were sampled for intact and fracture strength testing, respectively. Samples were collected with the intent of representing the variability of rock and alteration types. Descriptions of the laboratory tests and results are presented in Chapter 6.

Table 5-1. 2017 Geotechnical Drill Plan for Glory Hole Deposit
Aranzazu Mine, Aura Minerals Inc., 2017

Drill Hole ID	Collar Location			Azimuth (deg)	Dip (deg)	Length (m)	Section	Footwall/ Hanging Wall
	Northing	Easting	Elevation					
GHP_GMX01	2,723,914	254,514	2,003	205	-25	70	18	HW
GHP_GMX02	2,723,928	254,436	2,004	205	-45	250	21	Both
GHP_GMX03	2,723,951	254,383	2,003	205	-40	180	25	Both
GHP_GMX04	2,723,977	254,339	2,003	205	-70	315	27	Both
GHP_GMX05	2724018	254250	2012	205	-60	230	32	FW
GHP_GMX06	2724023	254118	1998	205	-50	140	38	FW
GHP_GMX07	2724023	254118	1998	280	-65	200	39	FW

TOTAL: **1385**



LEGEND

- HORNFELS
- INTRUSIVE
- SKARN
- LIMESTONE / MARBLE
- GLORY HOLE PIT
- ORE
- FAULTS

CALL & NICHOLAS, INC.

TUCSON, ARIZONA USA

DRAWN	DATE	REVISED
LMC	05/17	10/30/2017 2:59 PM

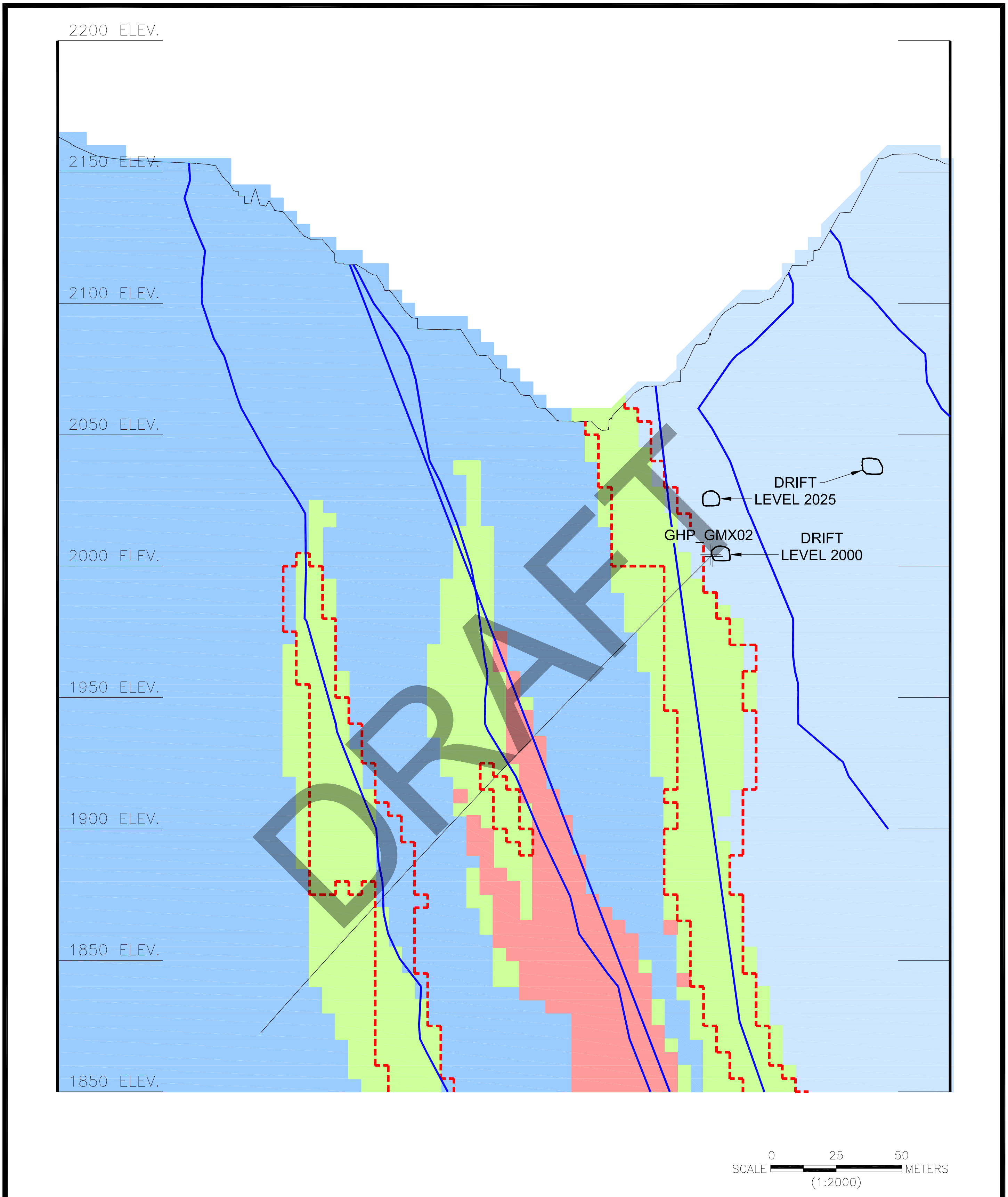
\2017_REPORT\FIGURES\FIG5-1_GHP_GMX01_LITH.DWG

LITHOLOGY SECTION GHP_GMX01 (Looking NW)

ARANZAZU

SCALE 1:2000

FIGURE 5-1



LEGEND

- HORNFELS
- INTRUSIVE
- SKARN
- LIMESTONE / MARBLE
- GLORY HOLE PIT
- ORE
- FAULTS

CALL & NICHOLAS, INC.

TUCSON, ARIZONA USA

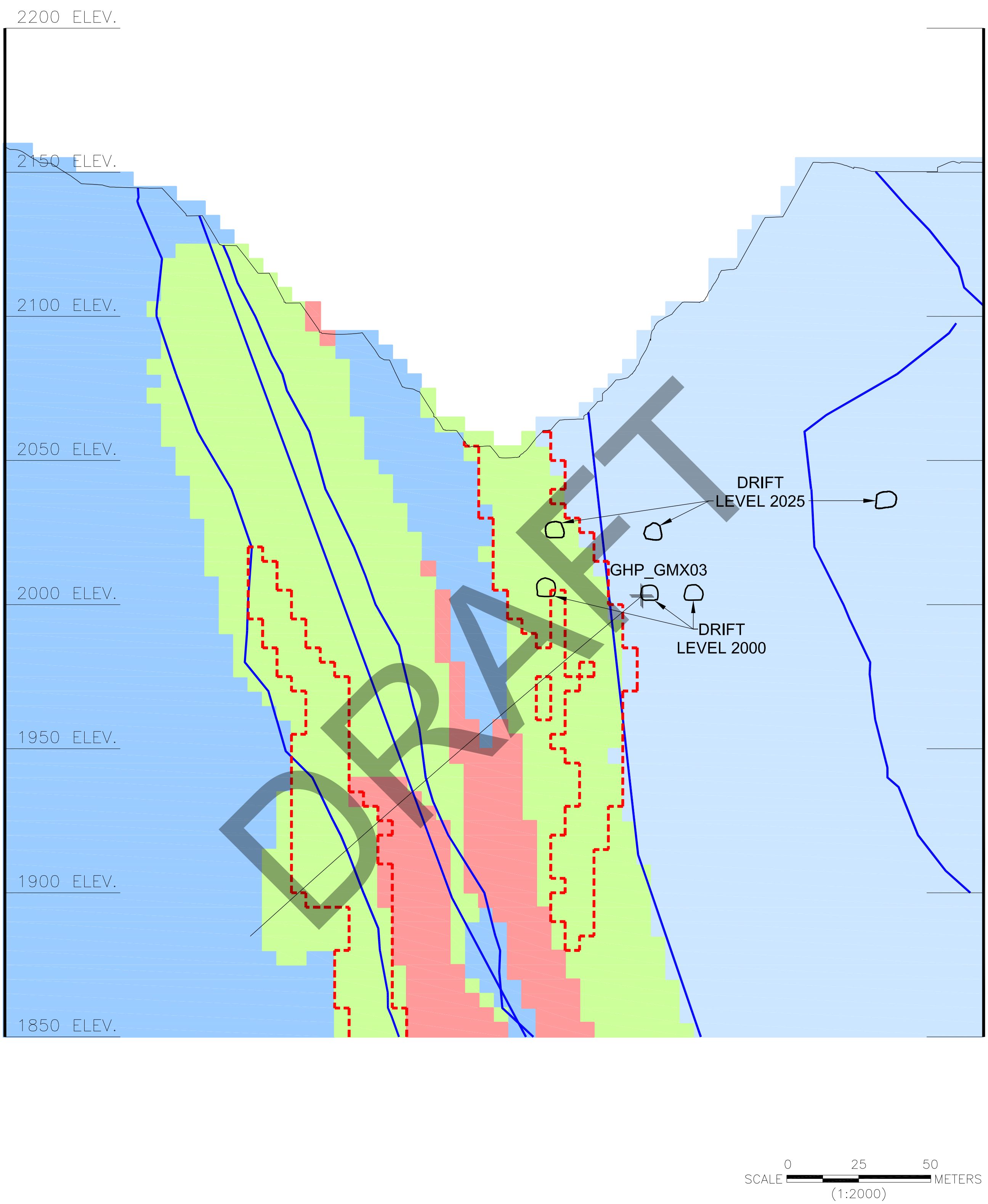
DRAWN	LMC	DATE	05/17	REVISED	9/27/2017 4:06 PM

\2017_REPORT\FIGURES\FIG5-2_GHP_GMX02_LITH.DWG

LITHOLOGY SECTION GHP_GMX02 (Looking NW)

ARANZAZU

SCALE	1:2000	FIGURE 5-2



LEGEND

HORNFELS
INTRUSIVE
SKARN
LIMESTONE / MARBLE
GLORY HOLE PIT
ORE
FAULTS

CALL & NICHOLAS, INC.
TUCSON, ARIZONA USA

DRAWN LMC | DATE 05/17 | REVISED 10/30/2017 3:00 PM

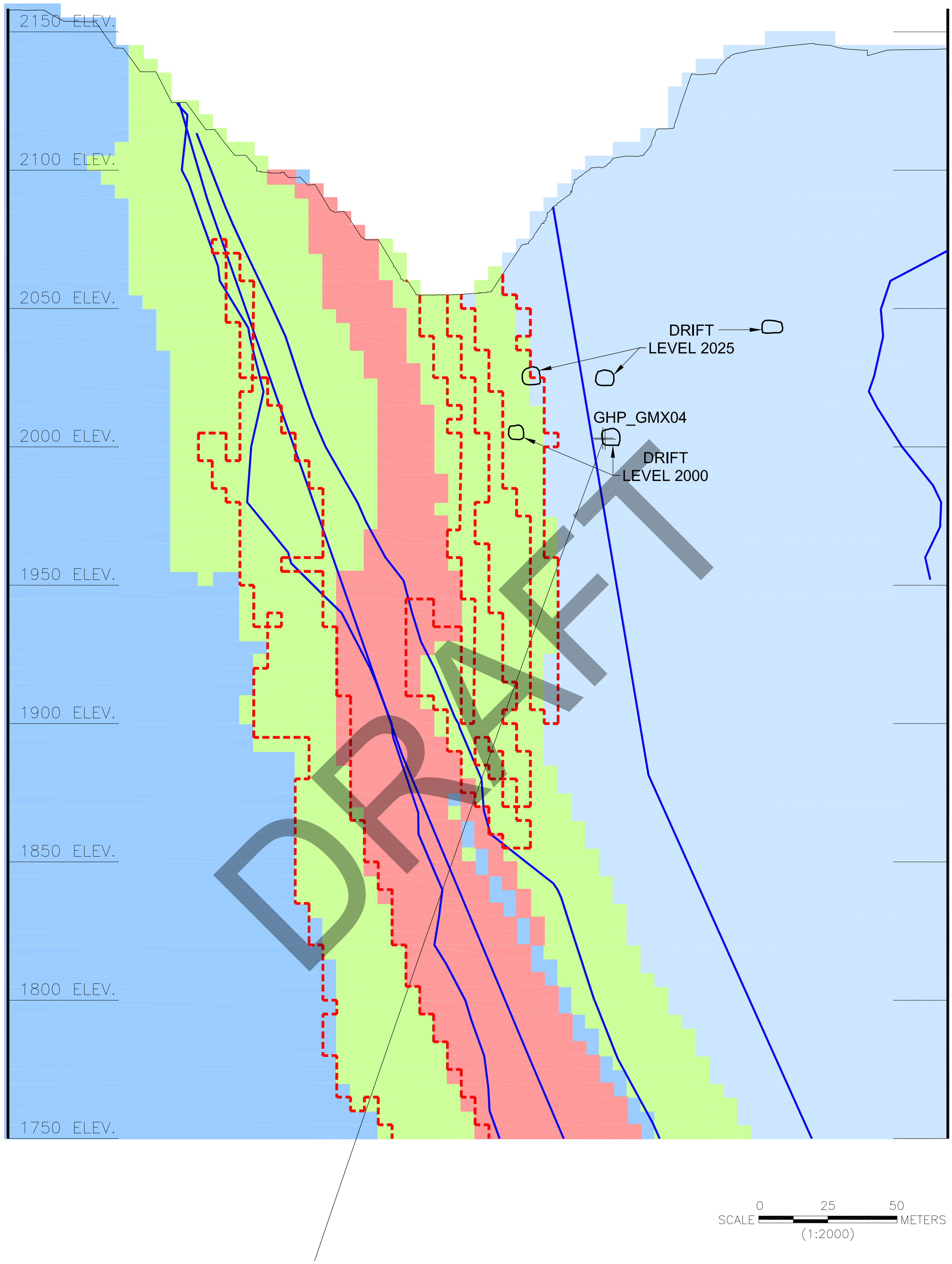
\2017_REPORT\FIGURES\FIG5-3_GHP_GMX03_LITH.DWG

LITHOLOGY SECTION GHP_GMX03 (Looking NW)

ARANZAZU

SCALE 1:2000

FIGURE 5-3



LEGEND

- HORNFELS
- INTRUSIVE
- SKARN
- LIMESTONE / MARBLE
- GLORY HOLE PIT
- ORE
- FAULTS

CALL & NICHOLAS, INC.

TUCSON, ARIZONA USA

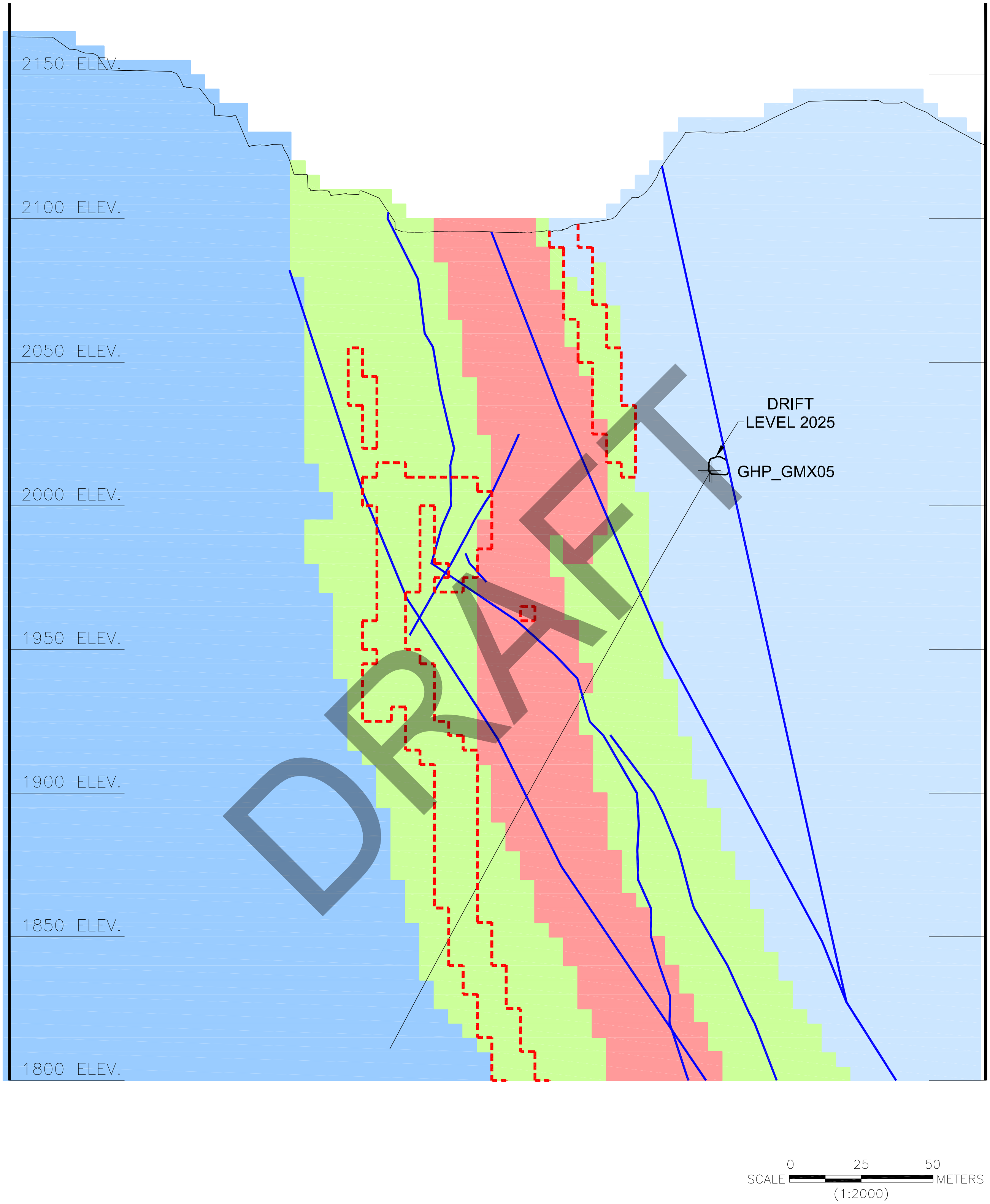
DRAWN LMC	DATE 05/17	REVISED 9/27/2017 4:07 PM

\2017_REPORT\FIGURES\FIG5-4_GHP_GMX04_LITH.DWG

LITHOLOGY SECTION GHP_GMX04 (Looking NW)

ARANZAZU

SCALE 1:2000	FIGURE 5-4



LEGEND

- HORNFELS
- INTRUSIVE
- SKARN
- LIMESTONE / MARBLE
- GLORY HOLE PIT
- ORE
- FAULTS

CALL & NICHOLAS, INC.

TUCSON, ARIZONA USA

DRAWN LMC	DATE 05/17	REVISED 9/27/2017 4:07 PM

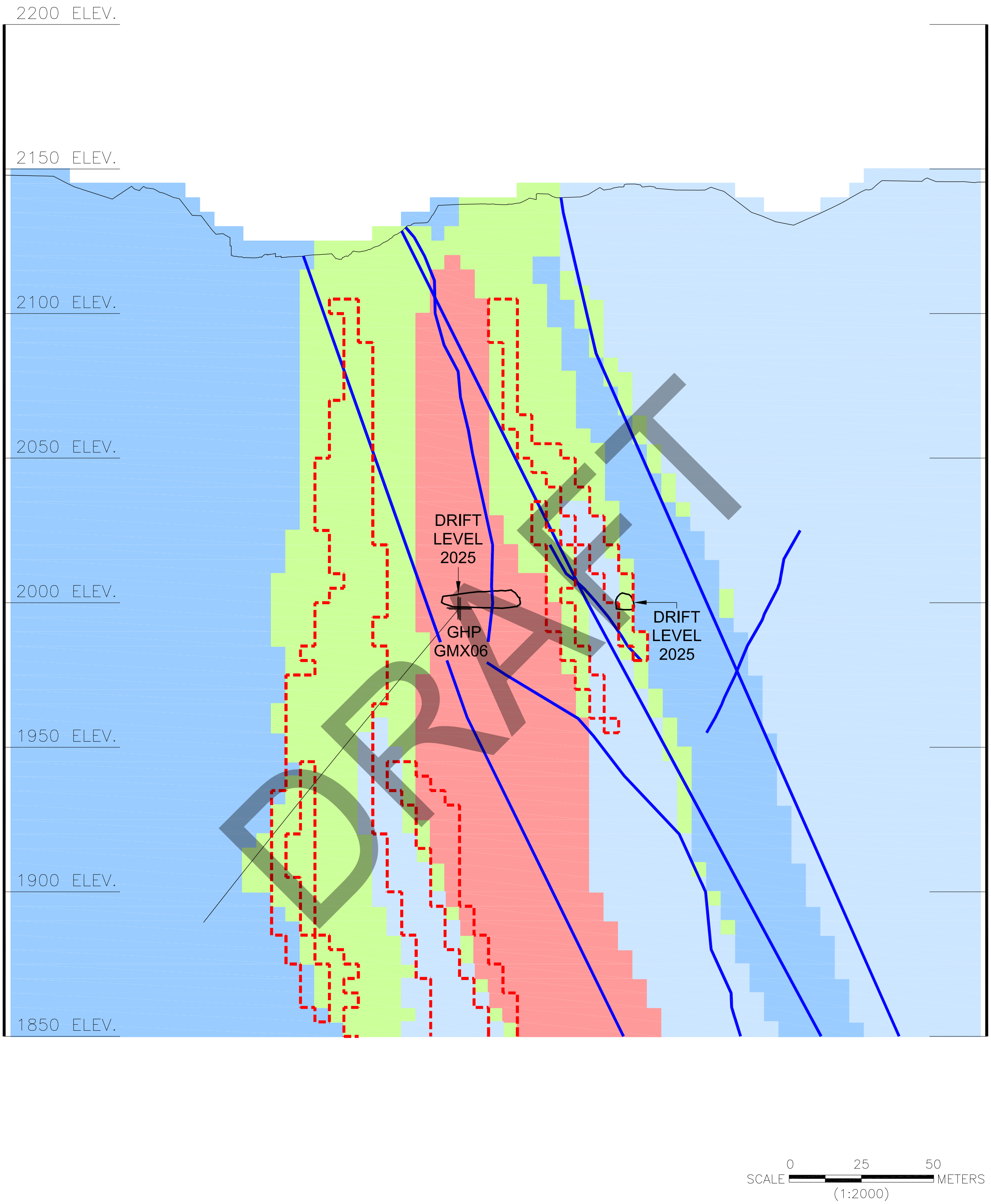
\2017_REPORT\FIGURES\FIG5-5_GHP_GMX05_LITH.DWG

LITHOLOGY SECTION GHP_GMX05 (Looking NW)

ARANZAZU

SCALE 1:2000

FIGURE 5-5



LEGEND

- HORNFELS
- INTRUSIVE
- SKARN
- LIMESTONE / MARBLE
- GLORY HOLE PIT
- ORE
- FAULTS

CALL & NICHOLAS, INC.
TUCSON, ARIZONA USA

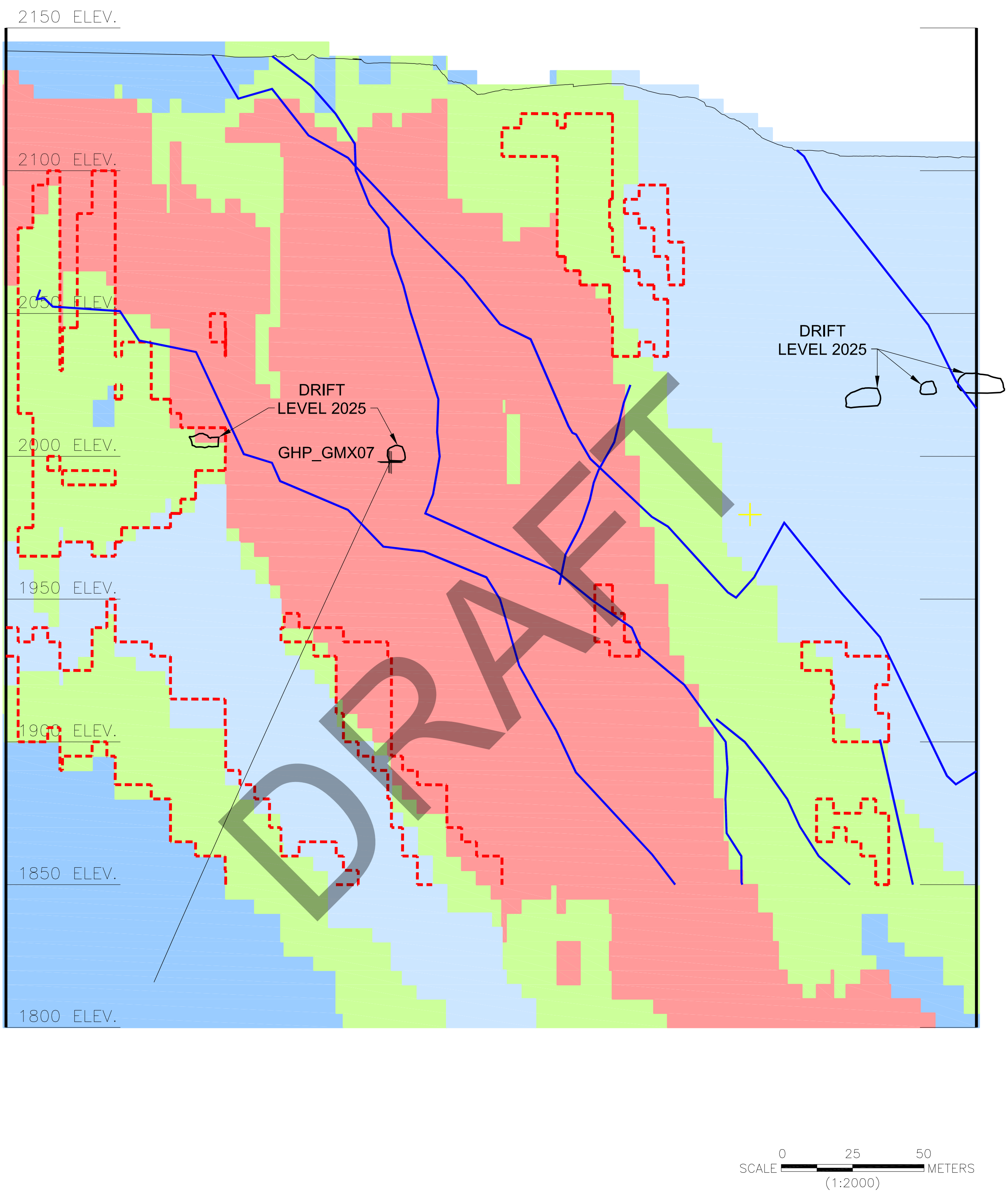
DRAWN LMC	DATE 05/17	REVISED 9/27/2017 4:08 PM

\2017_REPORT\FIGURES\FIG5-6_GHP_GMX06_LITH.DWG

LITHOLOGY SECTION
GHP_GMX06
(Looking NW)

ARANZAZU

SCALE 1:2000	FIGURE 5-6



LEGEND

- HORNFELS
- INTRUSIVE
- SKARN
- LIMESTONE / MARBLE
- GLORY HOLE PIT
- ORE
- FAULTS

CALL & NICHOLAS, INC.
TUCSON, ARIZONA USA

DRAWN LMC	DATE 05/17	REVISED 9/27/2017 4:08 PM

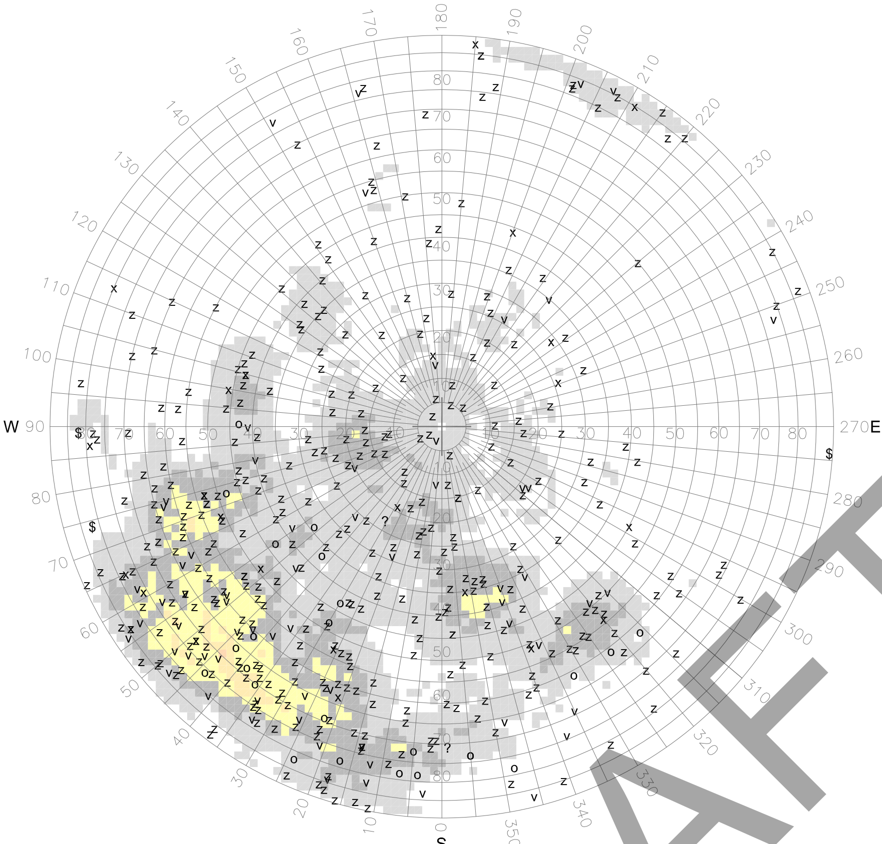
\2017_REPORT\FIGURES\FIG5-7_GHP_GMX07_LITH.DWG

LITHOLOGY SECTION GHP_GMX07 (Looking N)

ARANZAZU

SCALE 1:2000	FIGURE 5-7

SCHMIDT EQUAL AREA   LOWER HEMISPHERE



Aura Minerals Inc. Aranzazu Mine Oriented Core
All CNI Drillholes, Skarn

Call & Nicholas, Inc.

File Used: GHP-GMX.cnv

NUMBER OF POINTS: 456

FRAC: all CONF: all

ROCK TYPE	DEPTH	STR. TYPE	FILL TYPE
020	all	all	all

PLOT LEGEND
----

o = Bedding Joint
? = Unknown
x = Fault
z = Single Joint
$ = Shear Zone
v = Vein

STRUCTURE CONCENTRATION:

0.0% ~ 1.0%
1.0% ~ 2.0%
2.0% ~ 3.0%
3.0% ~ 4.0%
4.0% ~ 5.0%
5.0% ~ 6.0%
6.0% ~ 7.0%
7.0% ~ 8.0%
8.0% ~ 9.0%
9.0% ~ 10.0%
>10%

Date: July 24, 2017
File: GHP-ALL-030.scr

LEGEND

CALL & NICHOLAS, INC.
TUCSON, ARIZONA USA

DRAWN SMD | DATE 07/24 | REVISED 10/10/2017 4:34 PM

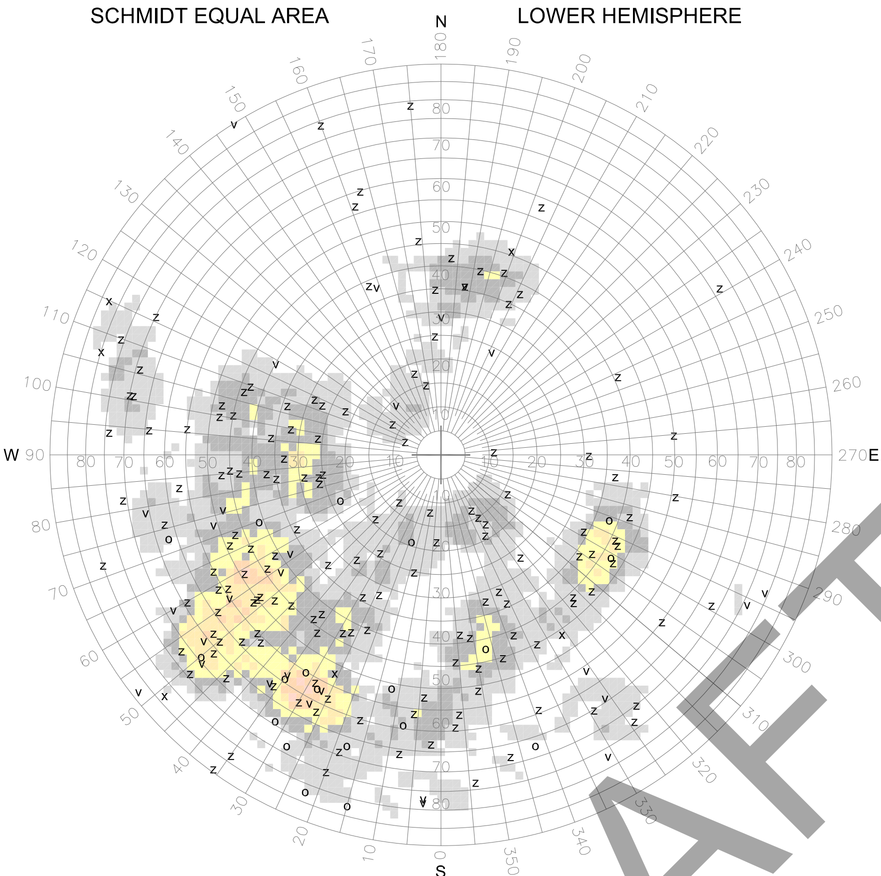
\2017_REPORT\FIGURES\FIG5-8_CNI-GH-SKARN-UPDATED.DWG

2017 CNI ORIENTED CORE DATA SKARN

ARANZAZU

SCALE N.T.S.

FIGURE 5-8



Aura Minerals Inc. Aranzazu Mine Oriented Core
All CNI Drillholes, Intrusive

Call & Nicholas, Inc.

File Used: GHP-GMX.cnv

NUMBER OF POINTS: 206

FRAC: all CONF: all

ROCK TYPE	DEPTH	STR. TYPE	FILL TYPE
040	all	all	all

PLOT LEGEND
----
o = Bedding Joint
? = Unknown
x = Fault
z = Single Joint
$ = Shear Zone
v = Vein

STRUCTURE CONCENTRATION:

- 0.0% ~ 1.0%
- 1.0% ~ 2.0%
- 2.0% ~ 3.0%
- 3.0% ~ 4.0%
- 4.0% ~ 5.0%
- 5.0% ~ 6.0%
- 6.0% ~ 7.0%
- 7.0% ~ 8.0%
- 8.0% ~ 9.0%
- 9.0% ~ 10.0%
- >10%

Date: July 24, 2017
File: GHP-ALL-020.scr

LEGEND

CALL & NICHOLAS, INC.
TUCSON, ARIZONA USA

DRAWN SMD | DATE 07/24 | REVISED 10/12/2017 4:13 PM

\2017_REPORT\FIGURES\FIG5-9_CNI-GH-INTRUSIVE.DWG

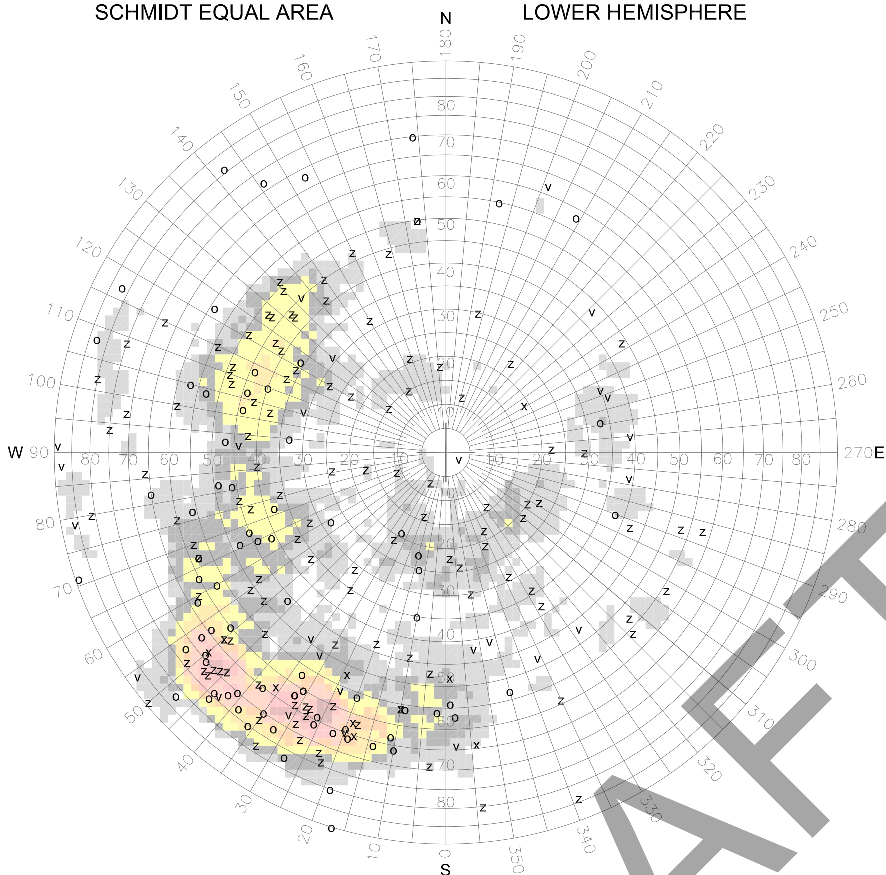
2017 CNI ORIENTED CORE DATA INTRUSIVE

ARANZAZU

SCALE N.T.S. | FIGURE 5-9

SCHMIDT EQUAL AREA

LOWER HEMISPHERE



Aura Minerals Inc. Aranzazu Mine Oriented Core
All CNI Drillholes, Hornfels

Call & Nicholas, Inc.

File Used: GHP-GMX.cnv

NUMBER OF POINTS: 233

FRAC: all CONF: all

ROCK TYPE	DEPTH	STR. TYPE	FILL TYPE
020	all	all	all

PLOT LEGEND

----

o = Bedding Joint
? = Unknown
x = Fault
z = Single Joint
$ = Shear Zone
v = Vein

STRUCTURE CONCENTRATION:

0.0% ~ 1.0%
1.0% ~ 2.0%
2.0% ~ 3.0%
3.0% ~ 4.0%
4.0% ~ 5.0%
5.0% ~ 6.0%
6.0% ~ 7.0%
7.0% ~ 8.0%
8.0% ~ 9.0%
9.0% ~ 10.0%
>10%

Date: July 24, 2017

File: GHP-ALL-020.scr

LEGEND

CALL & NICHOLAS, INC.
TUCSON, ARIZONA USA

DRAWN SMD DATE 07/24 REVISED 10/10/2017 4:36 PM

\2017_REPORT\FIGURES\FIG5-10_CNI-GH-HORNFELS.DWG

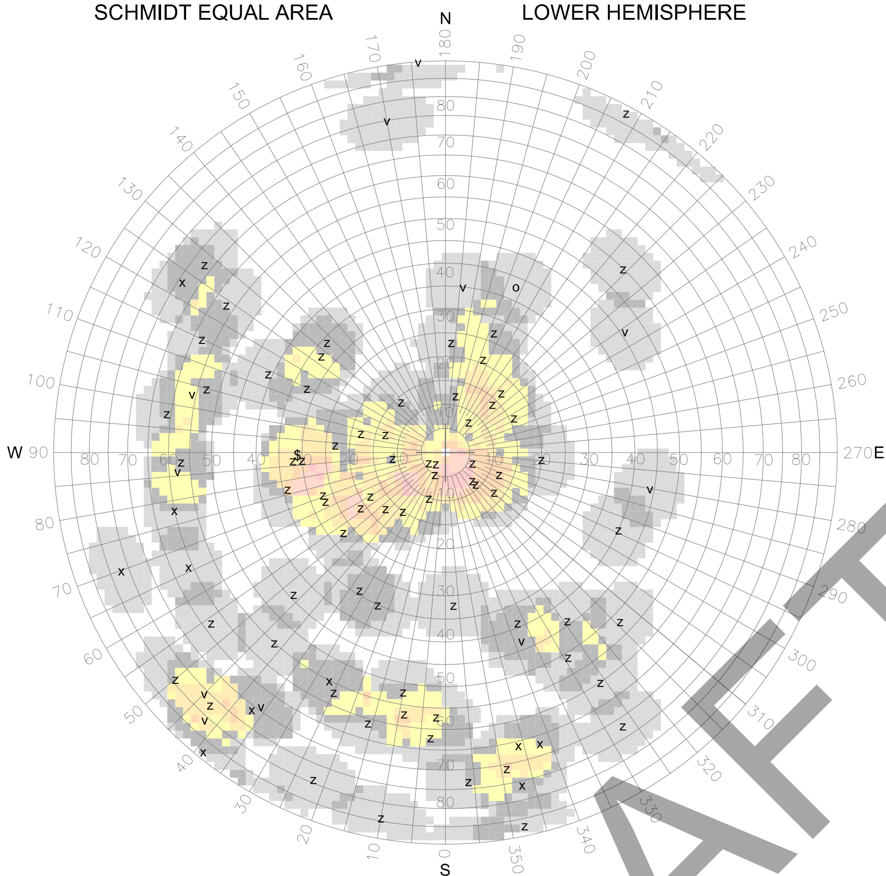
2017 CNI ORIENTED CORE DATA HORNFELS

ARANZAZU

SCALE N.T.S. FIGURE 5-10

SCHMIDT EQUAL AREA

LOWER HEMISPHERE



Aura Minerals Inc. Aranzazu Mine Oriented Core
All CNI Drillholes, Limestone/Marble Rock Type

Call & Nicholas, Inc.

File Used: GHP-GMX.cnv

NUMBER OF POINTS: 94

FRAC: all CONF: all

ROCK TYPE	DEPTH	STR. TYPE	FILL TYPE
010	all	all	all

PLOT LEGEND
----
o = Bedding Joint
? = Unknown
x = Fault
z = Single Joint
$ = Shear Zone
v = Vein

STRUCTURE CONCENTRATION:

- 0.0% ~ 1.0%
- 1.0% ~ 2.0%
- 2.0% ~ 3.0%
- 3.0% ~ 4.0%
- 4.0% ~ 5.0%
- 5.0% ~ 6.0%
- 6.0% ~ 7.0%
- 7.0% ~ 8.0%
- 8.0% ~ 9.0%
- 9.0% ~ 10.0%
- >10%

Date: July 24, 2017

File: GHP-ALL-010.scr

LEGEND

CALL & NICHOLAS, INC.
TUCSON, ARIZONA USA

DRAWN SMD | DATE 07/24 | REVISED 10/30/2017 3:05 PM

\2017_REPORT\FIGURES\FIG5-11_CNI-GH-MARBLE.DWG

2017 CNI ORIENTED CORE DATA MARBLE

ARANZAZU

SCALE N.T.S. FIGURE 5-11

6.0 LABORATORY TESTING AND ROCK STRENGTH

Samples collected from the geotechnical core holes were sent for testing at CNI's geomechanics laboratory located in Tucson, Arizona. The purpose of the laboratory testing was to determine strength parameters for use in pillar and excavation stability analyses. Laboratory testing was conducted to ASTM standards and included small-scale direct-shear, uniaxial compression, triaxial compression, and Brazilian disk tension testing. Classification studies were conducted which included USCS and x-ray diffraction to determine particle size and clay content in the soft materials.

Small-scale direct-shear testing was conducted on joint surfaces to determine the shear strength of natural joints. Uniaxial compression testing was performed to determine the unconfined compressive strength. Triaxial compression was done at confinement stresses which varied between 750 and 2400 psi and was utilized with uniaxial compression test data to calculate intact shear strengths by rock type. Brazilian disk tension tests were conducted on disks cut from the ends of uniaxial and triaxial compression test samples and were used to determine the tensile strength of the sample.

Results of the laboratory tests are summarized in the following tables:

- Table 6-1 – Small-Scale Direct-Shear Test Results, 24 tests
- Table 6-2 – Uniaxial Compression Test Results, 20 tests
- Table 6-3 – Triaxial Compression Test Results, 32 tests
- Table 6-4 – Brazilian Disk Tension Test Results, 39 tests
- Table 6-5 – X-Ray Diffraction Results, 2 tests

Laboratory testing data sheets for each test are presented in "Appendix C: Laboratory Testing" with a description of testing procedures and data reduction techniques for each test type.

6.1 Sample Selection

Laboratory samples were selected based on lithology, alteration, and rock quality. Only rock types in which there would be mining and or development access were selected for testing. This includes the marble/limestone, hornfels, intrusive, and skarn material types. Because of similarities in character, the marble and limestone were combined for testing and are referred to singularly as the "marble rock type" throughout this document.

6.2 Intact Rock Shear Strength

Intact shear strengths were determined for 4 geotechnical rock types with the use of uniaxial and triaxial compression test data. Rock types with similar intact strength results were combined. The intact strength at increasing confinement is defined by a Mohr-Coulomb strength envelope. The envelope parameters friction angle and cohesion are utilized to define the intact shear strength envelope for use in determining the rock-mass shear strength. The mean intact shear strength for each engineering rock type was calculated using a linear regression.

Intact shear strengths were calculated for the following geotechnical rock type groups:

1. Marble
2. Hornfels
3. Skarn
4. Intrusive

Intact shear strength regressions are shown for each of these rock types on Figures 6-1 through 6-4. Figure 6-5 presents a summary of the calculated intact shear strengths. This figure illustrates the differences between the geotechnical rock types. The skarn and intrusive are generally the stronger rock followed by the marble and hornfels.

6.3 Fracture Shear Strength

Fracture shear strengths were determined with the use of small-scale direct-shear testing. The fracture shear strength at increasing normal stress is defined by a Mohr-Coulomb strength envelope. The parameters friction angle and cohesion are utilized to define the fracture shear strength envelope and in determining the rock-mass shear strength. The mean fracture shear strength was calculated using a linear regression for the following geotechnical fracture types:

1. Marble
2. Hornfels
3. Skarn
4. Intrusive

The mean fracture strength and regressions are presented in Figures 6-6 through 6-9 for each of these geotechnical fracture types. Figure 6-10 presents a summary of the mean fracture shear strengths for these fracture types. In this case, the marble and skarn are similar and have the highest fracture shear strength followed by the intrusive and hornfels which are similar and weaker.

6.4 Rock-mass Shear Strength

This section presents the rock-mass shear strengths used in the stability analyses and the methodology used in the estimation of these strengths.

6.4.1 CNI Rock-Mass Shear Strengths

The rock-mass shear strength refers to the large-scale resistance to shear failure of jointed rock, whereby failure takes place along joint planes and through intact rock. CNI's rock-mass shear strength calculation involves combining the fracture and intact shear strengths according to the degree of fracturing as indicated by the RQD. As the degree of fracturing increases (lower RQD), the rock-mass strength approaches the fracture shear strength, whereas the rock-mass strength approaches the intact rock shear strength as the degree of fracturing decreases (higher RQD). The rock-mass shear strength is therefore dependent upon the shear strength of both fractures and intact rock.

The calculated rock-mass strength envelopes may be defined in terms of normal-shear strength for linear (friction angle - ϕ and cohesion - C), power with cohesion intercept (K, m, C), or a bilinear fit to the power with intercept curves ([ϕ1, C1], and [ϕ2, C2]). For the Aranzazu analysis, a Mohr-Coulomb linear strength model was utilized.

Values of the intact rock shear strength and fracture shear strength were combined to calculate the rock-mass cohesion (c) and friction angle (ϕ) based on weighting factors determined by the RQD value for each geotechnical rock type. Equations relating the weighting factors and RQD are as follows:

$$PRS(\phi) = \left[0.3775 e^{0.0075*RQD}\right]^2$$

$$PRS(c) = \left[0.225 e^{0.013*RQD}\right]^2$$

$$PRF(\phi) = 1 - PRS(\phi)$$

$$PRF(c) = 1 - PRS(c)$$

PRS = Percent Rock Substance (or the Percent of failure path through intact rock)

PRF = Percent Rock Fracture (or the Percent of failure path along fractures)

With the percentages defined above, the rock mass friction angle and cohesion are calculated as shown below:

$$\phi_m = \tan^{-1}\left[PRS(\phi) * \tan(\phi_s) + PRF(\phi) * \tan(\phi_f)\right]$$

ϕ_m = Mean Rock Mass Friction Angle

ϕ_s = Intact (Rock Substance) Friction Angle

ϕ_f = Fracture Friction Angle

and:

$$C_m = \left[PRS(c) * c_s + PRF(c) * c_f\right] * c_{rf}$$

C_m = Mean Rock Mass Cohesion

c_s = Intact (Rock Substance) Cohesion

c_f = Fracture Cohesion

c_{rf} = Cohesion Reduction Factor

These equations are presented in the section "CNI Criterion" (Read, Stacey, 2009) of the *Large Open Pit Manual*, and in the SME paper *Managing and Analyzing Overall Pit Slopes* (Call, Cicchini, 2000).

CNI's experience with the use of this rock-mass estimation method has indicated that the theoretical value obtained for the cohesion must be reduced to obtain satisfactory back-analysis of observed behavior. The Cohesion Reduction Factor (C_{rf}) modifies the calculated cohesion value and is based on the material's compressive strength where the value of C_{rf} increases as the compressive strength decreases. Materials which are very competent have C_{rf} values of around 0.5, while softer, less competent materials with low compressive strengths have C_{rf} values near 1.0.

6.4.2 *Input Parameters*

The input parameters for the rock-mass calculation are presented in Table 6-6. Intact and fracture shear strengths were derived from laboratory testing and are summarized in Figures 6-5 and 6-10, respectively. RQD input values were taken as the median RQD values from each rock type derived from the block model within the Glory Hole deposit area.

6.4.3 *Rock-Mass Strengths*

Rock-mass shear strength calculations are presented for each of the geotechnical rock types in Figure 6-11 through 6-14. The rock-mass shear strength summaries are presented in Table 6-6.

Table 6-1. Small-Scale Direct-Shear Testing Summary

Aranzazu Mine, Aura Minerals Inc., 2017

Sample #	Drill Hole	Depth (m)	Rock Type	Area (cm^2)	Diameter (cm)	Linear		Power (for x in kPa)	
						Phi (deg)	Cohesion (kPa)	k	m
17508-GHP_GMX07-0044	GHP_GMX07	44.6 - 45.0	Hornfels	40.3	7.2	13.5	40.2	1.387	0.772
17508-GHP_GMX07-0096	GHP_GMX07	96.5 - 96.7	Hornfels	42.7	7.4	31.6	25.2	0.986	0.938
17508-GHP_GMX07-0091	GHP_GMX07	91.8 - 92.0	Hornfels	32.8	6.5	19.9	86.7	3.225	0.720
17508-GHP_GMX06-0030	GHP_GMX06	30.2 - 30.4	Hornfels	33.7	6.6	23.8	30.8	0.865	0.914
17508-GHP_GMX04-0154	GHP_GMX04	154.1 - 154.3	Hornfels	35.4	6.7	24.3	49.6	1.281	0.867
17508-GHP_GMX04-0139	GHP_GMX04	139.8 - 140.0	Hornfels	35.4	6.7	25.7	70.3	2.046	0.814
17508-GHP_GMX01-0055	GHP_GMX01	55.0 - 55.4	Intrusive	35.0	6.7	31.0	39.7	1.252	0.905
17508-GHP_GMX02-0233	GHP_GMX02	233.3 - 233.9	Intrusive	40.5	7.2	27.6	26.7	0.886	0.932
17508-GHP_GMX04-0112	GHP_GMX04	112.8 - 113.0	Intrusive	44.0	7.5	22.9	38.9	1.104	0.877
17508-GHP_GMX04-0141	GHP_GMX04	141.9 - 142.1	Intrusive	38.2	7.0	23.1	53.2	1.414	0.847
17508-GHP_GMX07-0030	GHP_GMX07	30.0 - 30.5	Intrusive	40.3	7.2	26.9	60.7	1.684	0.846
17508-GHP_GMX07-0197	GHP_GMX07	197.1 - 197.3	Intrusive	41.0	7.2	30.8	41.6	1.337	0.895
17508-GHP_GMX01-0006	GHP_GMX01	6.8 - 7.1	Marble	31.6	6.3	30.6	39.3	1.235	0.905
17508-GHP_GMX04-0045	GHP_GMX04	45.8 - 46.2	Marble	35.9	6.8	27.7	13.9	0.745	0.954
17508-GHP_GMX07-0132	GHP_GMX07	132.7 - 132.8	Marble	38.9	7.0	29.5	19.5	0.824	0.951
17508-GHP_GMX02-0207	GHP_GMX02	207.1 - 207.2	Skarn	33.2	6.5	28.9	25.2	0.927	0.932
17508-GHP_GMX02-0218	GHP_GMX02	218.8 - 219.4	Skarn	34.7	6.6	32.3	64.3	1.964	0.853
17508-GHP_GMX02-0224	GHP_GMX02	224.7 - 225.0	Skarn	40.5	7.2	23.4	48.2	1.254	0.865
17508-GHP_GMX04-0231	GHP_GMX04	231.5 - 231.8	Skarn	38.5	7.0	31.4	19.8	0.849	0.958
17508-GHP_GMX05-0180	GHP_GMX05	180.8 - 181.1	Skarn	30.2	6.2	33.7	83.7	2.380	0.836
17508-GHP_GMX05-0191	GHP_GMX05	191.8 - 192.2	Skarn	37.3	6.9	31.8	83.1	2.600	0.814
17508-GHP_GMX06-0041	GHP_GMX06	41.2 - 41.3	Skarn	30.5	6.2	19.3	58.6	1.541	0.812
17508-GHP_GMX07-0169	GHP_GMX07	169.1 - 169.4	Skarn	37.9	7.0	30.4	44.6	1.283	0.900
17508-GHP_GMX07-0171	GHP_GMX07	171.3 - 171.4	Skarn	30.1	6.2	14.0	46.8	1.180	0.805

Table 6-2. Uniaxial Compression Testing Summary
Aranzazu Mine, Aura Minerals Inc., 2017

Sample #	Drill Hole	Depth (m)	Rock Type	Diameter (cm)	Height (cm)	Density (kg/m^3)	Failure Mode	Failure Stress (Mpa)
17508-GHP_GMX05-0203-A	GHP_GMX05	203.25 - 203.50	Contact	6.14	9.93	2514.3	Both	7.32
17508-GHP_GMX05-0086	GHP_GMX05	86.65 - 86.90	Hornfels	6.09	11.92	2397.5	Fracture	25.95
17508-GHP_GMX06-0025	GHP_GMX06	25.45 - 25.75	Hornfels	6.11	12.68	2931.2	Both	292.14
17508-GHP_GMX07-0044	GHP_GMX07	44.6 - 45.0	Hornfels	6.09	12.77	2622.9	Fracture	48.59
17508-GHP_GMX02-0159	GHP_GMX02	159.1 - 159.35	Intrusive	6.07	12.76	2532.8	Both	74.14
17508-GHP_GMX04-0112	GHP_GMX04	112.75 - 112.95	Intrusive	6.10	12.64	2475.6	Fracture	45.74
17508-GHP_GMX04-0253	GHP_GMX04	253.3 - 253.5	Intrusive	6.09	12.94	2738.6	Intact	210.57
17508-GHP_GMX04-0257	GHP_GMX04	257.35 - 257.60	Intrusive	6.10	12.88	2730.4	Intact	277.88
17508-GHP_GMX05-0148	GHP_GMX05	148.15 - 148.35	Intrusive	6.10	12.88	2478.2	Fracture	84.79
17508-GHP_GMX07-0189	GHP_GMX07	189.25 - 189.55	Intrusive	6.10	13.14	2649.1	Fracture	131.73
17508-GHP_GMX04-0017	GHP_GMX04	17.6 - 17.9	Marble	6.10	12.99	2792.0	Fracture	39.90
17508-GHP_GMX04-0040	GHP_GMX04	40.45 - 40.65	Marble	6.10	12.72	2911.5	Both	111.88
17508-GHP_GMX07-0128	GHP_GMX07	128.05 - 128.25	Marble	6.09	12.74	2721.6	Both	43.06
17508-GHP_GMX02-0196	GHP_GMX02	196.9 - 197.1	Skarn	6.07	12.81	3672.4	Both	154.48
17508-GHP_GMX02-0224	GHP_GMX02	224.0 - 224.25	Skarn	6.10	12.70	3903.8	Intact	88.48
17508-GHP_GMX04-0224	GHP_GMX04	224.25 - 224.50	Skarn	6.06	12.44	3346.9	Intact	125.59
17508-GHP_GMX05-0195	GHP_GMX05	195.45 - 195.65	Skarn	6.13	12.48	2626.8	Fracture	14.67
17508-GHP_GMX07-0168-A	GHP_GMX07	168.75 - 169.05	Skarn	6.08	10.22	2697.5	Both	6.02
17508-GHP_GMX04-0222	GHP_GMX04	222.0 - 222.25	Skarn	6.10	12.36	3106.8	Fracture	60.65
17508-GHP_GMX07-0172-A	GHP_GMX07	172.5 - 172.8	Skarn	6.05	10.92	2761.3	Fracture	5.73

*Both indicates Failure Occurred through both Natural Fractures and Intact Rock

Table 6-3. Triaxial Compression Testing Summary
Aranzazu Mine, Aura Minerals Inc., 2017

Sample #	Drill Hole	Depth (m)	Rock Type	Diameter (cm)	Height (cm)	Density (kg/m3)	Failure Mode	Peak / Residual	Failure Stress (MPa)	
									Sigma 3	Sigma 1
17508-GHP_GMX01-0035	GHP_GMX01	35.9 - 36.1	Contact	6.12	12.43	3024.0	Fracture	Peak	8.3	74.6
17508-GHP_GMX05-0203-B	GHP_GMX05	203.3 - 203.5	Fault	6.14	9.57	2608.6	Fracture	Peak	5.2	31.0
17508-GHP_GMX05-0203-B	GHP_GMX05	203.3 - 203.5	Fault	6.14	9.57	2608.6	Fracture	Residual	8.3	29.3
17508-GHP_GMX05-0203-B	GHP_GMX05	203.3 - 203.5	Fault	6.14	9.57	2608.6	Fracture	Residual	16.5	38.7
17508-GHP_GMX02-0037	GHP_GMX02	37.9 - 38.3	Hornfels	6.07	12.32	2622.9	Both	Peak	8.3	115.6
17508-GHP_GMX04-0071	GHP_GMX04	71.1 - 71.3	Hornfels	6.05	11.43	2924.2	Fracture	Peak	16.5	82.3
17508-GHP_GMX04-0081	GHP_GMX04	81.0 - 81.4	Hornfels	6.06	11.12	3041.4	Both	Peak	5.2	77.3
17508-GHP_GMX04-0205	GHP_GMX04	205.7 - 206.0	Hornfels	6.10	12.33	2674.3	Fracture	Peak	16.5	89.7
17508-GHP_GMX05-0105	GHP_GMX05	105.8 - 106.3	Hornfels	6.08	12.58	2558.0	Fracture	Peak	5.2	60.3
17508-GHP_GMX05-0146	GHP_GMX05	146.5 - 146.75	Hornfels	6.10	8.81	2928.0	Both	Peak	16.5	441.8
17508-GHP_GMX07-0090	GHP_GMX07	90.8 - 91.0	Hornfels	6.09	12.37	2598.0	Fracture	Peak	8.3	104.1
17508-GHP_GMX02-0056	GHP_GMX02	56.1 - 56.4	Intrusive	6.09	12.55	2650.7	Fracture	Peak	8.3	135.2
17508-GHP_GMX02-0083	GHP_GMX02	83.3 - 83.6	Intrusive	6.12	10.37	2487.0	Fracture	Peak	16.5	157.7
17508-GHP_GMX02-0171	GHP_GMX02	171.1 - 171.4	Intrusive	6.08	12.89	2519.5	Fracture	Peak	5.2	108.5
17508-GHP_GMX02-0245	GHP_GMX02	245.8 - 246.1	Intrusive	6.09	12.85	2694.8	Fracture	Peak	16.5	203.4
17508-GHP_GMX05-0221	GHP_GMX05	221.8 - 222.1	Intrusive	6.11	12.98	2760.6	Both	Peak	8.3	248.6
17508-GHP_GMX06-0136	GHP_GMX06	136.5 - 136.7	Intrusive	6.07	11.86	2703.9	Fracture	Peak	5.2	99.1
17508-GHP_GMX07-0030	GHP_GMX07	30.0 - 30.5	Intrusive	6.09	12.80	2465.9	Fracture	Peak	16.5	109.8
17508-GHP_GMX07-0032	GHP_GMX07	32.2 - 32.6	Intrusive	6.10	12.63	2429.3	Fracture	Peak	8.3	73.1
17508-GHP_GMX01-0006	GHP_GMX01	6.8 - 7.1	Marble	6.11	12.48	2714.3	Both	Peak	5.2	99.4
17508-GHP_GMX01-0018	GHP_GMX01	18.6 - 19.0	Marble	6.11	12.40	2721.0	Fracture	Peak	16.5	136.2
17508-GHP_GMX04-0045	GHP_GMX04	45.8 - 46.2	Marble	6.10	12.41	2709.2	Both	Peak	8.3	132.3
17508-GHP_GMX07-0148	GHP_GMX07	148.3 - 148.5	Marble	6.09	12.75	2716.1	Both	Peak	8.3	71.9
17508-GHP_GMX02-0200	GHP_GMX02	200.7 - 200.9	Skarn	6.06	12.71	4027.8	Fracture	Peak	16.5	209.4
17508-GHP_GMX02-0218	GHP_GMX02	218.8 - 219.4	Skarn	6.07	12.85	2961.4	Fracture	Peak	8.3	126.7
17508-GHP_GMX04-0064	GHP_GMX04	64.3 - 64.6	Skarn	6.10	13.02	3607.0	Fracture	Peak	16.5	229.4
17508-GHP_GMX04-0066	GHP_GMX04	66.7 - 67.0	Skarn	6.09	13.01	3629.2	Fracture	Peak	5.2	265.6
17508-GHP_GMX04-0226	GHP_GMX04	226.9 - 227.1	Skarn	6.09	12.12	3977.5	Both	Peak	8.3	133.3
17508-GHP_GMX05-0167	GHP_GMX05	168.0 - 168.2	Skarn	6.07	12.04	3189.7	Both	Peak	16.5	65.0
17508-GHP_GMX05-0179	GHP_GMX05	179.9 - 180.1	Skarn	6.11	12.77	2806.2	Fracture	Peak	5.2	57.8
17508-GHP_GMX06-0093	GHP_GMX06	93.0 - 93.2	Skarn	5.91	11.12	2948.8	Fracture	Peak	8.3	42.1
17508-GHP_GMX07-0160	GHP_GMX07	160.6 - 160.8	Skarn	6.10	13.04	3408.2	Fracture	Peak	8.3	90.3
17508-GHP_GMX07-0167	GHP_GMX07	167.3 - 167.5	Skarn	6.00	9.71	2853.0	Both	Peak	16.5	66.1
17508-GHP_GMX07-0167	GHP_GMX07	167.3 - 167.5	Skarn	6.00	9.71	2853.0	Both	Residual	5.2	27.6
17508-GHP_GMX07-0167	GHP_GMX07	167.3 - 167.5	Skarn	6.00	9.71	2853.0	Both	Residual	8.3	39.6
17508-GHP_GMX07-0168-B	GHP_GMX07	168.8 - 169.1	Skarn	6.09	10.42	3082.4	Both	Peak	5.2	31.4
17508-GHP_GMX07-0168-B	GHP_GMX07	168.8 - 169.1	Skarn	6.09	10.42	3082.4	Both	Residual	8.3	40.6
17508-GHP_GMX07-0168-B	GHP_GMX07	168.8 - 169.1	Skarn	6.09	10.42	3082.4	Both	Residual	16.5	65.4
17508-GHP_GMX07-0172-B	GHP_GMX07	172.5 - 172.8	Skarn	6.05	10.97	2468.8	Fracture	Peak	8.3	34.3
17508-GHP_GMX07-0172-B	GHP_GMX07	172.5 - 172.8	Skarn	6.05	10.97	2468.8	Fracture	Residual	16.5	55.0
17508-GHP_GMX07-0172-B	GHP_GMX07	172.5 - 172.8	Skarn	6.05	10.97	2468.8	Fracture	Residual	5.2	23.4

*Both indicates Failure Occurred through both Natural Fractures and Intact Rock

Table 6-4. Brazilian Disk Tension Testing Summary
Aranzazu Mine, Aura Minerals Inc., 2017

Sample #	Drill Hole	Depth (m)	Rock Type	Density (kg/m^3)	Failure Load (kg)	Tensile Strength (MPa)
17508-GHP_GMX01-0035	GHP_GMX01	35.9 - 36.1	Contact	2892.0	1283.7	4.5
17508-GHP_GMX02-0037	GHP_GMX02	37.9 - 38.3	Hornfels	2610.5	1719.1	5.1
17508-GHP_GMX04-0205	GHP_GMX04	205.7 - 206.0	Hornfels	2594.9	1079.5	3.6
17508-GHP_GMX05-0086	GHP_GMX05	86.7 - 86.9	Hornfels	2554.3	3216.0	9.6
17508-GHP_GMX05-0105	GHP_GMX05	105.8 - 106.3	Hornfels	2530.2	757.5	2.5
17508-GHP_GMX06-0025	GHP_GMX06	25.5 - 25.8	Hornfels	2858.9	7030.7	21.7
17508-GHP_GMX07-0090	GHP_GMX07	90.8 - 91.0	Hornfels	2598.0	2004.9	6.5
17508-GHP_GMX02-0056	GHP_GMX02	56.1 - 56.4	Intrusive	2626.1	4495.1	13.7
17508-GHP_GMX02-0159	GHP_GMX02	159.1 - 159.4	Intrusive	2509.5	2712.5	8.5
17508-GHP_GMX02-0171	GHP_GMX02	171.1 - 171.4	Intrusive	2594.9	3234.1	3.6
17508-GHP_GMX02-0245	GHP_GMX02	245.8 - 246.1	Intrusive	2554.3	3615.1	9.6
17508-GHP_GMX04-0253	GHP_GMX04	253.3 - 253.5	Intrusive	2530.2	4204.8	2.5
17508-GHP_GMX04-0257	GHP_GMX04	257.4 - 257.6	Intrusive	2858.9	4354.5	21.7
17508-GHP_GMX05-0148	GHP_GMX05	148.2 - 148.4	Intrusive	2598.0	2463.0	6.5
17508-GHP_GMX05-0221	GHP_GMX05	221.8 - 222.1	Intrusive	2626.1	5320.6	13.7
17508-GHP_GMX06-0136	GHP_GMX06	136.5 - 136.7	Intrusive	2399.6	3261.3	6.0
17508-GHP_GMX07-0030	GHP_GMX07	30.0 - 30.5	Intrusive	2626.1	2658.1	13.7
17508-GHP_GMX07-0032	GHP_GMX07	32.2 - 32.6	Intrusive	2509.5	1914.2	8.5
17508-GHP_GMX07-0189	GHP_GMX07	189.3 - 189.6	Intrusive	2511.5	3996.1	10.2
17508-GHP_GMX01-0018	GHP_GMX01	18.6 - 19.0	Marble	2676.6	1542.2	12.2
17508-GHP_GMX04-0017	GHP_GMX04	17.6 - 17.9	Marble	2708.2	2916.6	13.3
17508-GHP_GMX04-0040	GHP_GMX04	40.5 - 40.7	Marble	2702.1	2508.4	13.6
17508-GHP_GMX04-0045	GHP_GMX04	45.8 - 46.2	Marble	2455.8	2154.6	7.9
17508-GHP_GMX07-0128	GHP_GMX07	128.1 - 128.3	Marble	2777.0	1065.9	16.4
17508-GHP_GMX07-0148	GHP_GMX07	148.3 - 148.5	Marble	2691.7	1433.4	4.4
17508-GHP_GMX02-0196	GHP_GMX02	196.9 - 197.1	Skarn	3872.2	2295.2	8.0
17508-GHP_GMX02-0200	GHP_GMX02	200.7 - 200.9	Skarn	3702.2	1233.8	4.1
17508-GHP_GMX02-0218	GHP_GMX02	218.8 - 219.4	Skarn	2771.3	1347.2	4.1
17508-GHP_GMX02-0224	GHP_GMX02	224.0 - 224.3	Skarn	3379.1	1664.7	5.5
17508-GHP_GMX04-0064	GHP_GMX04	64.3 - 64.6	Skarn	3577.8	3814.7	11.5
17508-GHP_GMX04-0066	GHP_GMX04	66.7 - 67.0	Skarn	3462.7	4350.0	13.9
17508-GHP_GMX04-0224	GHP_GMX04	224.3 - 224.5	Skarn	4021.9	2925.7	9.5
17508-GHP_GMX04-0226	GHP_GMX04	226.9 - 227.1	Skarn	4006.8	780.2	2.5
17508-GHP_GMX05-0167	GHP_GMX05	168.0 - 168.2	Skarn	3089.8	340.2	1.1
17508-GHP_GMX05-0179	GHP_GMX05	179.9 - 180.1	Skarn	2720.7	2422.2	7.6
17508-GHP_GMX05-0191	GHP_GMX05	191.75-192.15	Skarn	3914.5	4699.2	14.9
17508-GHP_GMX06-0093	GHP_GMX06	93.0 - 93.2	Skarn	2907.4	267.6	0.9
17508-GHP_GMX07-0160	GHP_GMX07	160.6 - 160.8	Skarn	3189.8	2009.4	6.3
17508-GHP_GMX07-0167	GHP_GMX07	167.3 - 167.5	Skarn	2417.9	263.1	0.8

Averages		
Rock Type	**# of Samples**	**Tensile Strength (MPa)**
Contact	1	4.5
Hornfels	6	8.2
Intrusive	12	9.9
Marble	6	11.3
Skarn	14	6.5

Table 6-5. X-Ray Diffraction Results (Q' < 0.6)
Aranzazu Mine, Aura Minerals Inc., 2017

Sample	17508-GHP_GMX01-0030	17508-GHP_GMX01-0032
Rock Type	Skarn	Skarn
Total Clay (%)	**50.0**	**58.0**
Smectite (%)	49.0	57.0
Kaolinite (%)	1.0	1.0

Table 6-6. Rock-Mass Strengths
Aranzazu Mine, Aura Minerals Inc., 2017

Rock Type	Intact Shear Strength			Fracture Shear Strength		Estimated Rock-Mass Shear Strength				
	Uniaxial Compressive Strength (MPa)	Φ (deg)	C (MPa)	Φ (deg)	C (kPa)	Median RQD (%)	Crf	Uniaxial Compressive Strength (MPa)	Φ (deg)	C (MPa)
Skarns	68.9	52.7	11.6	27.4	55.2	80	0.5	10.6	41.8	2.4
Hornfels	53.4	29.5	15.6	23.5	59.4	74	0.5	8.7	26.2	2.7
Intrusive	69.0	42.8	15.1	25.2	44.9	82	0.5	12.4	34.7	3.2
Marble	50.0	44.9	10.4	29.3	24.2	87	0.5	10.5	38.3	2.5

Marble Uniaxial and Triaxial Compression Test Data

ID	Drill Hole	Depth (m)	Rock Type	Density (kg/m^3)	Failure Mode	Sigma 3 (MPa)	Sigma 1 (MPa)
17508-GHP_GMX04-0017	GHP_GMX04	17.6 - 17.9	Marble	2792.0	Both	0.0	39.9
17508-GHP_GMX07-0128	GHP_GMX07	128.05 - 128.25	Marble	2721.6	Both	0.0	43.1
17508-GHP_GMX01-0006	GHP_GMX01	6.8 - 7.1	Marble	2714.3	Both	5.2	99.4
17508-GHP_GMX01-0018	GHP_GMX01	18.6 - 19.0	Marble	2721.0	Fracture	16.5	136.2
17508-GHP_GMX04-0045	GHP_GMX04	45.8 - 46.2	Marble	2709.2	Both	8.3	132.3
17508-GHP_GMX07-0148	GHP_GMX07	148.3 - 148.5	Marble	2716.1	Both	8.3	71.9

*Both indicates Failure Occurred through both Natural Fractures and Intact Rock

Mohr-Coulomb	
Φ (deg)	45.0
C (MPa)	10.4
Density (kg/m^3)	2729.0
# Tests:	6

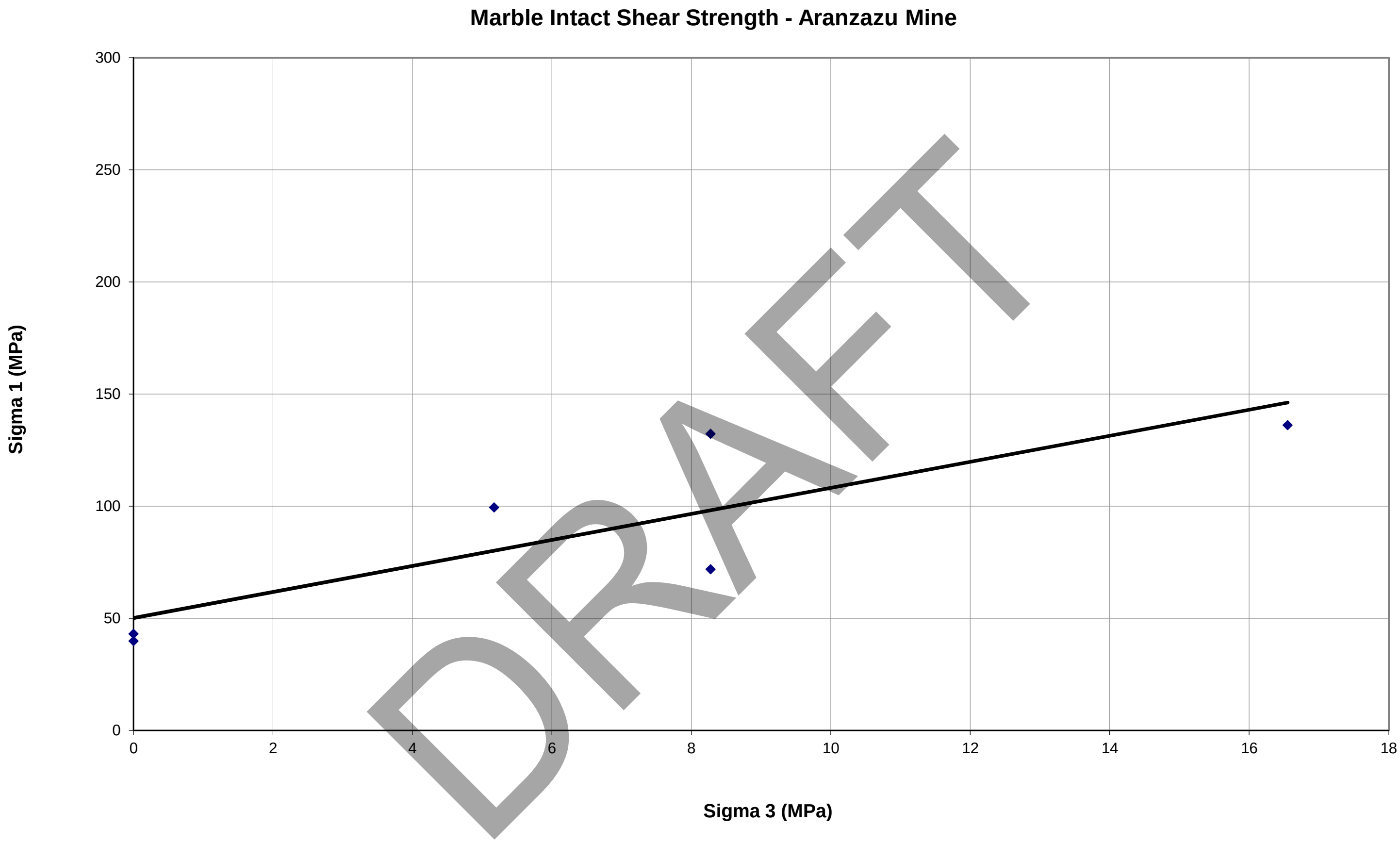


Figure 6-1. Marble Intact Shear Strength
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

Hornfels Uniaxial and Triaxial Compression Test Data

ID	Drill Hole	Depth (m)	Rock Type	Density (kg/m^3)	Failure Mode	Sigma 3 (MPa)	Sigma 1 (MPa)
17508-GHP_GMX05-0086	GHP_GMX05	86.65 - 86.90	Hornfels	2397.5	Fracture	0.0	25.9
17508-GHP_GMX07-0044	GHP_GMX07	44.6 - 45.0	Hornfels	2622.9	Fracture	0.0	48.6
17508-GHP_GMX02-0037	GHP_GMX02	37.9 - 38.3	Hornfels	2622.9	Both	8.3	115.6
17508-GHP_GMX04-0071	GHP_GMX04	71.1 - 71.3	Hornfels	2924.2	Fracture	16.5	82.3
17508-GHP_GMX04-0081	GHP_GMX04	81.0 - 81.4	Hornfels	3041.4	Both	5.2	77.3
17508-GHP_GMX04-0205	GHP_GMX04	205.7 - 206.0	Hornfels	2674.3	Fracture	16.5	89.7
17508-GHP_GMX05-0105	GHP_GMX05	105.8 - 106.3	Hornfels	2558.0	Fracture	5.2	60.3
17508-GHP_GMX07-0090	GHP_GMX07	90.8 - 91.0	Hornfels	2598.0	Fracture	8.3	104.1

*Both indicates Failure Occurred through both Natural Fractures and Intact Rock

Mohr-Coulomb	
Φ (deg)	29.5
C (MPa)	15.6
Density (kg/m^3)	2679.9
# Tests:	8

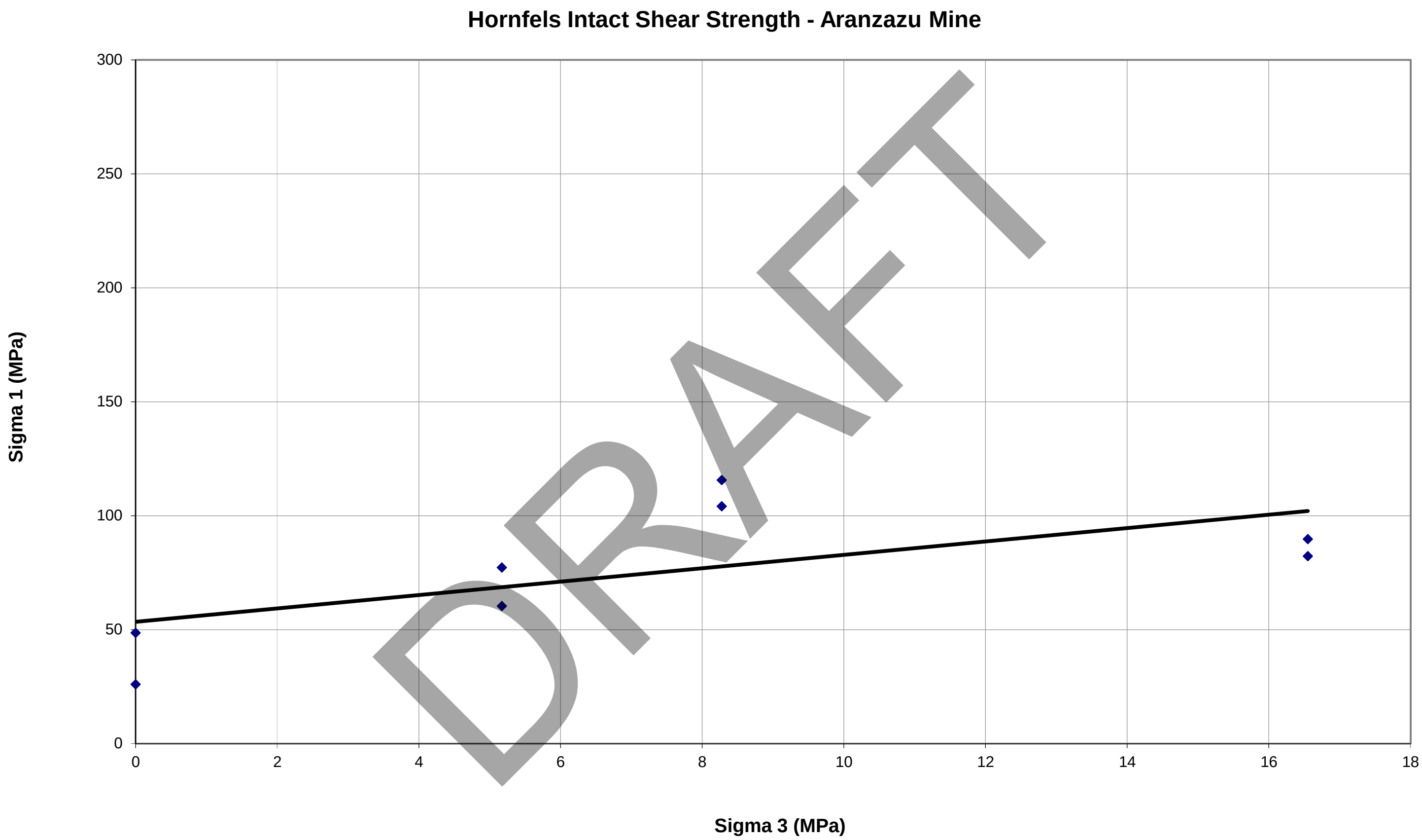


Figure 6-2. Hornfels Intact Shear Strength
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

Skarn Uniaxial and Triaxial Compression Test Data

ID	Drill Hole	Depth (m)	Rock Type	Density (kg/m^3)	Failure Mode	Sigma 3 (MPa)	Sigma 1 (MPa)
17508-GHP_GMX02-0224	GHP_GMX02	224.0 - 224.25	Skarn	3903.8	Intact	0.0	88.5
17508-GHP_GMX04-0222	GHP_GMX04	222.0 - 222.25	Skarn	3106.8	Fracture	0.0	60.6
17508-GHP_GMX02-0200	GHP_GMX02	200.7 - 200.9	Skarn	4027.8	Fracture	16.5	209.4
17508-GHP_GMX02-0218	GHP_GMX02	218.8 - 219.4	Skarn	2961.4	Fracture	8.3	126.7
17508-GHP_GMX04-0064	GHP_GMX04	64.3 - 64.6	Skarn	3607.0	Fracture	16.5	229.4
17508-GHP_GMX04-0226	GHP_GMX04	226.9 - 227.1	Skarn	3977.5	Both	8.3	133.3

*Both indicates Failure Occurred through both Natural Fractures and Intact Rock

Mohr-Coulomb	
Φ (deg)	52.7
C (MPa)	11.6
Density (kg/m^3)	3597.4
# Tests:	6

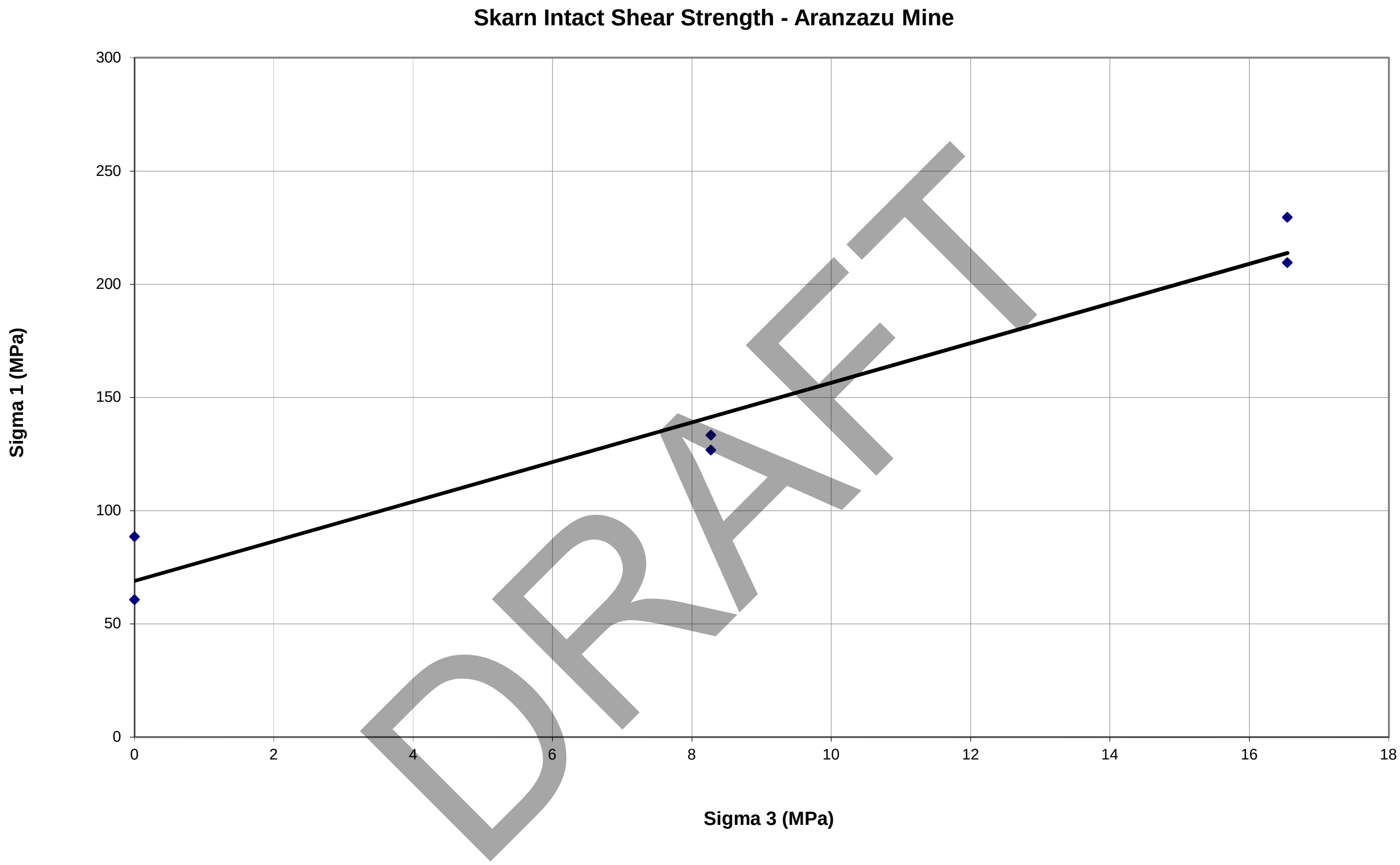


Figure 6-3. Skarn Intact Shear Strength
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

Intrusive Uniaxial and Triaxial Compression Test Data

ID	Drill Hole	Depth (m)	Rock Type	Density (kg/m^3)	Failure Mode	Sigma 3 (MPa)	Sigma 1 (MPa)
17508-GHP_GMX02-0159	GHP_GMX02	159.1 - 159.35	Intrusive	2532.8	Both	0.0	74.1
17508-GHP_GMX04-0112	GHP_GMX04	112.75 - 112.95	Intrusive	2475.6	Fracture	0.0	45.7
17508-GHP_GMX05-0148	GHP_GMX05	148.15 - 148.35	Intrusive	2478.2	Fracture	0.0	84.8
17508-GHP_GMX02-0056	GHP_GMX02	56.1 - 56.4	Intrusive	2650.7	Fracture	8.3	135.2
17508-GHP_GMX02-0083	GHP_GMX02	83.3 - 83.6	Intrusive	2487.0	Fracture	16.5	157.7
17508-GHP_GMX02-0171	GHP_GMX02	171.1 - 171.4	Intrusive	2519.5	Fracture	5.2	108.5
17508-GHP_GMX02-0245	GHP_GMX02	245.8 - 246.1	Intrusive	2694.8	Fracture	16.5	203.4
17508-GHP_GMX06-0136	GHP_GMX06	136.5 - 136.7	Intrusive	2703.9	Fracture	5.2	99.1
17508-GHP_GMX07-0030	GHP_GMX07	30.0 - 30.5	Intrusive	2465.9	Fracture	16.5	109.8
17508-GHP_GMX07-0032	GHP_GMX07	32.2 - 32.6	Intrusive	2429.3	Fracture	8.3	73.1

*Both indicates Failure Occurred through both Natural Fractures and Intact Rock

Mohr-Coulomb	
Φ (deg)	42.8
C (MPa)	15.1
Density (kg/m^3)	2543.8
# Tests:	10

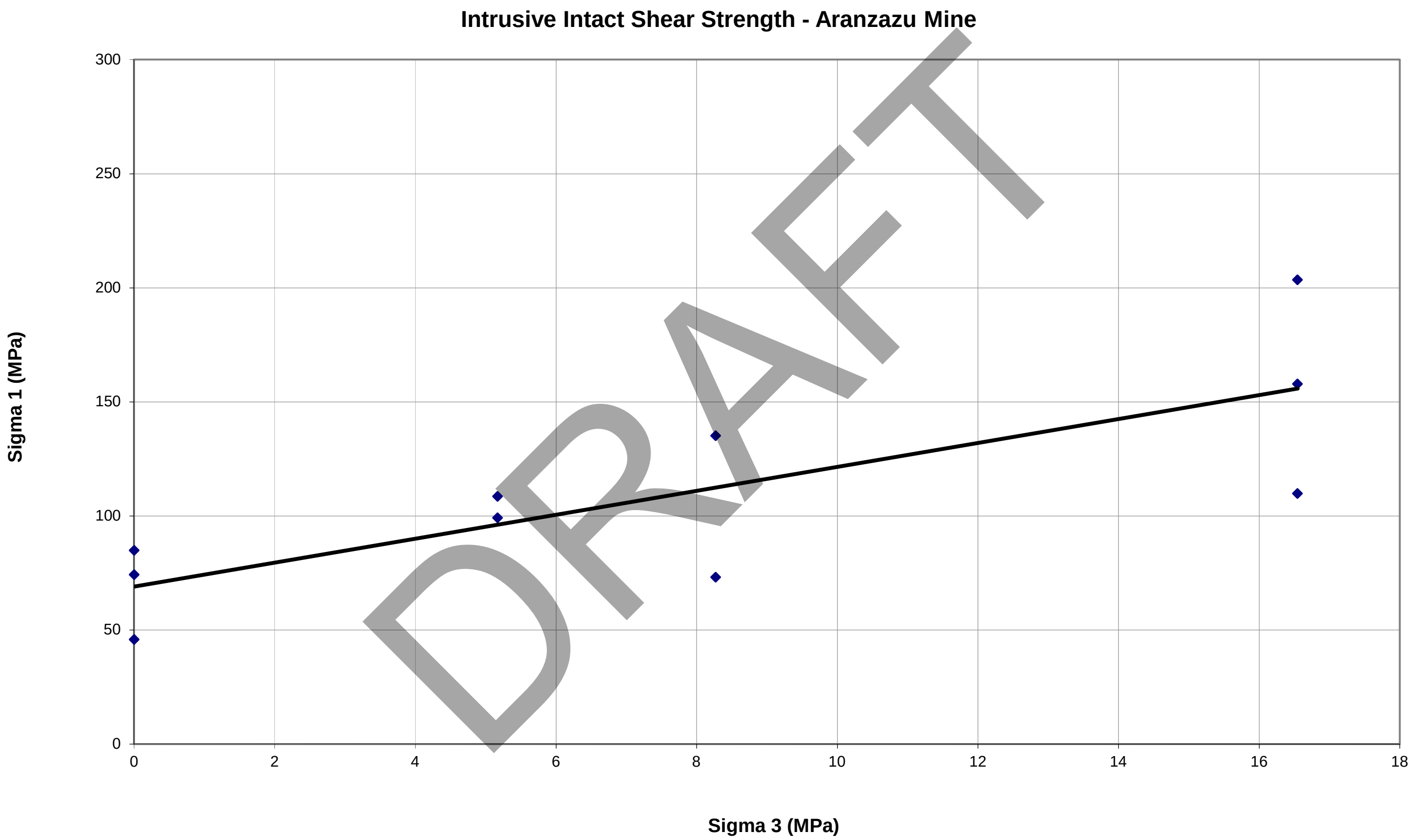


Figure 6-4. Intrusive Intact Shear Strength
Aranzazu Mine, Aura Minerals Inc., 2017

INTACT SHEAR STRENGTH				
			MOHR-COULOMB	
		UCS	C	Φ
Lithology	# Tests	(Mpa)	(Mpa)	(deg)
Marble	6	50.1	10.4	44.9
Hornfels	8	53.4	15.6	29.5
Skarn	6	69.0	11.6	52.7
Intrusive	10	69.0	15.1	42.8

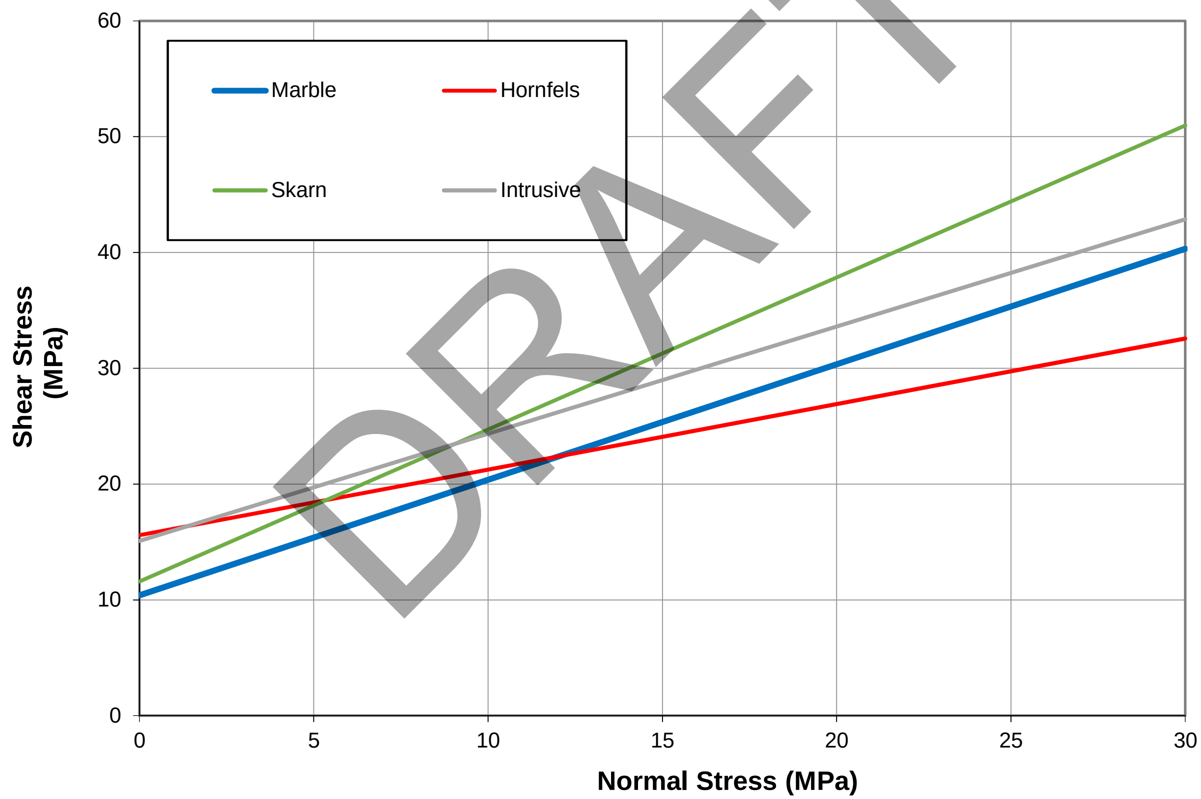


Figure 6-5. Intact Shear Strength Summary
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

Marble Direct-Shear Laboratory Test Data

Sample #	***Test Date***	***Location***	***Depth (m)***	***Rock Type***	***Residual Shear Strength***	
					C (kPa)	***Φ (deg)***
17508-GHP_GMX01-0006	8/3/2017	Aranzazu	6.8 - 7.1	Marble	39.3	30.6
17508-GHP_GMX04-0045	8/4/2017	Aranzazu	45.8 - 46.2	Marble	13.9	27.7
17508-GHP_GMX07-0132	8/7/2017	Aranzazu	132.7 - 132.8	Marble	19.5	29.5

	C	***Φ***
	(kPa)	(deg)
Average	**24.2**	**29.3**

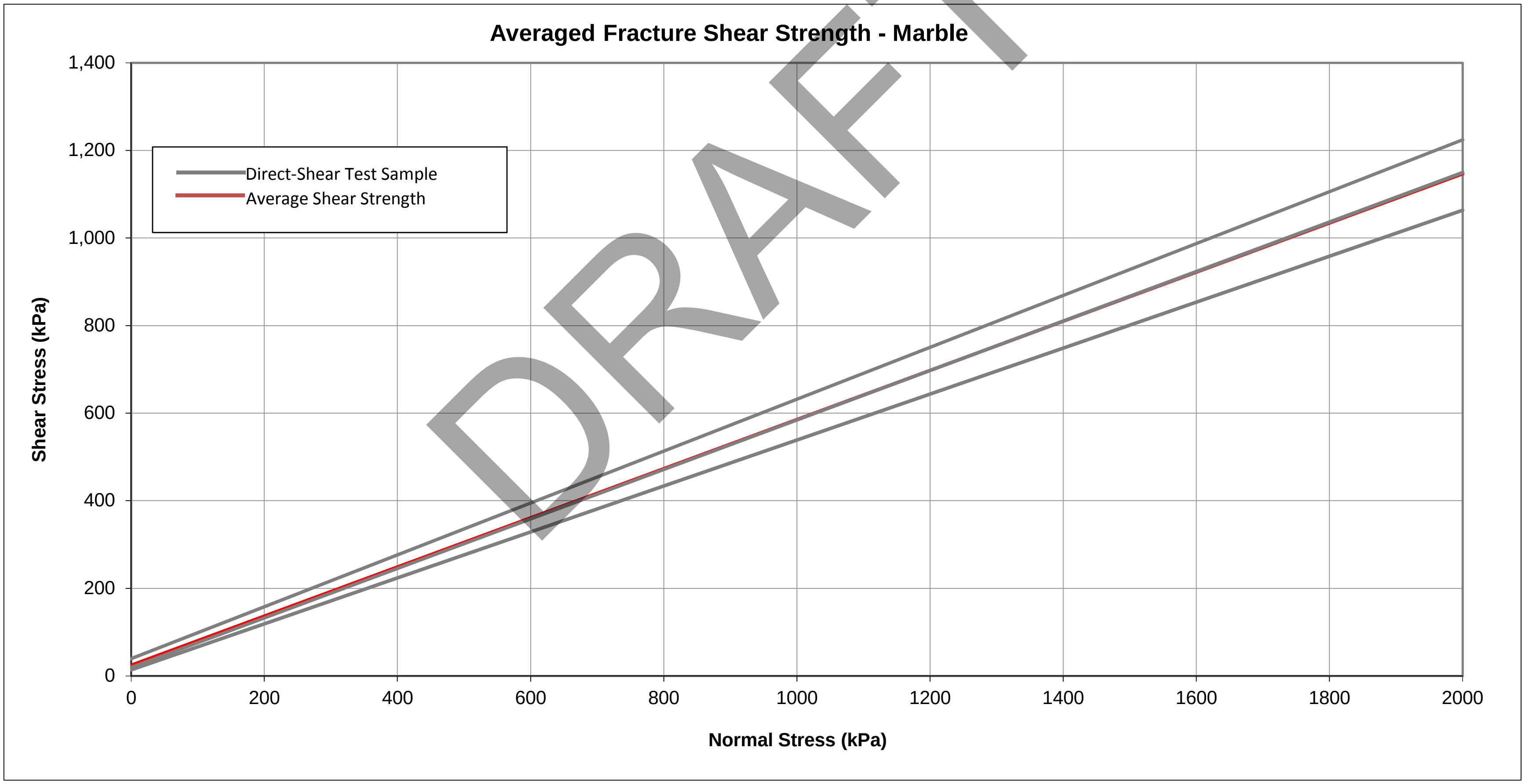


Figure 6-6. Marble Average Fracture Shear Strength
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

Hornfels Direct-Shear Laboratory Test Data

Sample #	Test Date	Location	Depth (m)	Rock Type	Residual Shear Strength	
					C (kPa)	Φ (deg)
17508-GHP_GMX07-0091	8/7/2017	Aranzazu	91.8 - 92.0	Hornfels	86.7	19.9
17508-GHP_GMX06-0030	8/8/2017	Aranzazu	30.2 - 30.4	Hornfels	30.8	23.8
17508-GHP_GMX04-0154	8/7/2017	Aranzazu	154.1 - 154.3	Hornfels	49.6	24.3
17508-GHP_GMX04-0139	8/4/2017	Aranzazu	139.8 - 140.0	Hornfels	70.3	25.7

	C	Φ
	(kPa)	(deg)
Average	**59.4**	**23.5**

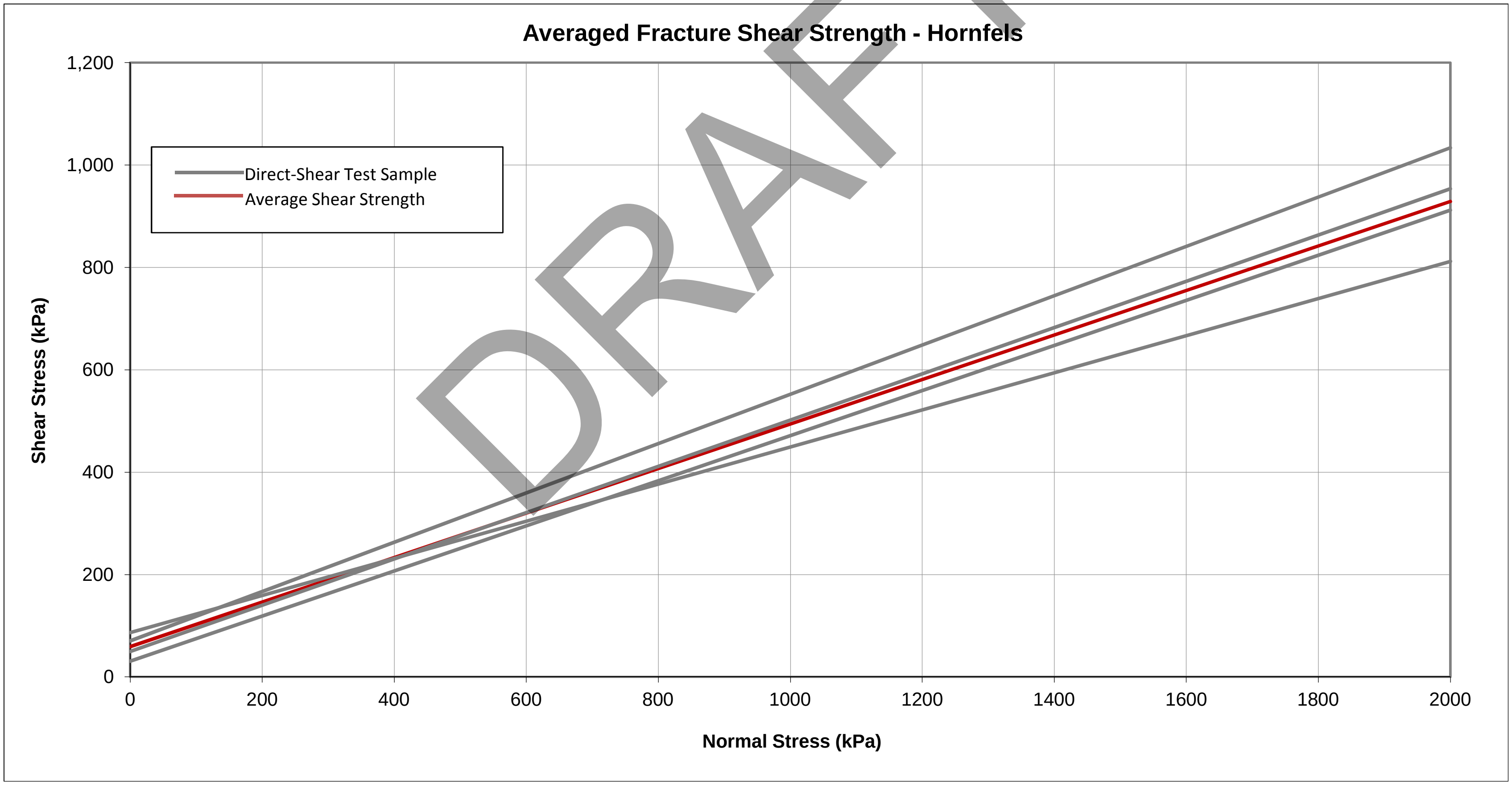


Figure 6-7. Hornfels Average Fracture Shear Strength
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

Skarn Direct-Shear Laboratory Test Data

Sample #	Test Date	Location	Depth (m)	Rock Type	Residual Shear Strength C (kPa)	Residual Shear Strength Φ (deg)
17508-GHP_GMX02-0207	8/1/2017	Aranzazu	207.1 - 207.2	Skarn	25.2	28.9
17508-GHP_GMX02-0218	8/1/2017	Aranzazu	218.8 - 219.4	Skarn	64.3	32.3
17508-GHP_GMX02-0224	8/1/2017	Aranzazu	224.7 - 225.0	Skarn	48.2	23.4
17508-GHP_GMX04-0231	8/1/2017	Aranzazu	231.5 - 231.8	Skarn	19.8	31.4
17508-GHP_GMX05-0180	8/1/2017	Aranzazu	180.8 - 181.1	Skarn	83.7	33.7
17508-GHP_GMX05-0191	8/1/2017	Aranzazu	191.8 - 192.2	Skarn	83.1	31.8
17508-GHP_GMX06-0041	8/2/2017	Aranzazu	41.2 - 41.3	Skarn	58.6	19.3
17508-GHP_GMX07-0169	8/2/2017	Aranzazu	169.1 - 169.4	Skarn	44.6	30.4
17508-GHP_GMX07-0171	8/2/2017	Aranzazu	171.3 - 171.4	Skarn	14.0	46.8

	C (kPa)	Φ (deg)
Average	**55.2**	**27.4**

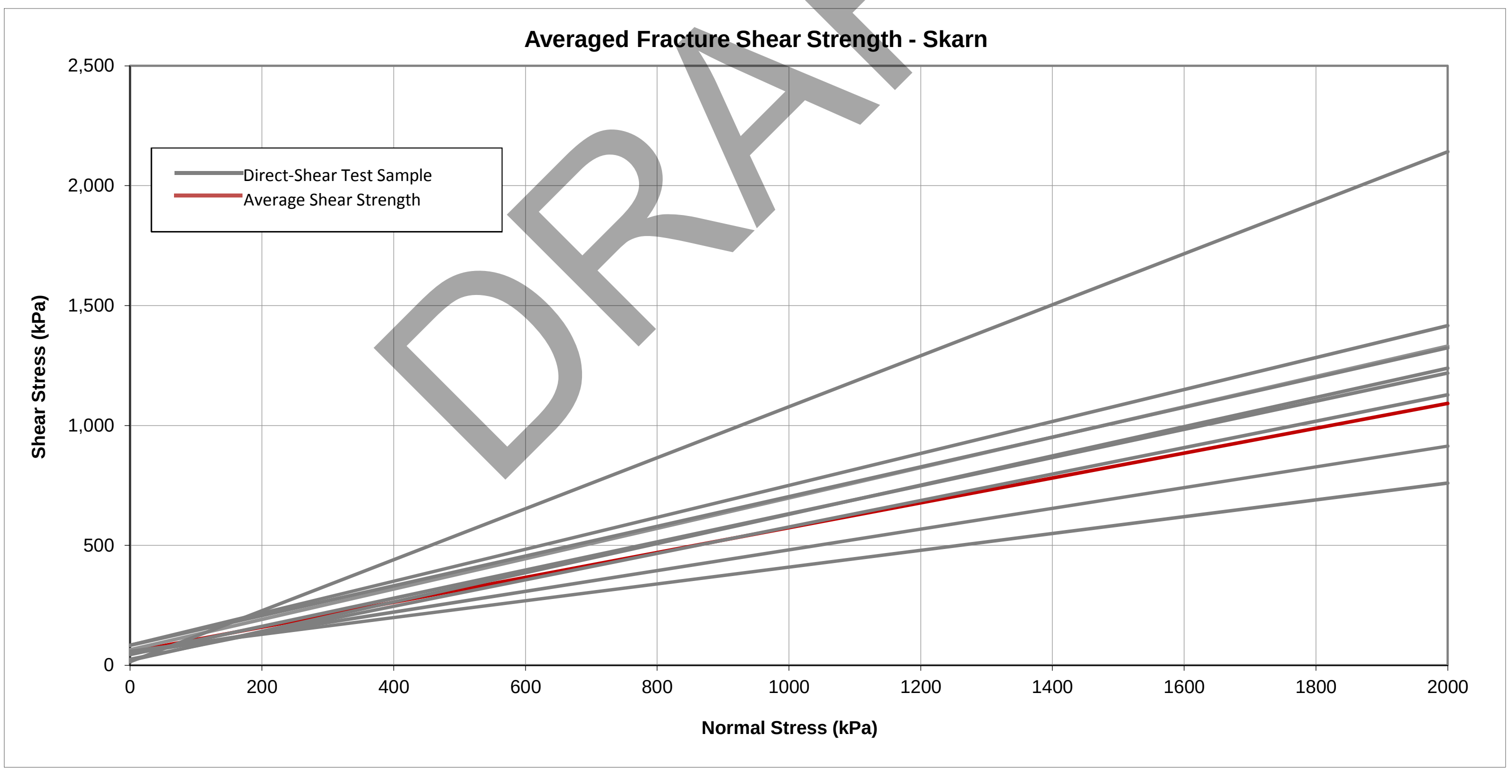


Figure 6-8. Skarn Average Fracture Shear Strength
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

Intrusive Direct-Shear Laboratory Test Data

Sample #	Test Date	Location	Depth (m)	Rock Type	Residual Shear Strength C (kPa)	Residual Shear Strength Φ (deg)
17508-GHP_GMX02-0233	8/4/2017	Aranzazu	233.3 - 233.9	Intrusive	26.7	27.6
17508-GHP_GMX04-0112	8/4/2017	Aranzazu	112.8 - 113.0	Intrusive	38.9	22.9
17508-GHP_GMX04-0141	8/4/2017	Aranzazu	141.9 - 142.1	Intrusive	53.2	23.1
17508-GHP_GMX07-0030	8/7/2017	Aranzazu	30.0 - 30.5	Intrusive	60.7	26.9

	C (kPa)	Φ (deg)
Average	44.9	25.2

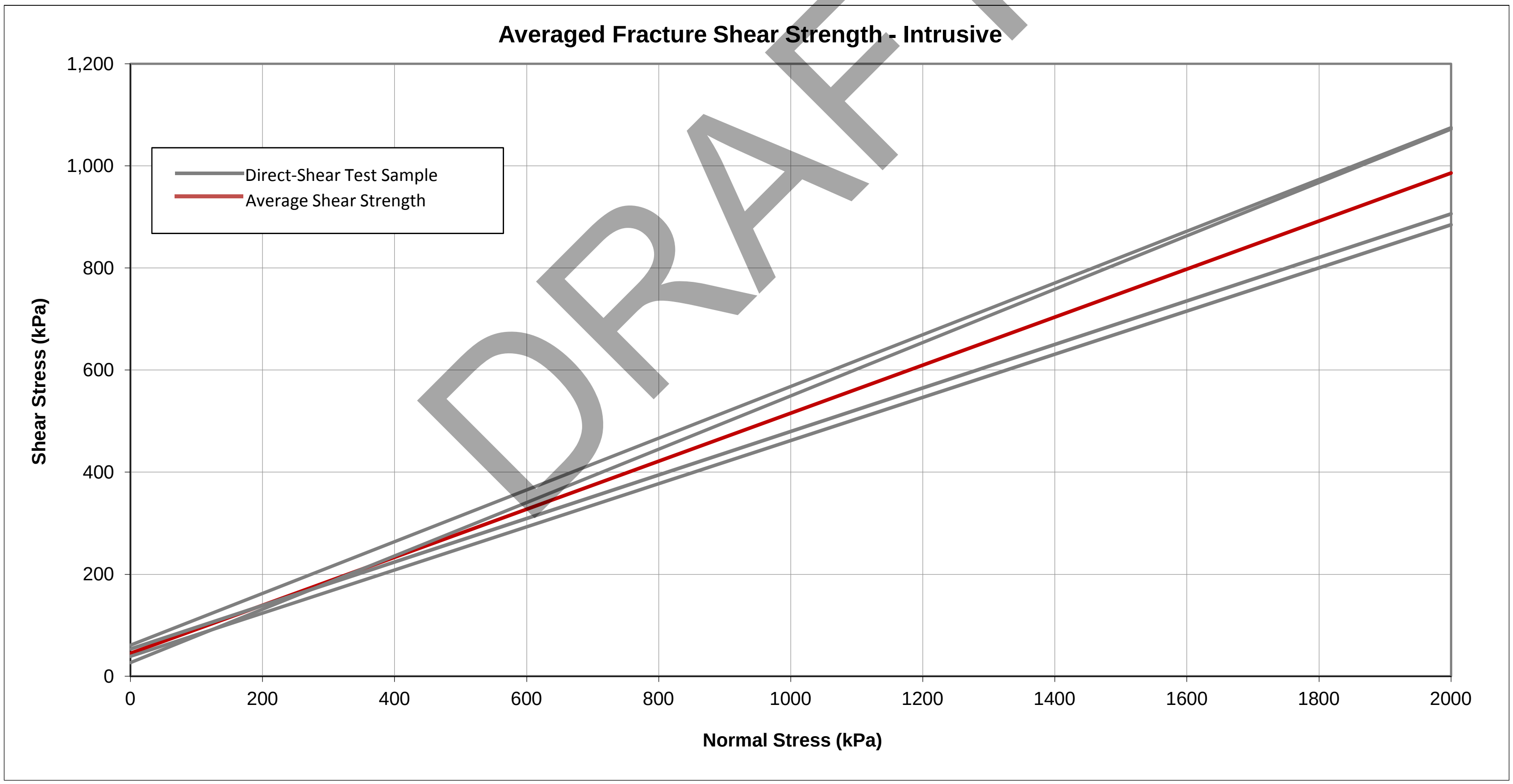


Figure 6-9. Intrusive Average Fracture Shear Strength
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

FRACTURE SHEAR STRENGTH			
Lithology	# Tests	C (kPa)	Φ (deg)
Marble	3	24.2	29.3
Hornfels	4	59.4	23.5
Skarn	9	55.2	27.4
Intrusive	4	44.9	25.2

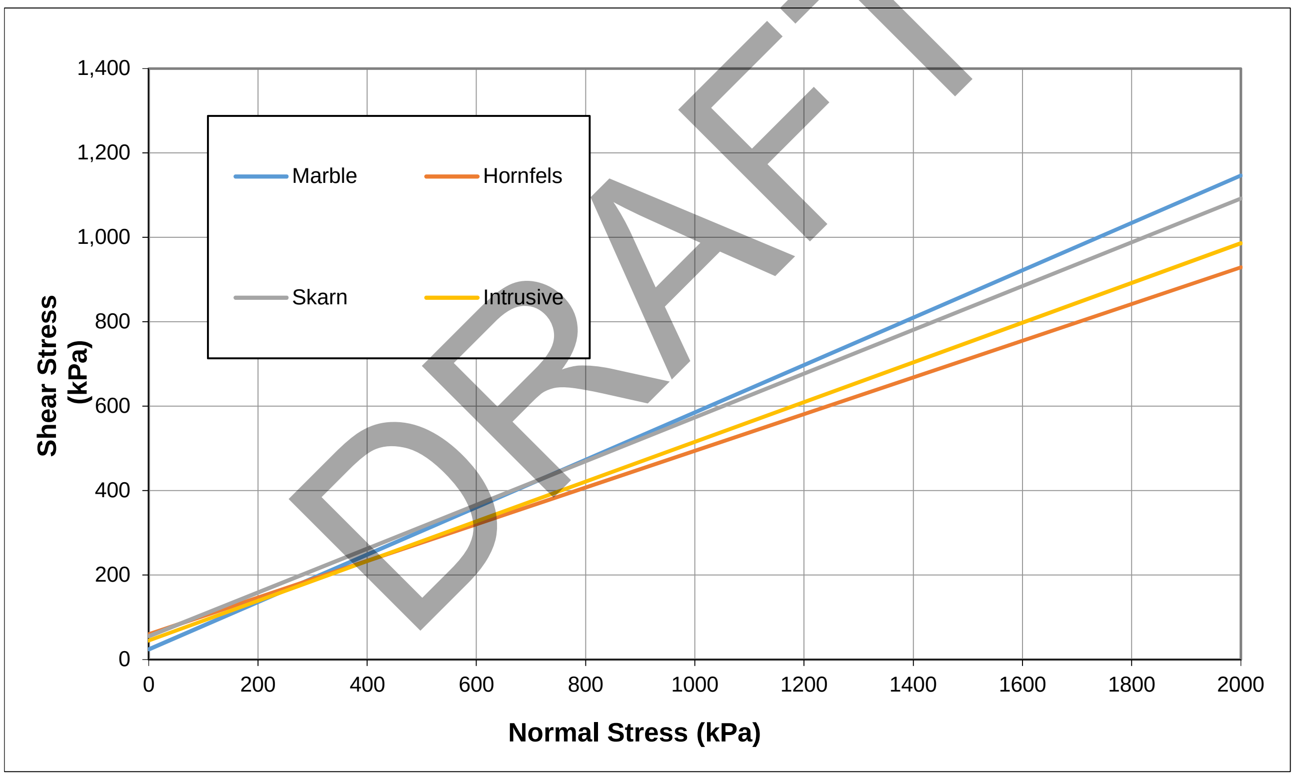


Figure 6-10. Fracture Shear Strength Summary
Aranzazu Mine, Aura Minerals, Inc., 2017

CALL & NICHOLAS, INC.

STRENGTH WORKSHEET

Project: Aranzazu Mine
Date: 08/01/17
Rock Type: Marble

(a) Substance

σ_{cs} = 50.1 MPa
σ_{ts} = 11.3 MPa

for : $\frac{E}{\sigma_c}$ = 0.0

E_s = (10^6) kPa
ν_s =

$m = \frac{\sigma_c}{\sigma_t}$ = 4.43

	Empirical	Triaxial
$\phi_s = 0.85 \cdot \left[\tan^{-1}\left(\frac{m-1}{2\sqrt{m}}\right)\right] =$	33.3 °	44.9 °
$c_s = 0.98 \cdot \left(\frac{\sigma_c}{2\sqrt{m}}\right) =$	11.7 MPa	10.4 MPa

(b) Fracture

Filling: None

ϕ_f = 29.3 °
c_f = 24.2 kPa

RQD = 87 %

k_s = 0 psi/in
$k_n = 20 \cdot k_s$ = 0 psi/in

c_{rf} = 0.5

Mi = --

RMR = --

S3 Max = --

(c) Mass

PRS = % Rock Substance PRF = % Rock Fracture

$PRS(\phi) = \left[0.3775 \cdot e^{0.0075 \cdot RQD}\right]^2 =$ 0.5255 $PRS(c) = \left[0.225 \cdot e^{0.013 \cdot RQD}\right]^2 =$ 0.4861

$PRF(\phi) = 1 - PRS(\phi) =$ 0.4745 $PRF(c) = 1 - PRS(c) =$ 0.5139

$\phi_m = \tan^{-1}\left[PRS(\phi) \cdot \tan(\phi_s) + PRF(\phi) \cdot \tan(\phi_f)\right] =$ 38.3 °

$c_m = \left[PRS(c) \cdot c_s + PRF \cdot c_f\right] \cdot c_{rf} =$ 2534.0 kPa

$E_m = E_s \sqrt{PRS(c)} =$ 0.000 (10^6) kPa

$\nu_m = \frac{1 - \sin\phi_m}{2 - \sin\phi_m} =$ 0.28

$\sigma_{cm} = 2c_m \tan(45 + \frac{\phi_m}{2}) =$ 10462.1 kPa

$\sigma_{tm} = \frac{\sigma_{cm} \cdot \sigma_{ts}}{\sigma_{cs}} =$ 2359.7 kPa

γ_s = 2800 kg/m^3

Figure 6-11. Marble Calculated Rock Mass Strength
Aranzazu Mine, Aura Minerals Inc., 2017

STRENGTH WORKSHEET

Project: Aranzazu Mine
Date: 08/01/17
Rock Type: Hornfels

(a) Substance

$\sigma_{cs} =$ 53.4 MPa
$\sigma_{ts} =$ 8.2 MPa

for : $\dfrac{E}{\sigma_c} =$ 0.0

$E_s =$ (10^6) kPa
$\nu_s =$

$m = \dfrac{\sigma_c}{\sigma_t} =$ 6.51

	Empirical	Triaxial
$\phi_s = 0.85 \cdot \left[\tan^{-1}\left(\dfrac{m-1}{2\sqrt{m}}\right)\right] =$	40.1 °	29.5 °
$c_s = 0.98 \cdot \left(\dfrac{\sigma_c}{2\sqrt{m}}\right) =$	10.3 MPa	15.6 MPa

(b) Fracture

Filling: None

$\phi_f =$ 23.5 °
$c_f =$ 59.4 kPa

RQD = 74 %

$k_s =$ 0 psi/in
$k_n = 20 \cdot k_s =$ 0 psi/in

$c_{rf} =$ 0.5

$Mi =$ --

$RMR =$ --

S3 Max = --

(c) Mass

PRS = % Rock Substance PRF = % Rock Fracture

$$PRS(\phi) = \left[0.3775 \cdot e^{0.0075 \cdot RQD}\right]^2 = 0.4324 \qquad PRS(c) = \left[0.225 \cdot e^{0.013 \cdot RQD}\right]^2 = 0.3467$$

$$PRF(\phi) = 1 - PRS(\phi) = 0.5676 \qquad PRF(c) = 1 - PRS(c) = 0.6533$$

$$\phi_m = \tan^{-1}\left[PRS(\phi) \cdot \tan(\phi_s) + PRF(\phi) \cdot \tan(\phi_f)\right] = 26.2°$$

$$c_m = \left[PRS(c) \cdot c_s + PRF \cdot c_f\right] \cdot c_{rf} = 2723.6 \text{ kPa}$$

$$E_m = E_s \sqrt{PRS(c)} = 0.000 \ (10^6) \text{ kPa}$$

$$\nu_m = \frac{1 - \sin\phi_m}{2 - \sin\phi_m} = 0.36$$

$$\sigma_{cm} = 2c_m \tan(45 + \frac{\phi_m}{2}) = 8746.5 \text{ kPa}$$

$$\sigma_{tm} = \frac{\sigma_{cm} \cdot \sigma_{ts}}{\sigma_{cs}} = 1343.1 \text{ kPa}$$

$\gamma_s =$ 2650 kg/m^3

DRAFT

Figure 6-12. Hornfels Calculated Rock Mass Strength
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

STRENGTH WORKSHEET

Project: Aranzazu Mine
Date: 08/01/17
Rock Type: Skarn

(a) Substance

σ_{cs} = 69.0 MPa
σ_{ts} = 6.5 MPa

for : $\frac{E}{\sigma_c}$ = 0.0

E_s = (10^6) kPa
ν_s =

$m = \frac{\sigma_c}{\sigma_t}$ = 10.62

	Empirical	Triaxial
$\phi_s = 0.85 \cdot \left[\tan^{-1}\left(\frac{m-1}{2\sqrt{m}}\right)\right]$ =	47.5 °	52.7 °
$c_s = 0.98 \cdot \left(\frac{\sigma_c}{2\sqrt{m}}\right)$ =	10.4 MPa	11.6 MPa

(b) Fracture

Filling: None

ϕ_f = 27.4 °
c_f = 55.2 kPa

RQD = 80 %

k_s = 0 psi/in
$k_n = 20 \cdot k_s$ = 0 psi/in

c_{rf} = 0.5

Mi = --

RMR = --

S3 Max = --

(c) Mass

PRS = % Rock Substance PRF = % Rock Fracture

$PRS(\phi) = \left[0.3775 \cdot e^{0.0075 \cdot RQD}\right]^2$ = 0.4731

$PRS(c) = \left[0.225 \cdot e^{0.013 \cdot RQD}\right]^2$ = 0.4052

$PRF(\phi) = 1 - PRS(\phi)$ = 0.5269

$PRF(c) = 1 - PRS(c)$ = 0.5948

$\phi_m = \tan^{-1}[PRS(\phi) \cdot \tan(\phi_s) + PRF(\phi) \cdot \tan(\phi_f)]$ = 41.8 °

$c_m = [PRS(c) \cdot c_s + PRF \cdot c_f] \cdot c_{rf}$ = 2366.7 kPa

$E_m = E_s \sqrt{PRS(c)}$ = 0.000 (10^6) kPa

$\nu_m = \frac{1 - \sin\phi_m}{2 - \sin\phi_m}$ = 0.25

$\sigma_{cm} = 2c_m \tan(45 + \frac{\phi_m}{2})$ = 10582.4 kPa

$\sigma_{tm} = \frac{\sigma_{cm} \cdot \sigma_{ts}}{\sigma_{cs}}$ = 996.9 kPa

γ_s = 3150 kg/m^3

Figure 6-13. Skarn Calculated Rock Mass Strength
Aranzazu Mine, Aura Minerals Inc., 2017

STRENGTH WORKSHEET

Project: Aranzazu Mine
Date: 08/01/17
Rock Type: Intrusive

(a) Substance

$\sigma_{cs} =$ 69.0 MPa
$\sigma_{ts} =$ 9.9 MPa

for : $\dfrac{E}{\sigma_c} =$ 0.0

$E_s =$ (10^6) kPa
$\nu_s =$

$m = \dfrac{\sigma_c}{\sigma_t} =$ 6.97

	Empirical	Triaxial
$\phi_s = 0.85 \cdot \left[\tan^{-1}\left(\dfrac{m-1}{2\sqrt{m}}\right)\right] =$	41.2 °	42.8 °
$c_s = 0.98 \cdot \left(\dfrac{\sigma_c}{2\sqrt{m}}\right) =$	12.8 MPa	15.1 MPa

(b) Fracture

Filling: None

$\phi_f =$ 25.2 °
$c_f =$ 44.9 kPa

RQD = 82 %

$k_s =$ 0 psi/in
$k_n = 20 \cdot k_s =$ 0 psi/in

$c_{rf} =$ 0.5

$Mi =$ --

$RMR =$ --

S3 Max = --

(c) Mass

PRS = % Rock Substance PRF = % Rock Fracture

$$PRS(\phi) = \left[0.3775 \cdot e^{0.0075 \cdot RQD}\right]^2 = 0.4875$$

$$PRS(c) = \left[0.225 \cdot e^{0.013 \cdot RQD}\right]^2 = 0.4269$$

$$PRF(\phi) = 1 - PRS(\phi) = 0.5125$$

$$PRF(c) = 1 - PRS(c) = 0.5731$$

$$\phi_m = \tan^{-1}\left[PRS(\phi) \cdot \tan(\phi_s) + PRF(\phi) \cdot \tan(\phi_f)\right] = 34.7\ °$$

$$c_m = \left[PRS(c) \cdot c_s + PRF \cdot c_f\right] \cdot c_{rf} = 3235.6 \text{ kPa}$$

$$E_m = E_s \sqrt{PRS(c)} = 0.000\ (10^6) \text{ kPa}$$

$$\nu_m = \frac{1 - \sin\phi_m}{2 - \sin\phi_m} = 0.30$$

$$\sigma_{cm} = 2c_m \tan(45 + \frac{\phi_m}{2}) = 12354.0 \text{ kPa}$$

$$\sigma_{tm} = \frac{\sigma_{cm} \cdot \sigma_{ts}}{\sigma_{cs}} = 1772.5 \text{ kPa}$$

$\gamma_s =$ 2600 kg/m^3

Figure 6-14. Intrusive Calculated Rock Mass Strength
Aranzazu Mine, Aura Minerals Inc., 2017

7.0 HYDROGEOLOGY

The purpose of the hydrogeologic analysis presented here is to provide AMI with estimated pumping requirements for the Glory Hole deposit area. Two separate but related analyses were conducted: (1) a groundwater recharge estimate using precipitation, land cover, topography, and evapotranspiration data, and (2) a mine inflow analysis using calculated groundwater recharge, hydraulic conductivity, hydraulic gradient, and underground mine footprint.

7.1 Groundwater Recharge

Groundwater recharge was estimated using a surface water balance method in which infiltration was calculated as the difference between precipitation and direct runoff. Infiltration was used as an input to a soil-water balance in the root zone. Groundwater recharge was then calculated as the portion of infiltration beyond the soil storage capacity minus the actual evapotranspiration. These computations are made on a monthly basis.

7.1.1 Infiltration Calculation

Runoff is calculated using the Soil Conservation Service (SCS) direct runoff method. Although the method was designed for a single storm event, it can be scaled to calculate average runoff values, as described by McWhorter (1983). The procedure first involves separating the range of recorded daily precipitation into equal bins (here separated by 0.5 mm). The average precipitation in each class is then used to calculate direct runoff, and the annual frequency of storms within each class is used as a multiplier to obtain annual runoff. This procedure is described in the equations below:

$$Q = N\sum_{i=1}^{m} r_i \frac{(P_i - I_a)^2}{(P_i - I_a + S)} \qquad S = \frac{1000}{CN} - 10 \qquad I_a = 0.2 \times S$$

Q = annual direct runoff, volume per unit area

N = mean number of days on which rainfall was recorded

r_i = relative frequency of rainfall amounts in interval i

P_i = mean rainfall in interval i

m = number of intervals

I_a = infiltration before runoff begins

S = potential maximum retention

CN = curve number, a constant related to the hydrologic classification of the soil, condition of the watershed, and type and quantity of vegetation

Infiltration was then computed directly from runoff:

$$I = P - Q$$

I = infiltrated volume per unit area

P = precipitation

Q = direct runoff from P

7.1.2 Recharge from Infiltration

A surface water balance was tabulated on a monthly basis to compute the volume of water infiltrated into the soil. Average monthly infiltration was calculated by multiplying annual infiltration by the relative proportion of monthly precipitation. Values for evapotranspiration were extracted from the Global Land Data Assimilation System evapotranspiration layer, a publicly available dataset calculated from satellite and ground-based observational data.

The monthly surface water balance was then calculated as follows:

$$W = I - E_{ta} - \Delta S$$

W = volume of water per unit area passing below the root zone, per month (i.e., recharge)

I = infiltrated volume per unit area

E_{ta} = actual evapotranspiration

ΔS = change in volume of stored water per unit area stored in the root zone

There is some amount of available water capacity (AWC) of the soil for water storage in the root zone. When infiltration minus evapotranspiration minus remaining AWC for a given month exceeds the total AWC, that exceedance amount will pass below the root zone into the regional groundwater system. This amount, W, is actual groundwater recharge to the system.

7.1.3 Recharge Calculation

To estimate volumetric recharge, the surface watershed was first delineated from the regional topography. Satellite-modeled land cover maps were also obtained, allowing for categorization of surface vegetation into (1) a generally higher elevation "coniferous" zone, (2) a generally lower elevation "scrub" zone, and (3) the highly disturbed zone on the mine property.

These zones are shown in Figure 7-1. A monthly water balance was computed as outlined in Section 7.1.2 above for each zone, using a separate curve number, available water capacity, and soil crop coefficient. Appropriate values for crop-use coefficient and available water capacity for various land covers were suggested in McWhorter (1983).

This soil water balance for average monthly conditions is summarized in Table 7-1. A balance was also computed separately for the monthly precipitation recorded in 1966, which represents the upper 90th percentile in terms of observed annual rainfall, and is summarized in Table 7-2.

An estimate of the upper 99th percentile average annual precipitation was also calculated using extreme value statistics. The values of average annual precipitation over the period of record is assumed to follow the Gumbel Extreme value Type 1 distribution. A theoretical curve fitting the data was computed using the cumulative distribution function, which was used to predict the upper 99th percentile average annual precipitation. This calculated distribution is shown in Figure 7-2.

Mean annual recharge was then summarized from the monthly data and multiplied by the surface area for each zone to obtain total annual volume and rates of recharge. This calculation was then repeated for the upper 90th percentile of observed precipitation. A third calculation of recharge was then performed for the 99th percentile annual precipitation, by applying the same ratio of recharge to precipitation as computed for the 90th percentile estimate. A summary of estimated groundwater recharge rates are presented in Table 7-3.

7.2 <u>Regional Groundwater Inflow Calculation</u>

A simple analytical solution was applied to predict groundwater inflow to the underground mine. This assumes the mine has intersected the regional water table and is intercepting flow from the groundwater basin. The approach divides the flow regime into two zones: Zone 1 exists above the base of the underground mine and represents downward and lateral inflow to the mine, while Zone 2 extends from the base of the mine downwards and considers upward flow into the base of the mine.

7.2.1 *Zone 1 Analytical Solution*

Lateral and downward inflow for Zone 1 considers steady state, unconfined horizontal radial flow, with uniformly distributed recharge at the water table. The following equation applies for these conditions (Marinelli & Niccoli, 2000):

$$Q_1 = W * \pi * \left(r_o{}^2 - r_p{}^2\right)$$

Q_1 = inflow rate from walls

W = distributed recharge flux

r_p = radius of mine

r_o = radius of influence

Distributed recharge flux is applied from Table 7-3 using rates calculated for the mine property, including average annual, 90th percentile, and 99th percentile precipitation conditions. The mine radius was estimated from known and planned extents of the underground mine. The current and planned dimensions were approximated by representative spheres with known radii. The radius of influence is approximated from the following formula (Sichardt, 1930):

$$r_o = 3000 * \left(h_o - h_p\right) * \sqrt{K_h}$$

r_o = radius of influence

h_o = elevation of the static regional water table

h_p = elevation of the locally depressurized water table

K_h = horizontal hydraulic conductivity

7.2.2 *Zone 2 Analytical Solution*

The analytical solution for Zone 2 is based on steady-state flow applying constant and uniform drawdown. The solution assumes hydraulic head is hydrostatic, with three-dimensional axially symmetric flow towards the underground mine. Hydraulic conductivity within Zone 2 is assumed to be anisotropic with principal flow in the horizontal and vertical directions (Marinelli & Niccoli, 2000):

$$Q_2 = 4r_p\left(\frac{K_h}{m}\right)\left(h_o - h_p\right) \qquad m = \sqrt{\frac{K_h}{K_v}}$$

Q_2 = inflow rate from the base of the mine

K_h = horizontal hydraulic conductivity

K_v = horizontal hydraulic conductivity

m = anisotropy parameter

h_o = elevation of the static regional water table

h_p = elevation of the locally depressurized water table

The static regional water table was estimated at 2150 meters AMSL, approximately 50 meters below ground surface. The current local water table elevation adjacent to the mine was estimated at 1940 meters AMSL from the upper elevation of known locations of inflows in the underground mine. The local water table is assumed to continue to be dewatered and decrease in elevation in tandem with the depth of mining activity.

7.2.3 Steady State Inflow Calculation

From early 2015 to August 2015, dewatering operations ceased and all infiltrated water accumulated in sumps at the 3988 AA, 4066 GHH, and 2047-2006 BW/MX ramps. Dewatering operations resumed in August 2015. The stored water volume at these locations was measured beginning in August 2015 through January 2017. Assuming all water stored in August 2015 infiltrated in the previous 8 months, the current inflow rate was estimated at 11 liters per second.

Q_1 and Q_2 were calibrated to this approximate groundwater infiltration rate by applying the estimated average annual recharge rate and by varying hydraulic conductivity. This resulted in a best fit hydraulic conductivity of 1.5e-5 cm/s. The inflow calculation was then repeated for increasing depth of the underground mine. As depth increases and mine dewatering continues, the local water table elevation will be dewatered accordingly, and the gradient with regional water table at a distance will increase, generating additional inflow with depth.

These calculations were then repeated for the 90^{th} and 99^{th} annual precipitation and calculated recharge values. The results are shown in Figure 7-3.

7.3 <u>Peak Inflow Calculation</u>

Short term maximum inflow rates from individual faults, fractures, and fracture zones are highly variable and difficult to calculate with high accuracy. When intersected they tend to have high initial flow rates that drain over the course of days or weeks. Here a range of realistic fault zone geometries and hydrogeologic properties were approximated. Given these assumptions, the potential peak inflow rates were calculated.

$$Q = K * W * H * K$$

Q = peak inflow rate

W = exposed fault width, estimated between 2 meters and 12 meters

H = exposed fault height, estimated at 30 meters (stope height)

K = hydraulic conductivity, estimated between 1.0e-2 and 1.0e-3 cm/s

Estimated inflows from these calculations are shown in Figure 7-4.

An estimate of peak inflow volume and peak inflow duration was also calculated for an estimated fault zone porosity of 5 to 10 percent. Flow duration for a given peak inflow volume was also calculated. Storage volume (V) within the fault zone and flow duration (D) are computed using the following equations:

$$V = L * W * H * \phi \qquad D = \frac{1}{Q} * V$$

V = peak inflow volume

L = fault length, estimated at 500 meters

W = exposed fault width, estimated between 2 meters and 12 meters

H = exposed fault height, estimated at 30 meters (stope height)

ϕ = fault zone porosity, estimated between 5 and 10 percent

D = flow duration

Q = peak inflow rate

Estimated volume and duration from these calculations are shown in Table 7-4.

Table 7-1. Soil Water Balance for Monthly Average Precipitation
Aranzazu Mine, Aura Minerals Inc., 2017

Land Cover Location and Type	Month	Average Precipitation (mm)	Crop Use Coefficient	Remaining Available Water Capacity (mm)	Infiltration (mm)	Potential Evapotranspiration (mm)	Adjusted Evapotranspiration (mm)	Actual Evapotranspiration (mm)	Change in Soil Storage (mm)	Groundwater Recharge (mm)
Upper Watershed: Confierous Pinyon & Juniper	Jan	25.9	0.65	0.0	19.1	15.3	10.0	10.0	0.0	9.2
	Feb	14.7	0.65	0.0	10.9	15.6	10.1	10.1	0.0	0.8
	Mar	14.7	0.65	0.0	10.8	19.7	12.8	12.8	-2.0	0.0
	Apr	18.5	0.70	2.0	13.7	19.1	13.4	13.4	0.3	0.0
	May	33.1	0.80	1.7	24.5	31.3	25.0	25.0	-0.5	0.0
	Jun	48.9	0.80	2.3	36.2	42.7	34.2	34.2	2.0	0.0
	Jul	74.8	0.80	0.3	55.3	56.5	45.2	45.2	0.3	9.8
	Aug	59.7	0.80	0.0	44.1	55.3	44.3	44.3	-0.2	0.0
	Sep	61.7	0.69	0.2	45.6	49.4	34.1	34.1	0.2	11.3
	Oct	34.3	0.65	0.0	25.4	41.9	27.3	27.3	-1.9	0.0
	Nov	18.9	0.65	1.9	14.0	26.4	17.2	17.2	-3.2	0.0
	Dec	23.7	0.65	5.1	17.5	19.2	12.5	12.5	5.1	0.0
								Annual Change in Stored Water Balance =	**0**	
Lower Watershed: Scrub, Brush & Grass	Jan	25.9	0.50	0.0	18.3	15.3	7.7	7.7	0.0	10.6
	Feb	14.7	0.50	0.0	10.4	15.6	7.8	7.8	0.0	2.6
	Mar	14.7	0.50	0.0	10.4	19.7	9.9	9.9	0.0	0.5
	Apr	18.5	0.60	0.0	13.1	19.1	11.5	11.5	0.0	1.6
	May	33.1	0.80	0.0	23.4	31.3	25.0	25.0	-1.6	0.0
	Jun	48.9	0.80	1.6	34.6	42.7	34.2	34.2	0.4	0.0
	Jul	74.8	0.80	1.2	52.9	56.5	45.2	45.2	1.2	6.4
	Aug	59.7	0.71	0.0	42.1	55.3	39.3	39.3	0.0	2.9
	Sep	61.7	0.53	0.0	43.6	49.4	26.2	26.2	0.0	17.4
	Oct	34.3	0.50	0.0	24.2	41.9	21.0	21.0	0.0	3.3
	Nov	18.9	0.50	0.0	13.4	26.4	13.2	13.2	0.0	0.2
	Dec	23.7	0.50	0.0	16.8	19.2	9.6	9.6	0.0	7.2
								Annual Change in Stored Water Balance =	**0**	
Mine Property: Disturbed Area	Jan	25.9	0.55	0.0	21.6	15.3	8.4	8.4	0.0	13.1
	Feb	14.7	0.55	0.0	12.2	15.6	8.6	8.6	0.0	3.7
	Mar	14.7	0.55	0.0	12.2	19.7	10.9	10.9	0.0	1.3
	Apr	18.5	0.65	0.0	15.4	19.1	12.4	12.4	0.0	3.0
	May	33.1	0.70	0.0	27.6	31.3	21.9	21.9	0.0	5.7
	Jun	48.9	0.70	0.0	40.7	42.7	29.9	29.9	0.0	10.8
	Jul	74.8	0.75	0.0	62.3	56.5	42.4	42.4	0.0	19.9
	Aug	59.7	0.75	0.0	49.7	55.3	41.5	41.5	0.0	8.2
	Sep	61.7	0.60	0.0	51.3	49.4	29.6	29.6	0.0	21.7
	Oct	34.3	0.60	0.0	28.6	41.9	25.2	25.2	0.0	3.4
	Nov	18.9	0.55	0.0	15.8	26.4	14.5	14.5	0.0	1.2
	Dec	23.7	0.55	0.0	19.7	19.2	10.6	10.6	0.0	9.2
								Annual Change in Stored Water Balance =	**0**	

Table 7-2. Soil Water Balance for Upper 90th Percentile Conditions (1966)
Aranzazu Mine, Aura Minerals Inc., 2017

Land Cover Location and Type	Month	Average Precipitation (mm)	Crop Use Coefficient	Remaining Available Water Capacity (mm)	Infiltration (mm)	Potential Evapotranspiration (mm)	Adjusted Evapotranspiration (mm)	Actual Evapotranspiration (mm)	Change in Soil Storage (mm)	Groundwater Recharge (mm)
Upper Watershed: Confierous Pinyon & Juniper	Jan	51.0	0.65	14.0	27.1	15.3	10.0	10.0	14.0	3.1
	Feb	18.0	0.65	0.0	9.6	15.6	10.1	10.1	-0.6	0.0
	Mar	125.0	0.65	0.6	66.4	19.7	12.8	12.8	0.6	53.0
	Apr	110.0	0.70	0.0	58.4	19.1	13.4	13.4	0.0	45.0
	May	56.5	0.80	0.0	30.0	31.3	25.0	25.0	0.0	5.0
	Jun	128.8	0.80	0.0	68.4	42.7	34.2	34.2	0.0	34.2
	Jul	119.3	0.80	0.0	63.4	56.5	45.2	45.2	0.0	18.1
	Aug	151.1	0.80	0.0	80.3	55.3	44.3	44.3	0.0	36.0
	Sep	149.9	0.69	0.0	79.6	49.4	34.1	34.1	0.0	45.5
	Oct	17.7	0.65	0.0	9.4	41.9	27.3	27.3	-17.9	0.0
	Nov	19.0	0.65	17.9	10.1	26.4	17.2	17.2	-7.1	0.0
	Dec	44.0	0.65	24.9	23.4	19.2	12.5	12.5	10.9	0.0
							Annual Change in Stored Water Balance =		**0**	
Lower Watershed: Scrub, Brush & Grass	Jan	51.0	0.50	2.5	26.1	15.3	7.7	7.7	2.5	15.9
	Feb	18.0	0.50	0.0	9.2	15.6	7.8	7.8	0.0	1.4
	Mar	125.0	0.50	0.0	64.0	19.7	9.9	9.9	0.0	54.1
	Apr	110.0	0.60	0.0	56.3	19.1	11.5	11.5	0.0	44.8
	May	56.5	0.80	0.0	28.9	31.3	25.0	25.0	0.0	3.9
	Jun	128.8	0.80	0.0	65.9	42.7	34.2	34.2	0.0	31.8
	Jul	119.3	0.80	0.0	61.1	56.5	45.2	45.2	0.0	15.9
	Aug	151.1	0.71	0.0	77.4	55.3	39.3	39.3	0.0	38.1
	Sep	149.9	0.53	0.0	76.7	49.4	26.2	26.2	0.0	50.6
	Oct	17.7	0.50	0.0	9.1	41.9	21.0	21.0	-11.9	0.0
	Nov	19.0	0.50	11.9	9.7	26.4	13.2	13.2	-3.5	0.0
	Dec	44.0	0.50	15.4	22.5	19.2	9.6	9.6	12.9	0.0
							Annual Change in Stored Water Balance =		**0**	
Mine Property: Disturbed Area	Jan	51.0	0.53	0.0	29.8	15.3	8.1	8.1	0.0	21.7
	Feb	18.0	0.53	0.0	10.5	15.6	8.2	8.2	0.0	2.3
	Mar	125.0	0.54	0.0	73.1	19.7	10.6	10.6	0.0	62.5
	Apr	110.0	0.60	0.0	64.3	19.1	11.5	11.5	0.0	52.8
	May	56.5	0.69	0.0	33.0	31.3	21.5	21.5	0.0	11.6
	Jun	128.8	0.72	0.0	75.3	42.7	30.7	30.7	0.0	44.6
	Jul	119.3	0.76	0.0	69.8	56.5	42.8	42.8	0.0	27.0
	Aug	151.1	0.75	0.0	88.3	55.3	41.7	41.7	0.0	46.7
	Sep	149.9	0.60	0.0	87.6	49.4	29.4	29.4	0.0	58.2
	Oct	17.7	0.58	0.0	10.3	41.9	24.3	22.3	-12.0	0.0
	Nov	19.0	0.55	12.0	11.1	26.4	14.5	11.1	0.0	0.0
	Dec	44.0	0.54	12.0	25.7	19.2	10.3	10.3	12.0	3.4
							Annual Change in Stored Water Balance =		**0**	

Table 7-3. Estimated Recharge Rates in Concepcion del Oro Watershed
Aranzazu Mine, Aura Minerals, Inc., 2017

		Upper Watershed	Lower Watershed	Mine Property
Area (m^2)		7,517,303	6,046,504	842,434
Mean Annual Precipitation	Recharge (l/s)	7	10	3
	Recharge (cm/s)	9.8E-06	1.7E-05	3.2E-05
Upper 90th Percentile Precipitation	Recharge (l/s)	57	49	9
	Recharge (cm/s)	7.6E-05	8.1E-05	1.0E-04
Upper 99th Percentile Precipitation	Recharge (l/s)	89	76	14
	Recharge (cm/s)	1.2E-04	1.2E-04	1.6E-04

Table 7-4. Estimated Peak Inflow Duration and Volume
Aranzazu Mine, Aura Minerals, Inc., 2017

		Flow Duration (days)			**Total Inflow Volume (m3)**		
		500 m Fault Length			500 m Fault Length		
		Porosity			**Porosity**		
		5%	7.5%	10%	5%	7.5%	10%
Fault Width (m)	2	3	4	6	1,500	2,250	3,000
	7	6	9	12	5,250	7,875	10,500
	12	29	43	58	9,000	13,500	18,000

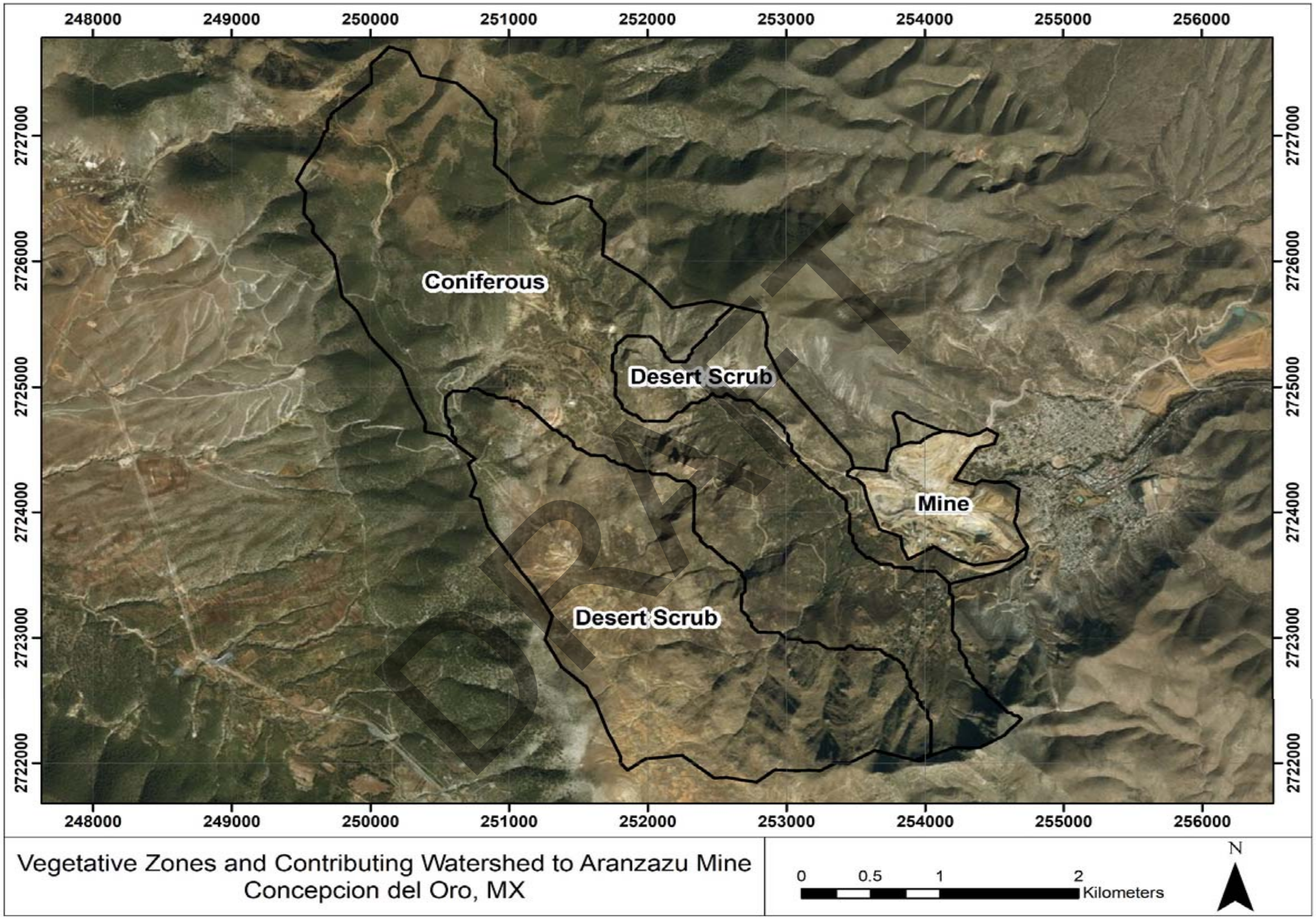


Figure 7-1. Vegetative Zones and Contributing Watershed To Aranzazu Mine
Aranzazu Mine, Aura Minerals Inc., 2017

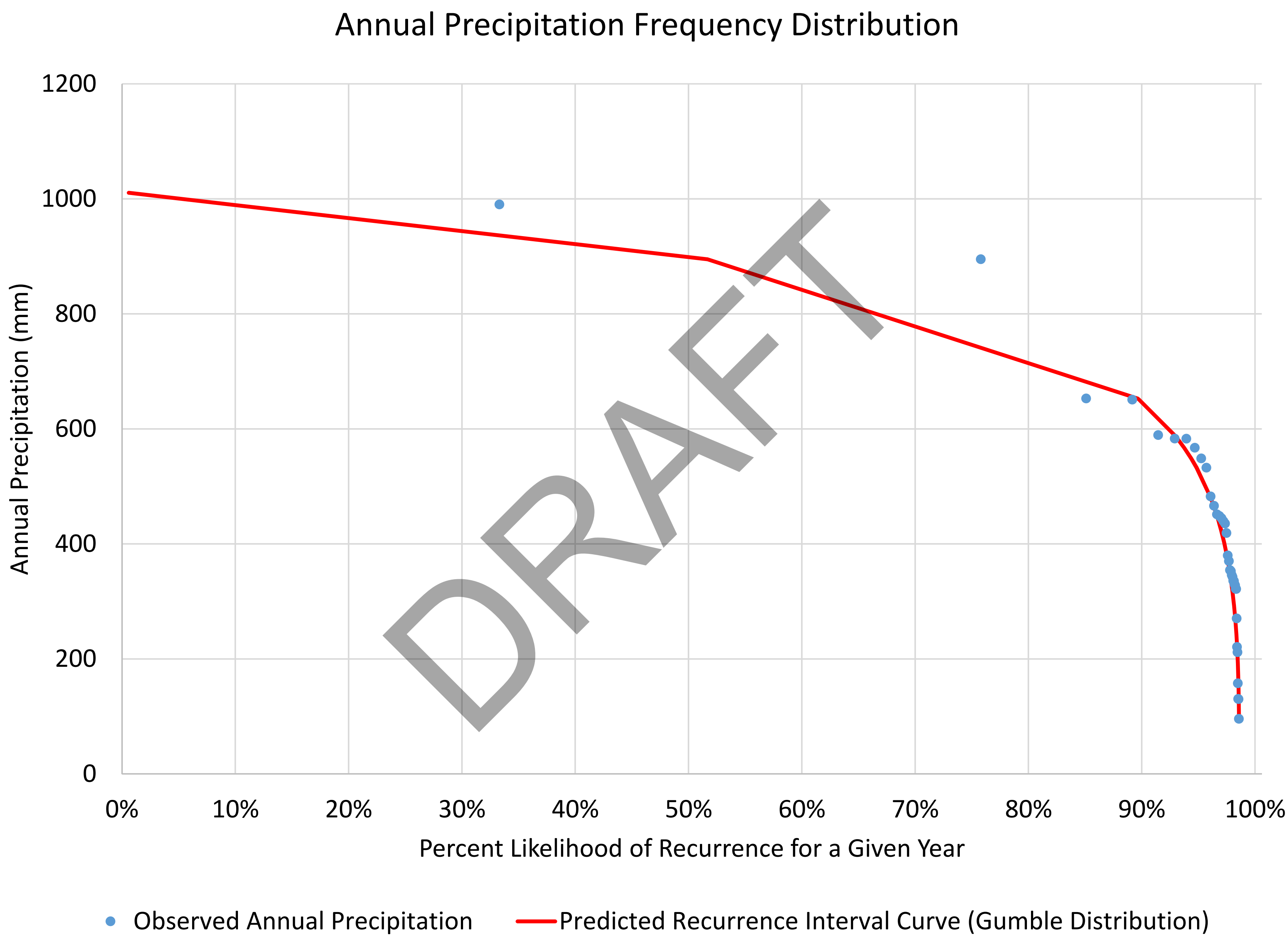


Figure 7-2. Annual Precipitation Frequency Distribution
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

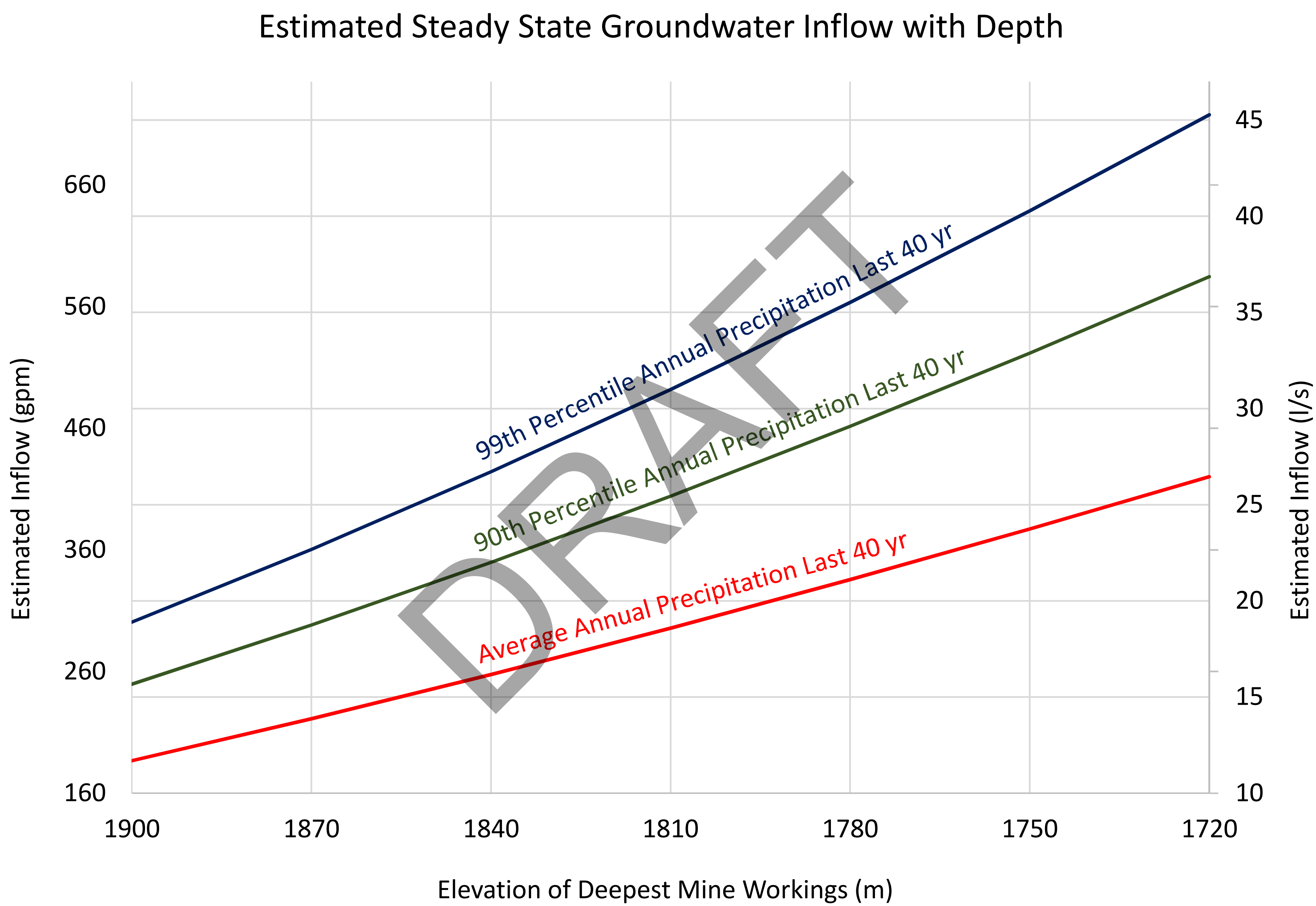


Figure 7-3. Estimated Steady State Groundwater Inflow with Depth
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

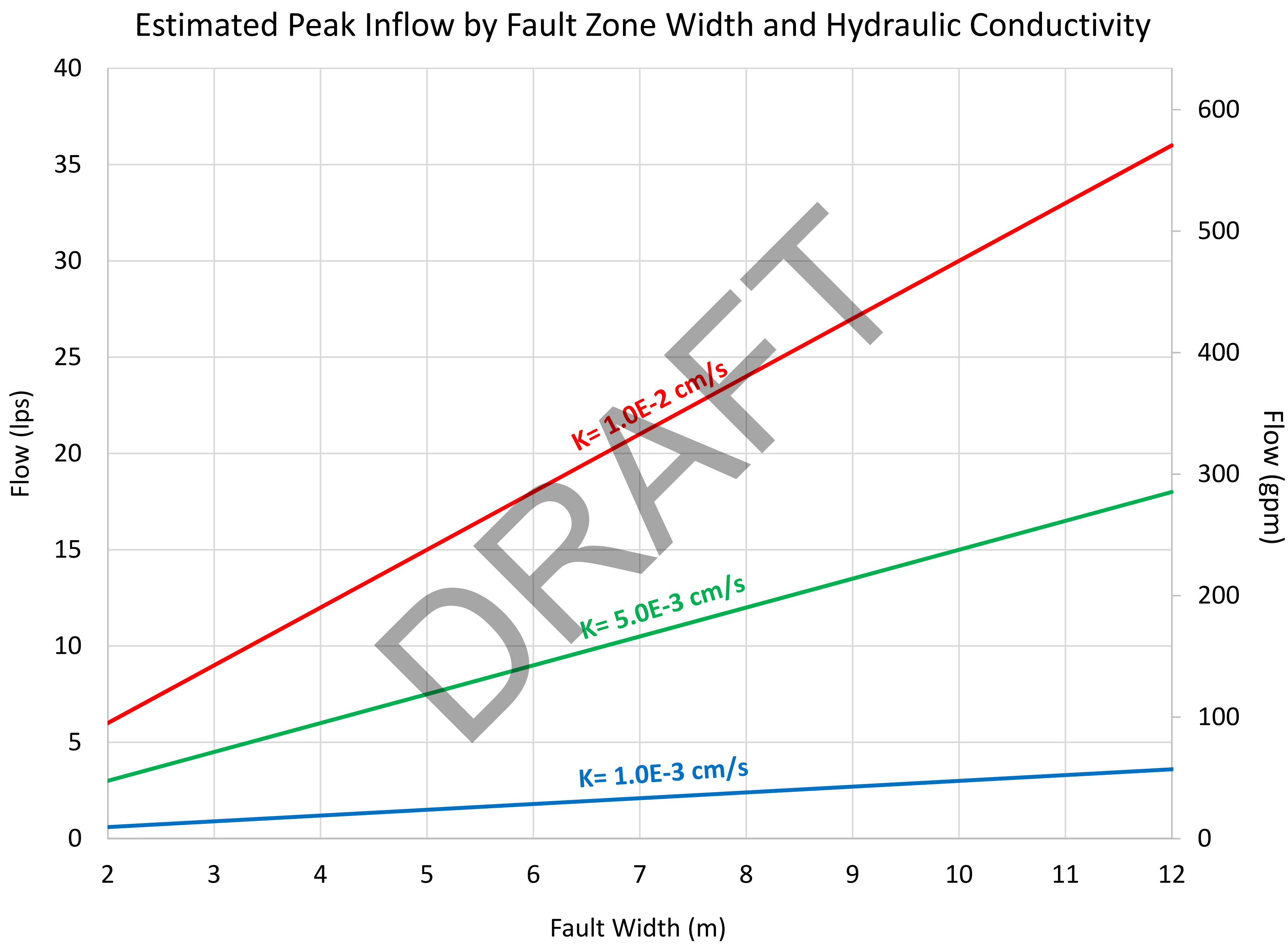


Figure 7-4. Estimated Peak Inflow by Fault Zone Width and Hydraulic Conductivity
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

8.0 PRODUCTION MINING – LONG HOLE OPEN STOPING

The mining method at Aranzazu mine will be long hole open stoping. This chapter details CNI's work in the evaluation of long hole open stoping, which includes both stability and pillar analyses.

8.1 Long Hole Open Stoping

Long hole open stoping requires a top cut, which is used as a drilling platform, and a bottom cut, which is used as a mucking level. The pillar between the top cut and the bottom cut is excavated by line blasts that progressively open up a large excavation with four walls (two side walls and two end walls) and a back (roof).

8.1.1 Criteria for Long Hole Open Stoping

When mining an ore body using the long hole open stoping method, the following are required:

1. The ore target must have sufficient vertical continuity (height) to maintain a 2:1 pillar between the top cut and bottom cut. At Aranzazu, this would mandate that the total height of a stope block must be at least 16 meters, accommodating two 4-meter accesses (top cut and bottom cut) and the 8 meters between the two.
2. To achieve full 100 percent recovery, backfill using a binder is necessary. Primary stopes will be filled with the cemented rockfill (CRF); these backfilled pillars will become the side walls of subsequent secondary stopes. The backfill strength must be of adequate strength to stand the vertical height and, in some cases, take the load of overlying fill.
3. Recoveries less than 100 percent (between 50 percent and 80 percent) are possible if backfill is not used.
4. The side walls and end walls of the primary stopes must be able to remain stable despite not being supported. The stability of the side walls and end walls is a function of the total amount of exposed surface (hydraulic radius) and the quality of the rock.
5. The stability of the primary stope surfaces is also depth-sensitive. Stopes at greater depths are more likely to be unstable than those of a similar size at a shallow depth.

8.1.2 Mathews Stability Graph Method

CNI used the Mathews Stability Graph Method to evaluate stope dimensions. This method is an empirical design tool based on case histories from Canadian underground mines, which typically have *good* to *very good* quality rock. While the rock quality at Aranzazu is typically of *fair* quality, this approach is still considered appropriate.

The Stability Graph method accounts for the key factors influencing open stope design, including rock mass strength and structure, stresses surrounding the opening, and the shape and orientation of the stope.

The method is based on two calculated factors: *N'* (modified stability number) and *S* (hydraulic radius). The stability number (*N'*) is comprised of the following components:

$$N' = Q' * A * B * C$$

Where: *Q'* = Modified Q Tunneling Quality Index
A = Rock stress Factor
B = Joint Orientation Factor
C = Gravity adjustment factor

The hydraulic radius (*S*) is calculated as follows:

$$S = (\text{Area of stope face- meters}^2) / (\text{perimeter of stope face-meters})$$

N' and *S* values are used to classify the excavations as one of the following:

- Stable Zone
- Stable without Support
- Stable with Support
- Supported Transition Zone
- Caving Zone

Mathews Stability Graph Input Parameters

The analysis was performed for open stopes in the skarn ore. The analysis assumes the following:

1. The horizontal in situ stresses are equal to the vertical in situ stress ($\sigma_{1(\text{vertical})} = \sigma_{2/3(\text{horizontal})}$), and have a stress ratio (K) of 1.0.
2. A depth of 240 meters.
3. The lowest Q' value for each GMT category was used in the stability graph evaluation as presented in Table 8-1.
4. Rock fabric orientations were estimated from oriented core data from within the skarn. Figure 8-1 presents the oriented core data and the joint set orientations used in the analysis.
5. Mine directions were assumed to be either parallel (313-degrees azimuth) or perpendicular (43-degrees azimuth) to bedding. Mining parallel to the strike of bedding is referred to as mining longitudinally; mining perpendicularly to the strike of bedding is referred to as mining transverse.

6. An unconfined compressive strength (UCS) value of 86.1 MPa was used in the analysis. This is the mean UCS value for the skarn rock type based on all data.

Input parameters for the calculation of *N'* are presented in Table 8-2. For calculating *N'*, the *A* (Stress Factor) is a function of depth and stope surface (back or rib); parameters *B* and *C* (joint orientation and gravity adjustment factors, respectively) were selected for the most unfavorably oriented structure or stope face that would induce sliding or slabbing at a given wall orientation. Stope walls will be controlled by the dip of the ore zone, which was assumed to be 72 degrees. Depending on the mining direction (transverse or longitudinal), the 72-degree dipping contact will be either the side or end wall of the stopes.

Mathews Stability Graph Results

To evaluate the critical hydraulic radius at Q', the *N'* (stability number) value was calculated and plotted to the stability graph, and the hydraulic radius was derived from the x-axis. Hydraulic radii were evaluated for each excavation surface (two side walls, two end walls, and the back) at a 240-meter depth. The summary of *N'* values and hydraulic radius by surface within each GMT category are presented in Table 8-3. Using their relative *N'* values, the side walls and end walls were plotted to the stable <u>without</u> support line, and the back was plotted to the stable <u>with</u> support line. Stability graph results are provided for each GMT category, for mining in both the transverse and longitudinal mining directions, in Figures 8-2A/B through 8-6A/B.

Given the maximum hydraulic radius (*S*) that was derived from the stability graph as shown in Figures 8-2A/B through 8-6A/B, and keeping the minimum stope height (30m) constant, the width and length of the stope excavation was generated. These dimensions are provided in Table 8-4. AMI plans on utilizing a 10-meter design stope width at Aranzazu, and as a result, no stopes will be planned in areas of GMT categories 1, 2, or 3. To optimize production CNI recommends that a stope design width of 12 meters be considered for future evaluation.

8.1.3 Hanging Wall Scab Pillars

Poor rock quality is most common at the hanging wall contact, which when mining in the transverse direction, will be the end wall of the stopes. To mitigate additional overbreak and control the stability of the stopes when being mined 10 meters wide, CNI recommends that a 2-meter pillar be left against the hanging wall. This will only apply when the hanging wall is of a

GMT quality of 3 or less. The scab pillar will be of a nominal 2 meters thickness, established fully within the zone of rock that is GMT 4 or greater.

8.1.4 Overbreak (Dilution) Estimates

At the request of AMI, CNI have provided overbreak estimates for mining stopes of 10, 12.5, and 15 meters wide in GMT categories 2, 3, 4, 5, and 6. Mining of these widths in GMT categories 2, 3, and 4 will incur some amount of undesirable overbreak due to the insufficient ground quality to maintain stability. These overbreak and slough estimates are presented in Tables 8-5A, 8-5B, and 8-5C. CNI have delineated 2 types of overbreak:

3. Equivalent length of estimated overbreak – which is breakage beyond the blast line
4. Equivalent length of additional slough – which is a nominal 50% of the maximum depth of collapse due to poor rock quality

CNI recommend that AMI design their stopes to anticipate the initial estimated overbreak (i.e. include these estimated lengths as offsets in production blast hole designs). By accepting this initial overbreak, the total amount of undesirable dilution can be minimized to the additional slough. AMI are investigating the potential to mine particular stopes at widths beyond their stable configuration and to accept the nominal amount of dilution that will occur. This approach will be evaluated by AMI on an economic basis. However, it is important to note that the total amount of additional slough is difficult to estimate and further dilution from what CNI have provided will be likely in some cases.

The equivalent length of estimated overbreak was estimated using the ELOS (Equivalent Length of Slough) chart. The ELOS chart is an extension of the stability graph developed by Mathews, using empirical evidence to estimate the amount of overbreak for different ground conditions at varying hydraulic radii. It is CNI's experience that this chart is most useful as an operational tool, in which mine planners can design production blast hole layouts with a nominal amount of offset to allow breakage to the preferable shape. Intentionally mining stopes or poorer rock quality at widths beyond their stable configuration will lead to additional sloughing. The total amount of additional slough is hard to estimate. However, based on the GMT block model, which has a 5 meter block size, there are no cases in which there are 2 continuous blocks of GMT category 2 or 3. Consequently, CNI do not anticipate additional sloughing to exceed 5 meters. However, because the amount of sloughing will be time-dependent, CNI recommend that AMI limit the length of stope being mined, so that the open stope has a limited stand-up time.

Minimizing the standup time will mitigate progressive instabilities and leave less void space for large blocks to fall out of the ribs which could damage equipment operating in the open stope. Timely placement of backfill in the stope after excavation will provide a superior end wall to mine subsequent stope panels against.

8.2 Pillar Stability Evaluations

Pillar stability analyses were performed for 3 scenarios:

1. The rib pillars between open stopes
2. The access pillars between crosscuts to the stopes from the haulage galleries
3. The sill pillar between mining areas

Pillar stability for cases 1 and 2 were evaluated using Wilson's Confined Core Pillar Analysis, which calculates the load carrying capacity (strength) of a pillar and the estimated load upon that pillar. The following subsections detail the evaluations of these cases. The stability of cemented rockfill (CRF) pillars is detailed in Chapter 9.

8.2.1 Wilson's Confined Core Method

The method of confined core pillar loading analysis (Wilson, 1972) computes the maximum stable vertical pillar stress under confinement and relates this quantity to the distance to the confined core. Wilson's method assumes that a pillar has two zones: (1) an outer fiber that carries little load, and (2) a confined core where most of the load is carried. Using the estimated rock-mass friction angle and compressive strength, as well as the pre-mining stress conditions, the distance to the confined core and the load carrying capacity (LCC) of each pillar can be calculated.

It is CNI's professional opinion that the non-linear approach for calculating the LCC results in a more robust design that better reflects how a pillar carries load across its cross section. Model studies and stress measurements support the concept that the stress is not uniformly distributed throughout the pillars cross sectional area; rather, stress is lowest in the outer fibers and increases toward the central core. The Wilson's confined core analysis accurately addresses this non-linear distribution of stress.

8.2.2 Rib Pillars between Open Stopes

If two open stopes are mined simultaneously with only a single stope pillar between them, this rib pillar must sustain a nominal amount of load which is shed onto it during the mining of the surrounding stopes. Estimating the amount of load that a rib pillar will sustain is a challenge. While some analyses use the entire column of overburden from the surface to excavation roof as the loading assumption, this is often a conservative estimate, particularly in areas in which the total mining span is narrow. At Aranzazu Glory Hole FW, the typical ore width (distance from the footwall and hanging wall) is approximately 30 meters. A common estimate for pillar loading conditions is that each pillar must carry the amount of overburden equal to twice the total mining span. Consequently, 60 meters of overburden was assumed as the loading condition in the pillar stability evaluation.

The load carrying capacity (pillar strength) was calculated using Wilson's calculation for a long pillar, which computes the strength of a pillar over a unit length. The ratio of load to pillar strength allows for the calculation of safety factor.

Figure 8-7 presents the results of the pillar stability analyses of rib pillars for 30-meter stope heights. The pillar dimensions were modeled at 9 meters wide and 30 meters high; the open stope was evaluated at 11 meters wide and at 30 meters high. The additional width of the stope is to account for 0.5 meters of overbreak on either side of the stope. Analyses were conducted at resulting skarn rock mass strengths from RQD values between 20 and 90 percent, as presented in Table 8-6. Figure 8-7 demonstrates stope rib pillars will remain stable when pillars have an RQD in excess of 53 percent. Figure 8-8 presents the average RQD values of stope shapes provided by AMI. Less than 10 percent of the stopes have an average RQD of less than 53 percent, and as a result may be unstable when left as a pillar between two open stopes. AMI plan to avoid this scenario in their mine plans. Should a wider stoping width be pursued in the future, such as at 12 meters, pillar stability will improve.

8.2.3 Access Pillars between Stopes and the Haulage Gallery

Stopes will be accessed off of the haulage gallery (levels) using cross cuts. Pillars will be left between these cross cuts, the haulage gallery, and the stoping areas. The cross cuts will be designed at 4.5-meter widths. Unlike the stope rib pillars, these pillars will be wider, shorter, and rectangular in shape, which typically leads to a more stable pillar geometry. However, these pillars are susceptible to additional load than those sustained by the stope rib pillars. As the stopes are mined out, the load shed may be redistributed to either the footwall or hanging wall. Because these access pillars will be within the footwall where this load will be shed, they should be designed to manage the full overburden load (total height of rock to surface). Consequently, these pillars were modeled to their full overburden load condition.

Analyses were performed at resulting intrusive (footwall) rock mass strengths from RQD values between 20 and 90 percent, as presented in Table 8-7. Figure 8-9 presents the results of the access pillar stability analysis. Pillars were assumed to be of 4 meters in height, at 10.5 meters width, and at 15 meters length. This assumes that the haulage gallery will be offset a minimum of 15 meters from the start of the stopes. Because AMI plans to minimize development by having the crosscut access for secondary stopes branch off of primary stope crosscuts, the pillar width estimate is conservative. Figure 8-9 indicates that the access pillars should remain stable when they have RQD values in excess of 40 percent. Figure 8-10 presents the RQD distribution for the intrusive rock type. The distribution suggests that for the intrusive rock type less than 10 percent of the deposit will have less RQD values of less than 40 percent. AMI plans to install additional ground support in pillars of low RQD to mitigate or manage potential pillar instability.

8.2.4 Sill Pillars between Mining Areas

Sill pillars are often used to isolate mining areas of different elevations. By leaving a sill pillar, mining can take place in the upper elevations while development is ongoing to establish mining at the lower elevations. This results in an early start to production before all capital development and infrastructure has been put into place. AMI currently plans on establishing a sill pillar between the 1840 and 1850 levels at Aranzazu.

Sill pillar thickness was evaluated using Carter's crown pillar analysis. With Carter's method, factors of safety can be calculated given the length and width of a void shape, Q-prime (rock quality estimate), and a sill pillar thickness. Figure 8-11 presents the results of the Carter's evaluation of sill pillar thicknesses by GMT category. Various lengths (to include the stoping area and accesses) were considered in the analysis. AMI plans to establish a 10-meter sill pillar, which requires the sill pillar be of GMT 6 rock quality. Figure 8-12 presents the distribution of GMT rock qualities within the planned sill pillar (between the 1840 and 1850 elevations). CNI believes that while a 10-meter sill pillar should be adequate, any overbreak which results in a thinner pillar can contribute to instability. AMI should closely monitor the survey of this sill pillar to verify adequate thickness.

Table 8-1. Geomechanical Material Types (GMT)
Aranzazu Mine, Aura Minerals Inc., 2017

GMT	Description	Q'
1	Intensely Fractured and Altered	< 0.6
2	Intensely Fractured	0.6 - 1.0
3	Highly Fractured	1.0 - 2.0
4	Moderate to Highly Fractured	2.0 - 4.0
5	Widely Spaced Fractured	4.0 - 10.0
6	Blocky	> 10.0

Table 8-2. N' Stability Number Inputs
Aranzazu Mine, Aura Minerals, Inc., 2017

"A" FACTOR SUMMARY		
Depth (m)	A-BACK	A-WALLS
240	0.8	1.0

"B" FACTOR SUMMARY			
Joint Set	Dip Direction	Strike	Dip
Bedding	43	313	72
X-Joint	223	133	18
Side Release	133	43	90
Side Release	313	223	90

Mining Parallel to Strike (313 degrees Az)						
Stope Surfaces			Critical	Delta	Delta	
	Strike	Dip	Joint	Strike	Dip	"B"Factor
Back	313	0	X-Joint	0	18	0.2
Up Dip **Side** Wall	313	72	Bedding	0	0	0.3
Down Dip **Side** Wall	313	72	Bedding	0	0	0.3
43 Striking **End** Wall	43	90	Side	0	0	0.3
223 Striking **End** Wall	223	90	Side	0	0	0.3

Mining Perpendicular to Strike (43 degrees Az)						
Stope Surfaces			Critical	Delta	Delta	
	Strike	Dip	Joint	Strike	Dip	"B"Factor
Back	313	0	X-Joint	0	18	0.2
Up Dip **End** Wall	313	72	Bedding	0	0	0.3
Down Dip **End** Wall	313	72	Bedding	0	0	0.3
43 Striking **Side** Wall	43	90	Side	0	0	0.3
223 Striking **Side** Wall	223	90	Side	0	0	0.3

"C" FACTOR SUMMARY			
Joint Set	Dip Direction	Strike	Dip
Bedding	43	313	72
X-Joint	223	133	18
Side Release	133	43	90
Side Release	313	223	90

Mining Parallel to Strike (313 degrees Az)			
Stope Surfaces	Inclination of Surface/Critical Joint	Critical Joint	"C"Factor
Back	0	Stope Surface	2.0
Up Dip **Side** Wall	72	Stope Surface	6.0
Down Dip **Side** Wall	72	Stope Surface	6.0
43 Striking **End** Wall	90	43 Side	8.0
223 Striking **End** Wall	90	223 Side	8.0

Mining Perpendicular to Strike (43 degrees Az)			
Stope Surface	Inclination of Surface/Critical Joint	Critical Joint	"C"Factor
Back	0	Stope Surface	2.0
Up Dip **End** Wall	75	Stope Surface	6.0
Down Dip **End** Wall	45	Stope Surface	6.0
43 Striking **Side** Wall	75	43 Side	8.0
223 Striking **Side** Wall	55	223 Side	8.0

Table 8-3. Stability Number and Maximum Hydraulic Radius by GMT
Aranzazu Mine, Aura Minerals, Inc., 2017

GMT	Q-Prime	Figure	**Mining Parallel to Strike** Max Stope Dimensions			Figure	**Mining Perpendicular to Strike** Max Stope Dimensions		
			Surface (Wall)	N-Prime	Max Stable Hydraulic Radius (m)		Surface (Wall)	N-Prime	Max Stable Hydraulic Radius (m)
2.00	0.6 - 1.0	8-2A	Back	0.20	5.3	8-2B	Back	0.20	5.3
			Up Dip **Side** Wall	1.08	2.5		Up Dip **End** Wall	1.08	2.5
			Down Dip **Side** Wall	1.08	2.5		Down Dip **End** Wall	1.08	2.5
			43 Striking **End** Wall	1.44	2.7		43 Striking **Side** Wall	1.44	2.7
			223 Striking **End** Wall	1.44	2.7		223 Striking **Side** Wall	1.44	2.7
3.00	1.0 - 2.0	8-3A	Back	0.33	5.6	8-3B	Back	0.33	5.6
			Up Dip **Side** Wall	1.80	3.0		Up Dip **End** Wall	1.80	3.0
			Down Dip **Side** Wall	1.80	3.0		Down Dip **End** Wall	1.80	3.0
			43 Striking **End** Wall	2.40	3.3		43 Striking **Side** Wall	2.40	3.3
			223 Striking **End** Wall	2.40	3.3		223 Striking **Side** Wall	2.40	3.3
4.00	2.0 - 4.0	8-4A	Back	0.66	6.2	8-4B	Back	0.66	6.2
			Up Dip **Side** Wall	3.60	3.8		Up Dip **End** Wall	3.60	3.8
			Down Dip **Side** Wall	3.60	3.8		Down Dip **End** Wall	3.60	3.8
			43 Striking **End** Wall	4.80	4.2		43 Striking **Side** Wall	4.80	4.2
			223 Striking **End** Wall	4.80	4.2		223 Striking **Side** Wall	4.80	4.2
5.00	4.0 - 10.0	8-5A	Back	1.32	6.9	8-5B	Back	1.32	6.9
			Up Dip **Side** Wall	7.20	4.9		Up Dip **End** Wall	7.20	4.9
			Down Dip **Side** Wall	7.20	4.9		Down Dip **End** Wall	7.20	4.9
			43 Striking **End** Wall	9.60	5.5		43 Striking **Side** Wall	9.60	5.5
			223 Striking **End** Wall	9.60	5.5		223 Striking **Side** Wall	9.60	5.5
6.00	> 10.0	8-6A	Back	3.31	7.9	8-6B	Back	3.31	7.9
			Up Dip **Side** Wall	18.00	6.9		Up Dip **End** Wall	18.00	6.9
			Down Dip **Side** Wall	18.00	6.9		Down Dip **End** Wall	18.00	6.9
			43 Striking **End** Wall	24.00	7.6		43 Striking **Side** Wall	24.00	7.6
			223 Striking **End** Wall	24.00	7.6		223 Striking **Side** Wall	24.00	7.6

Table 8-4. Stable Stope Dimensions at 30m Heights
Aranzazu Mine, Aura Minerals, Inc., 2017

Q - Prime	GMT	Transverse		Longitudinal	
		Width (m)	Length (m)	Width (m)	Length (m)
< 0.6	1	Not Stope-able (Requires Widths Less Than 5m)		Not Stope-able (Requires Widths Less Than 5m)	
0.6 - 1.0	2	5.5	6.5	6.5	5.5
1.0 - 2.0	3	7	8	8	7
2.0 - 4.0	4	10	11.5	11.5	10
4.0 - 10.0	5	15	17	17	15
> 10.0	6	25	20	31	20

* Assumes 30m Stope Heights

Table 8-5A. Overbreak & Slough Estimates at Stope Widths of 10 meters
Aranzazu Mine, Aura Minerals, Inc., 2017

GMT	Q - Prime	Empirical Estimation of Overbreak & Slough For Unsupported Hangingwall		
		Stope Width (m)	*Equivalent Length of Estimated Overbreak (m)	++Equivalent Length of Additional Slough (m)
1	< 0.6	Not Stope-able		
2	0.6 - 1.0	10.0	2.0	1.5
3	1.0 - 2.0	10.0	2.0	0.5
4	2.0 - 4.0	10.0	1.0	< 0.5
5	4.0 - 10.0	10.0	< 0.5	< 0.5
6	> 10.0	10.0	< 0.5	< 0.5

*Breakage Beyond the Blast Line
++ Nominal 50% of the Maximum Depth of Collapse

Table 8-5B. Overbreak & Slough Estimates at Stope Widths of 12.5 meters
Aranzazu Mine, Aura Minerals, Inc., 2017

GMT	Q - Prime	Empirical Estimation of Overbreak & Slough For Unsupported Hangingwall		
		Stope Width (m)	*Equivalent Length of Estimated Overbreak (m)	++Equivalent Length of Additional Slough (m)
1	< 0.6	Not Stope-able		
2	0.6 - 1.0	12.5	2.0	2.0
3	1.0 - 2.0	12.5	2.0	0.5
4	2.0 - 4.0	12.5	1.0	0.5
5	4.0 - 10.0	12.5	< 0.5	< 0.5
6	> 10.0	12.5	< 0.5	< 0.5

*Breakage Beyond the Blast Line
++ Nominal 50% of the Maximum Depth of Collapse

Table 8-5C. Overbreak & Slough Estimates at Stope Widths of 15 meters
Aranzazu Mine, Aura Minerals, Inc., 2017

GMT	Q - Prime	Empirical Estimation of Overbreak & Slough For Unsupported Hangingwall		
		Stope Width (m)	*Equivalent Length of Estimated Overbreak (m)	++Equivalent Length of Additional Slough (m)
1	< 0.6	Not Stope-able		
2	0.6 - 1.0	15.0	2.0	3.0
3	1.0 - 2.0	15.0	2.0	1.0
4	2.0 - 4.0	15.0	1.0	0.5
5	4.0 - 10.0	15.0	< 0.5	< 0.5
6	> 10.0	15.0	< 0.5	< 0.5

*Breakage Beyond the Blast Line
++ Nominal 50% of the Maximum Depth of Collapse

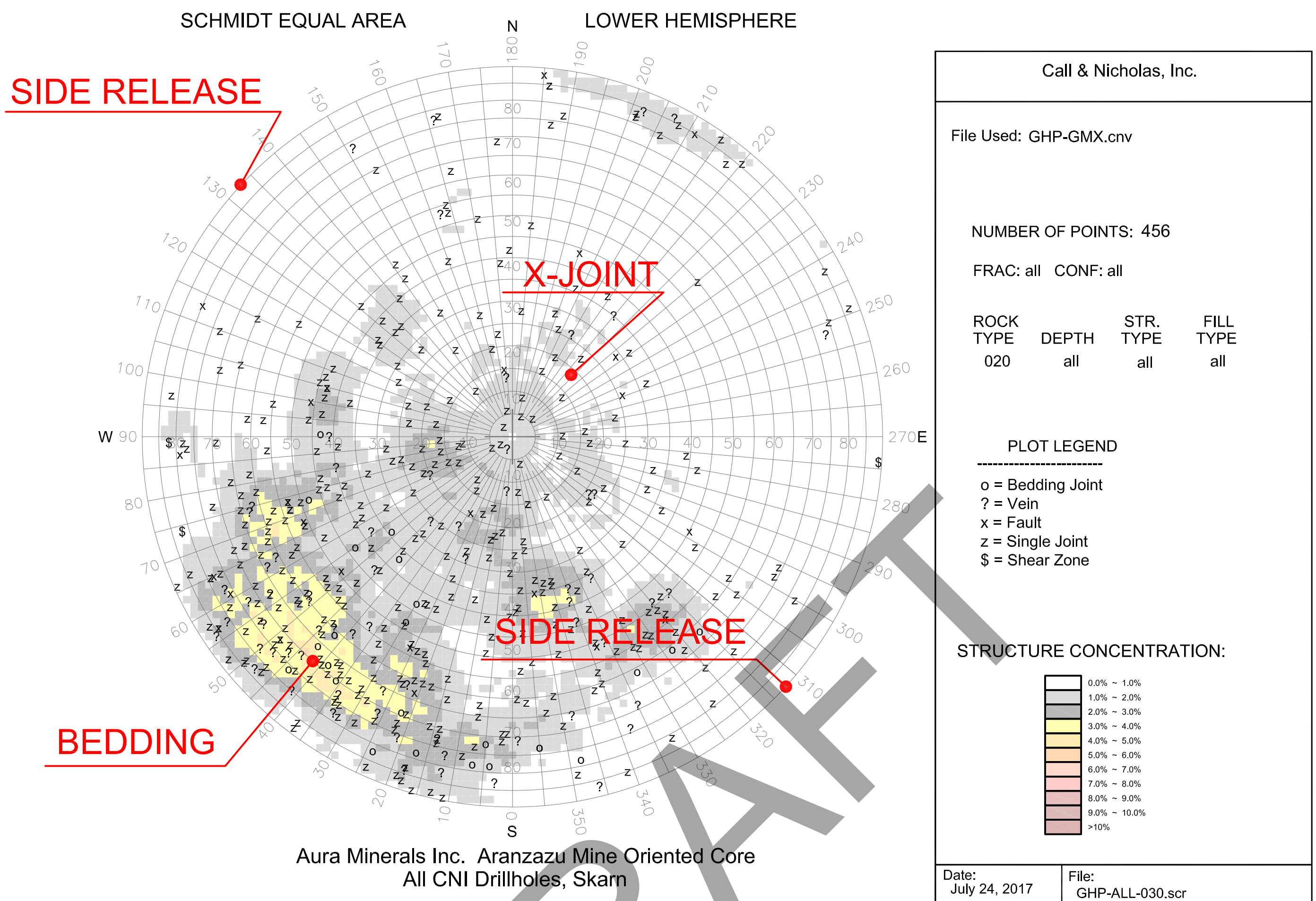
Table 8-6. Stope Rib Pillar Rock Mass Strengths
Aranzazu Mine, Aura Minerals, Inc., 2017

Intact Shear Strength		Fracture Shear Strength		Estimated Rock-Mass Shear Strength		
Φ (deg)	**C (MPa)**	**Φ (deg)**	**C (kPa)**	**RQD (%)**	**Φ (deg)**	**C (MPa)**
52.7	11.6	27.4	55.2	**20**	**33.8**	**0.5**
52.7	11.6	27.4	55.2	**25**	**34.3**	**0.6**
52.7	11.6	27.4	55.2	**30**	**34.8**	**0.7**
52.7	11.6	27.4	55.2	**35**	**35.3**	**0.8**
52.7	11.6	27.4	55.2	**40**	**35.9**	**0.9**
52.65	11.6	27.39	55.2	**45**	**36.5**	**1.0**
52.65	11.6	27.39	55.2	**50**	**37.1**	**1.1**
52.65	11.6	27.39	55.2	**55**	**37.8**	**1.3**
52.65	11.6	27.39	55.2	**60**	**38.5**	**1.4**
52.65	11.6	27.39	55.2	**65**	**39.3**	**1.6**
52.65	11.6	27.39	55.2	**70**	**40.1**	**1.8**
52.65	11.6	27.39	55.2	**75**	**40.9**	**2.1**
52.65	11.6	27.39	55.2	**80**	**41.8**	**2.4**
52.65	11.6	27.39	55.2	**85**	**42.7**	**2.7**
52.65	11.6	27.39	55.2	**90**	**43.6**	**3.1**

Table 8-7. Access Pillar Rock Mass Strengths

Aranzazu Mine, Aura Minerals, Inc., 2017

Intact Shear Strength		**Fracture Shear Strength**		**Estimated Rock-Mass Shear Strength**		
Φ (deg)	**C (MPa)**	**Φ (deg)**	**C (kPa)**	**RQD (%)**	**Φ (deg)**	**C (MPa)**
42.8	15.1	25.2	44.9	**20**	**29.1**	**0.7**
42.8	15.1	25.2	44.9	**25**	**29.4**	**0.8**
42.8	15.1	25.2	44.9	**30**	**29.8**	**0.9**
42.8	15.1	25.2	44.9	**35**	**30.1**	**1.0**
42.8	15.1	25.2	44.9	**40**	**30.5**	**1.1**
42.83	15.1	25.16	44.9	**45**	**30.9**	**1.2**
42.83	15.1	25.16	44.9	**50**	**31.3**	**1.4**
42.83	15.1	25.16	44.9	**55**	**31.7**	**1.6**
42.83	15.1	25.16	44.9	**60**	**32.2**	**1.8**
42.83	15.1	25.16	44.9	**65**	**32.7**	**2.1**
42.83	15.1	25.16	44.9	**70**	**33.3**	**2.4**
42.83	15.1	25.16	44.9	**75**	**33.8**	**2.7**
42.83	15.1	25.16	44.9	**80**	**34.5**	**3.1**
42.83	15.1	25.16	44.9	**85**	**35.1**	**3.5**
42.83	15.1	25.16	44.9	**90**	**35.8**	**4.0**



Joint Set	Dip Direction (Deg)	Strike (Deg)	Dip (Deg)
Bedding	43	313	72
X-Joint	223	133	18
Side Release	133	43	90
Side Release	313	223	90

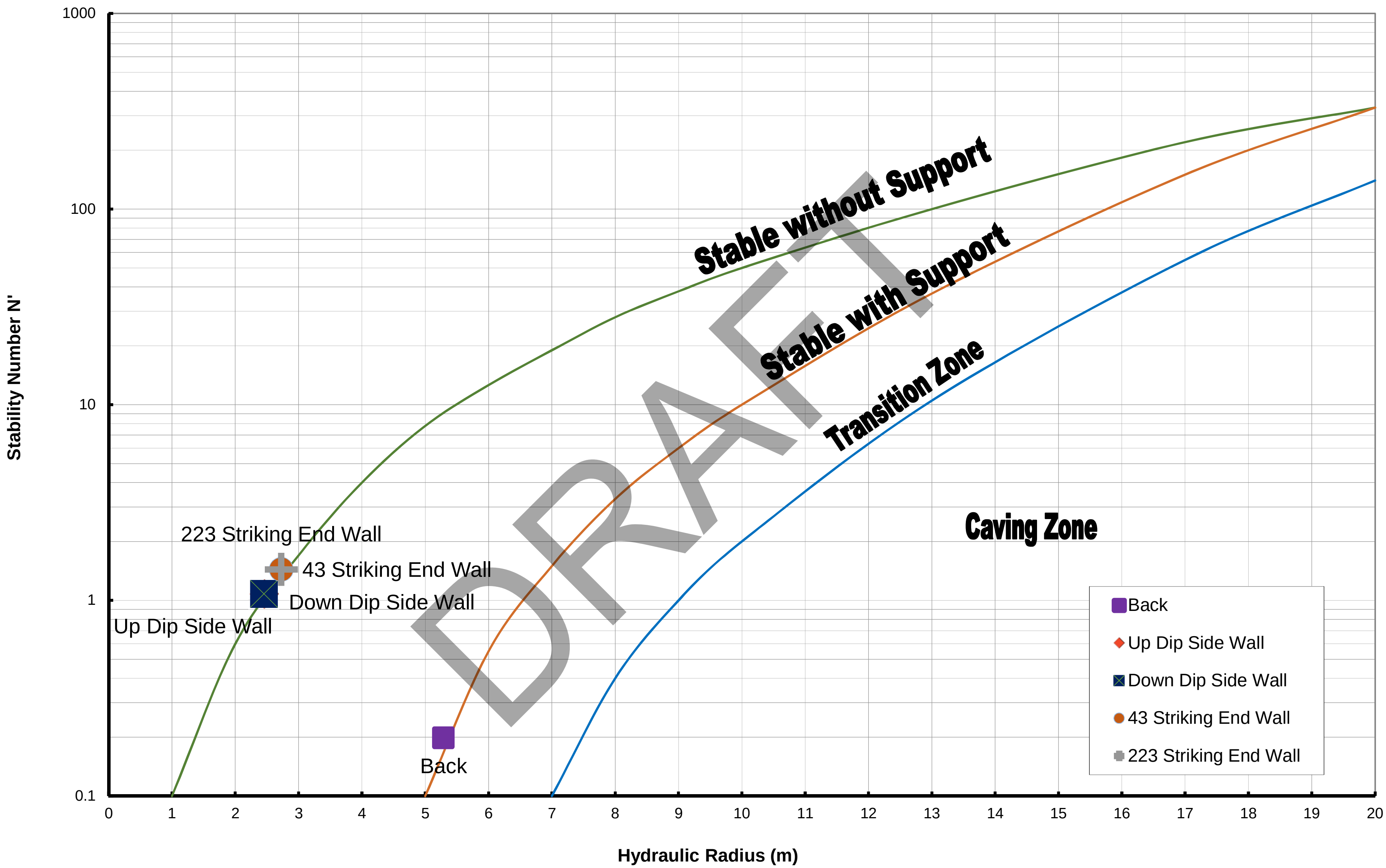


Figure 8-2A. Stability Graph Results for GMT 2 (Q' = 0.6); Longitudinal Mining

Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

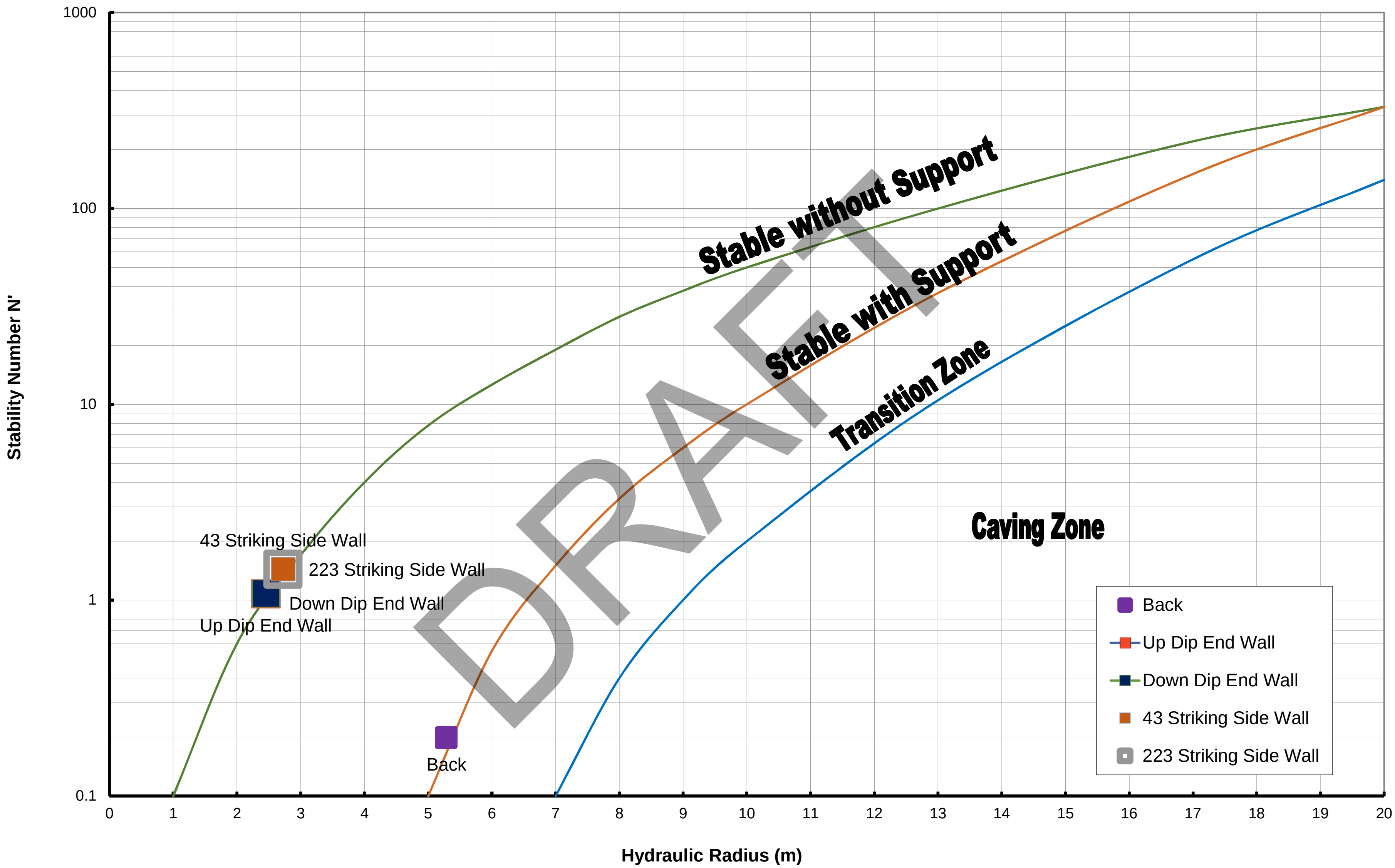


Figure 8-2B. Stability Graph Results for GMT 2 (Q' = 0.6); Transverse Mining
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

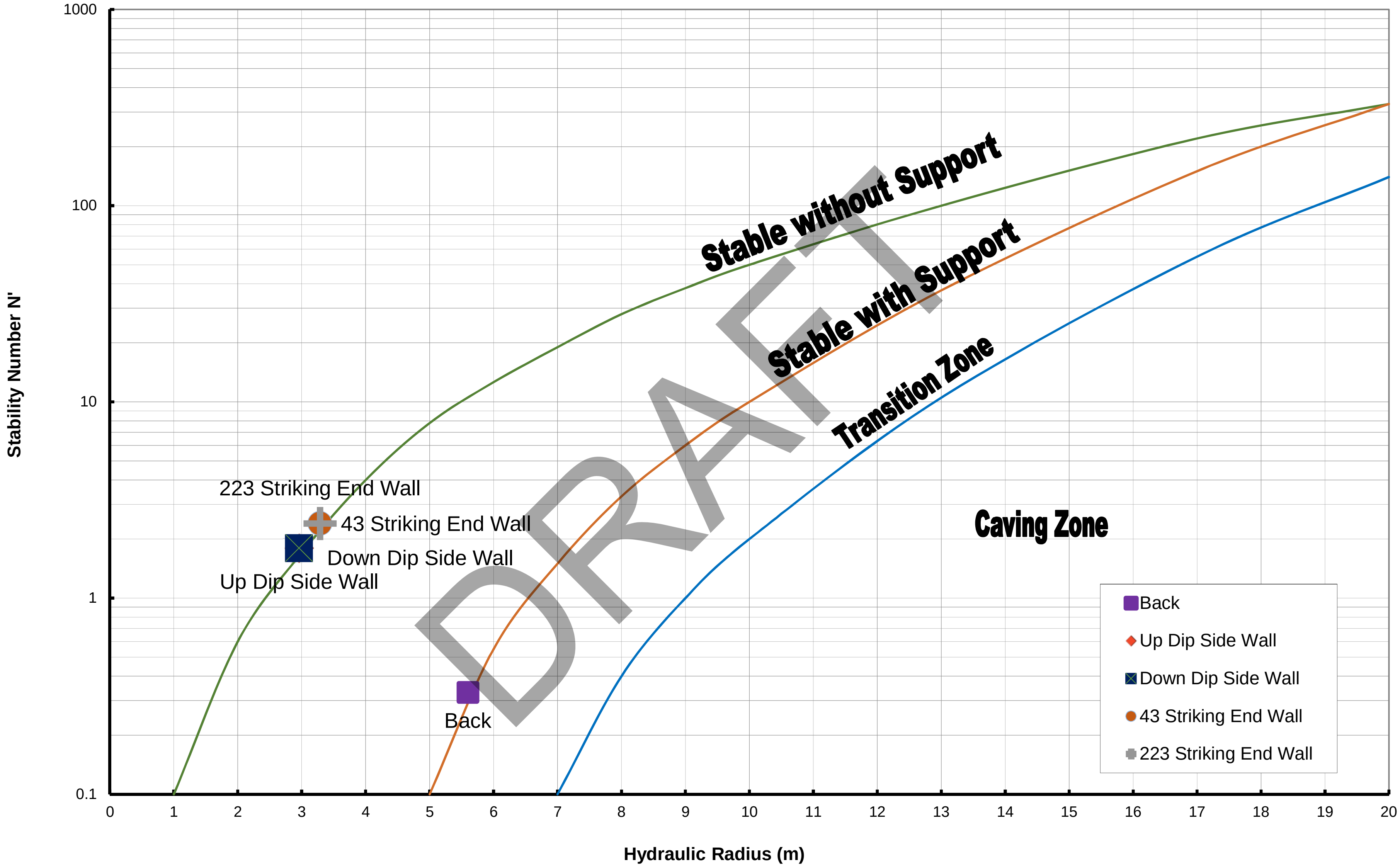


Figure 8-3A. Stability Graph Results for GMT 3 (Q' = 1.0); Longitudinal Mining
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

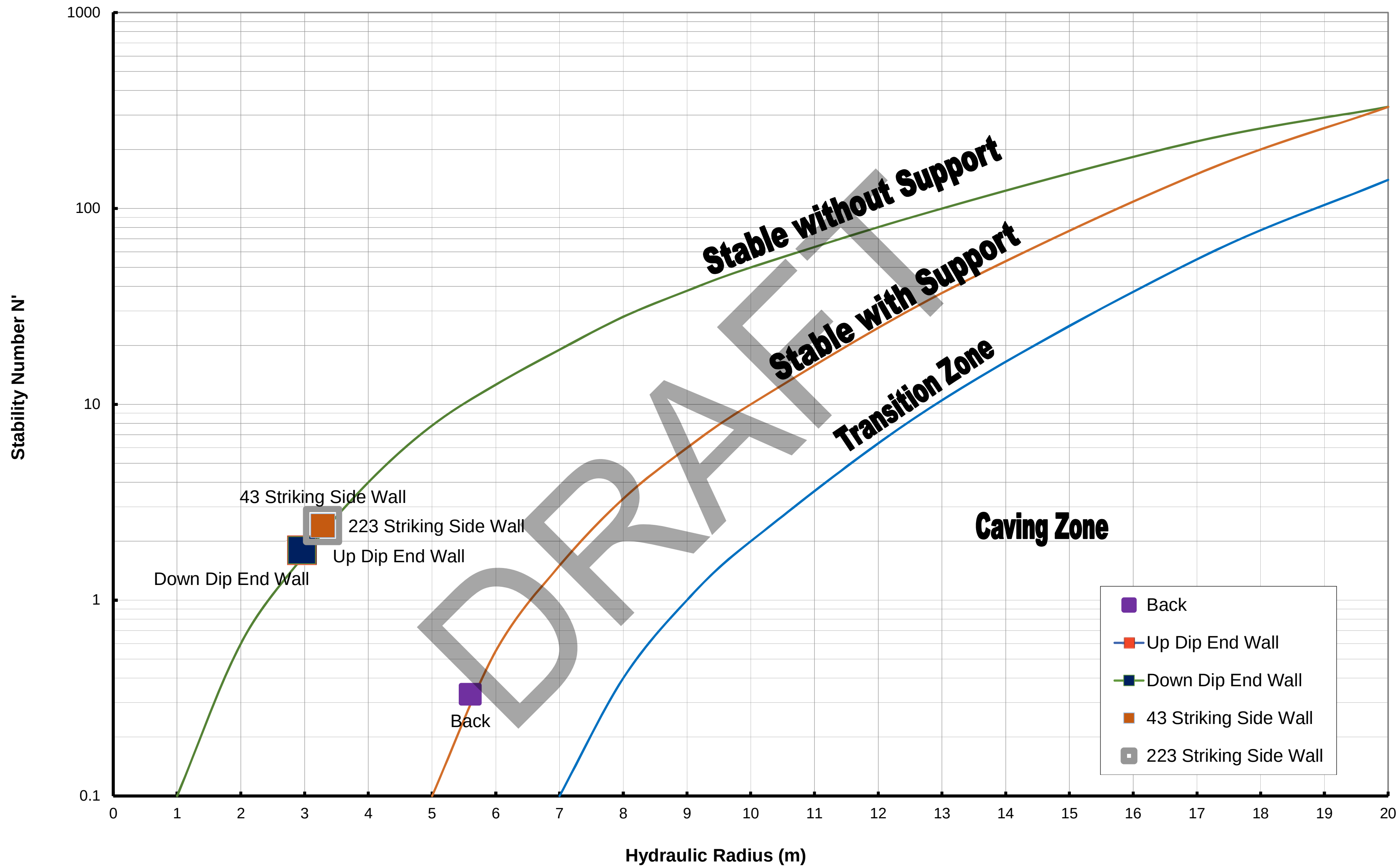


Figure 8-3B. Stability Graph Results for GMT 3 (Q' = 1.0); Transverse Mining
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

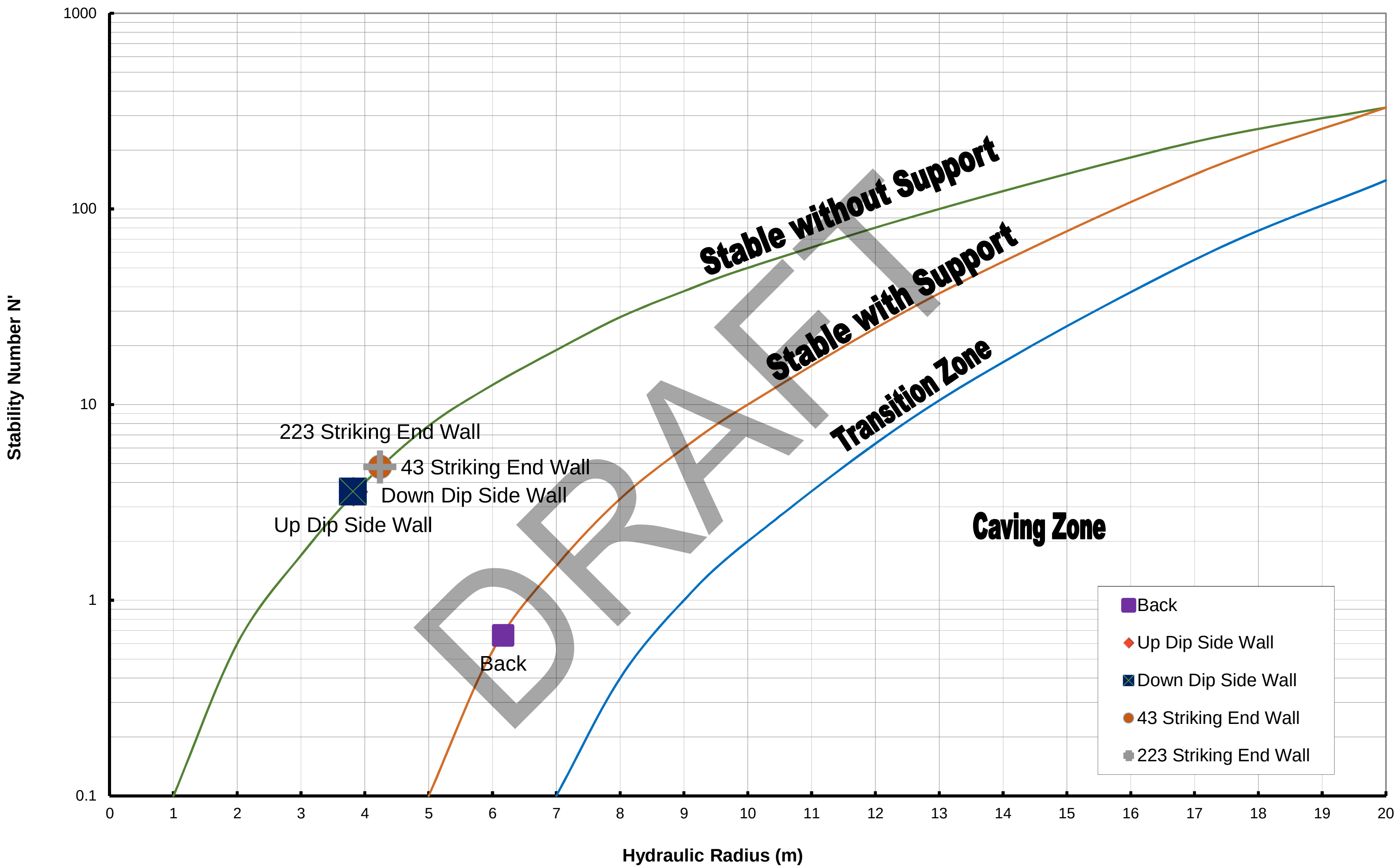


Figure 8-4A. Stability Graph Results for GMT 4 (Q' = 2.0); Longitudinal Mining
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

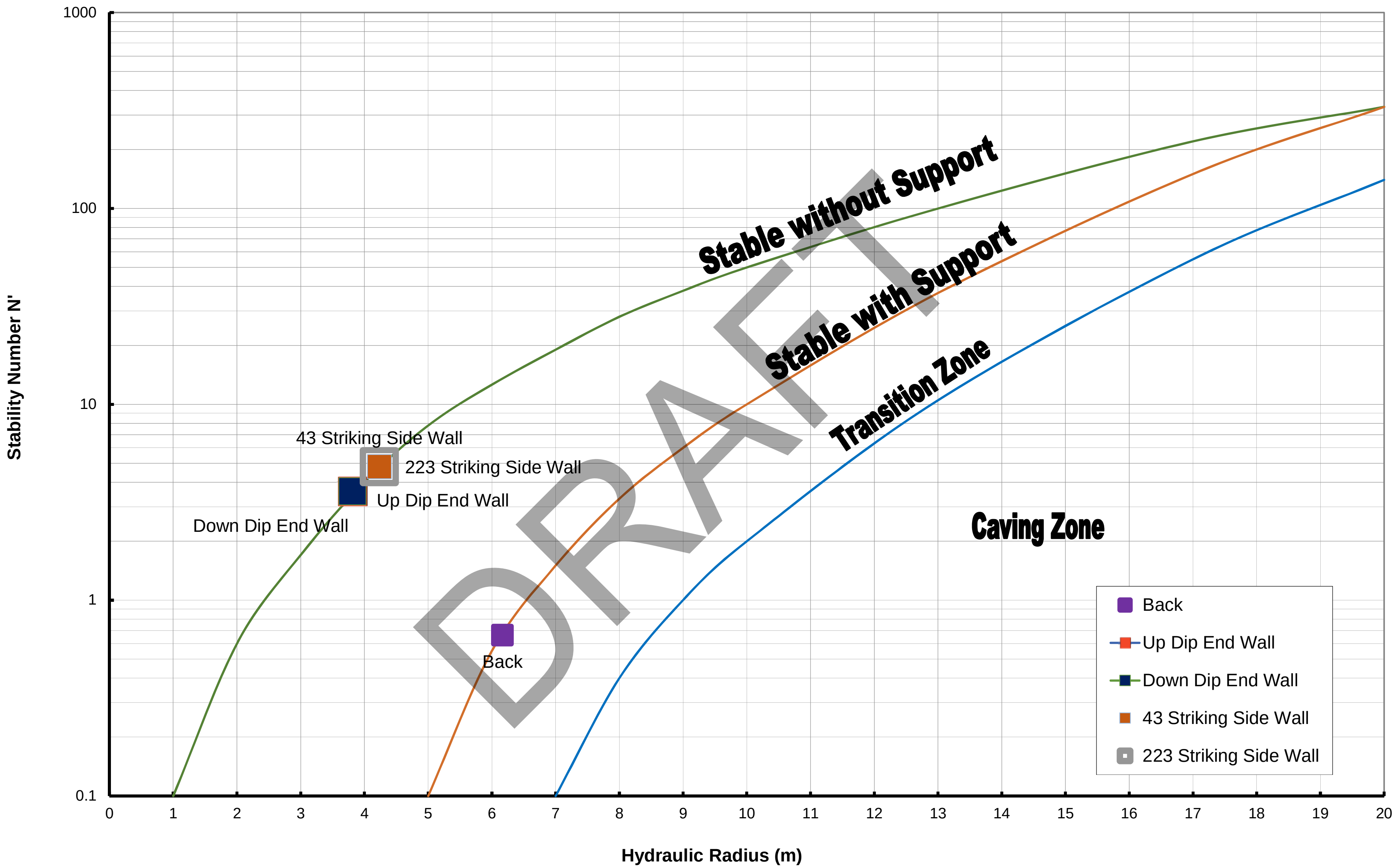


Figure 8-4B. Stability Graph Results for GMT 4 (Q' = 2.0); Transverse Mining
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

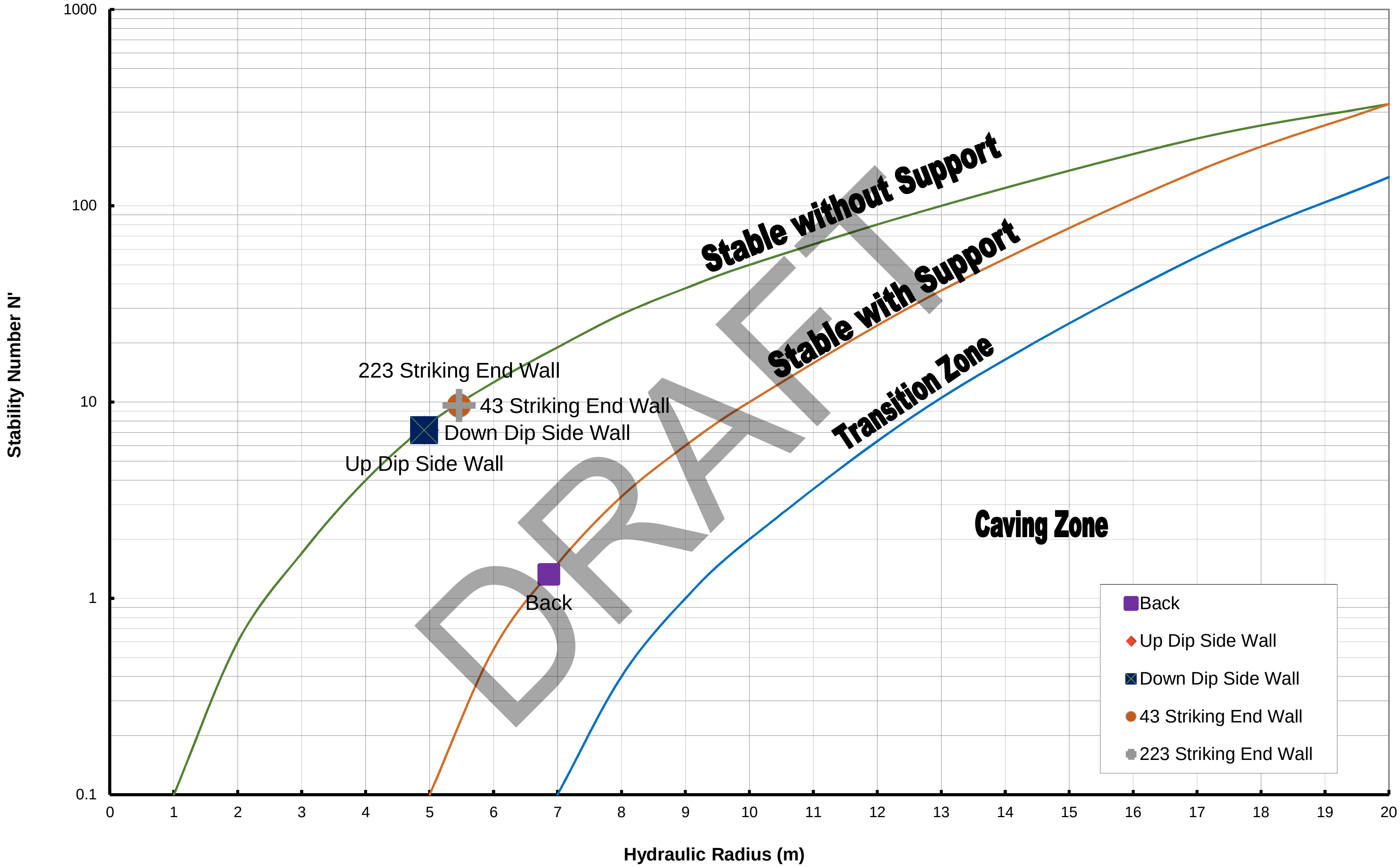


Figure 8-5A. Stability Graph Results for GMT 5 (Q' = 4.0); Longitudinal Mining
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

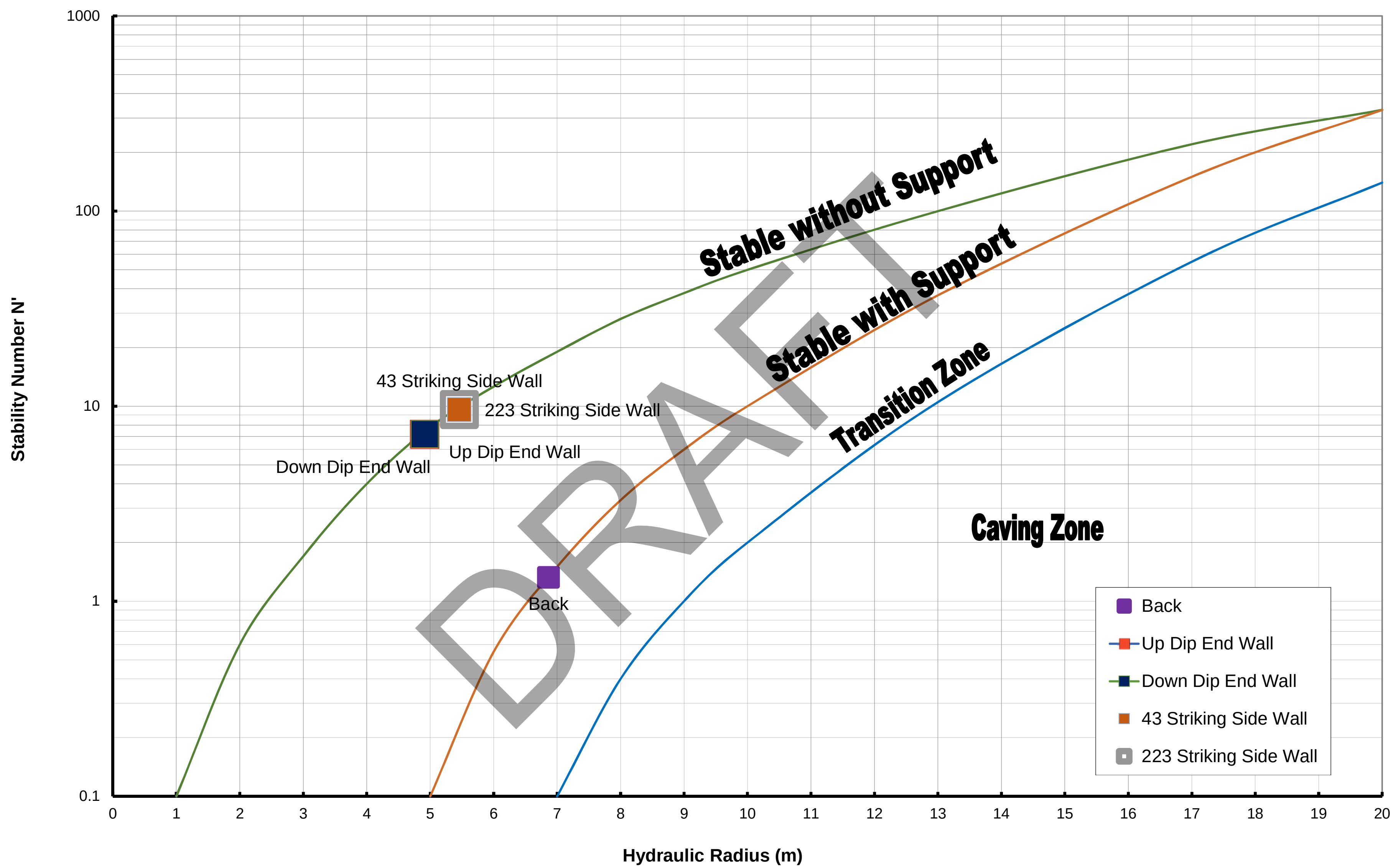


Figure 8-5B. Stability Graph Results for GMT 5 (Q' = 4.0); Transverse Mining
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

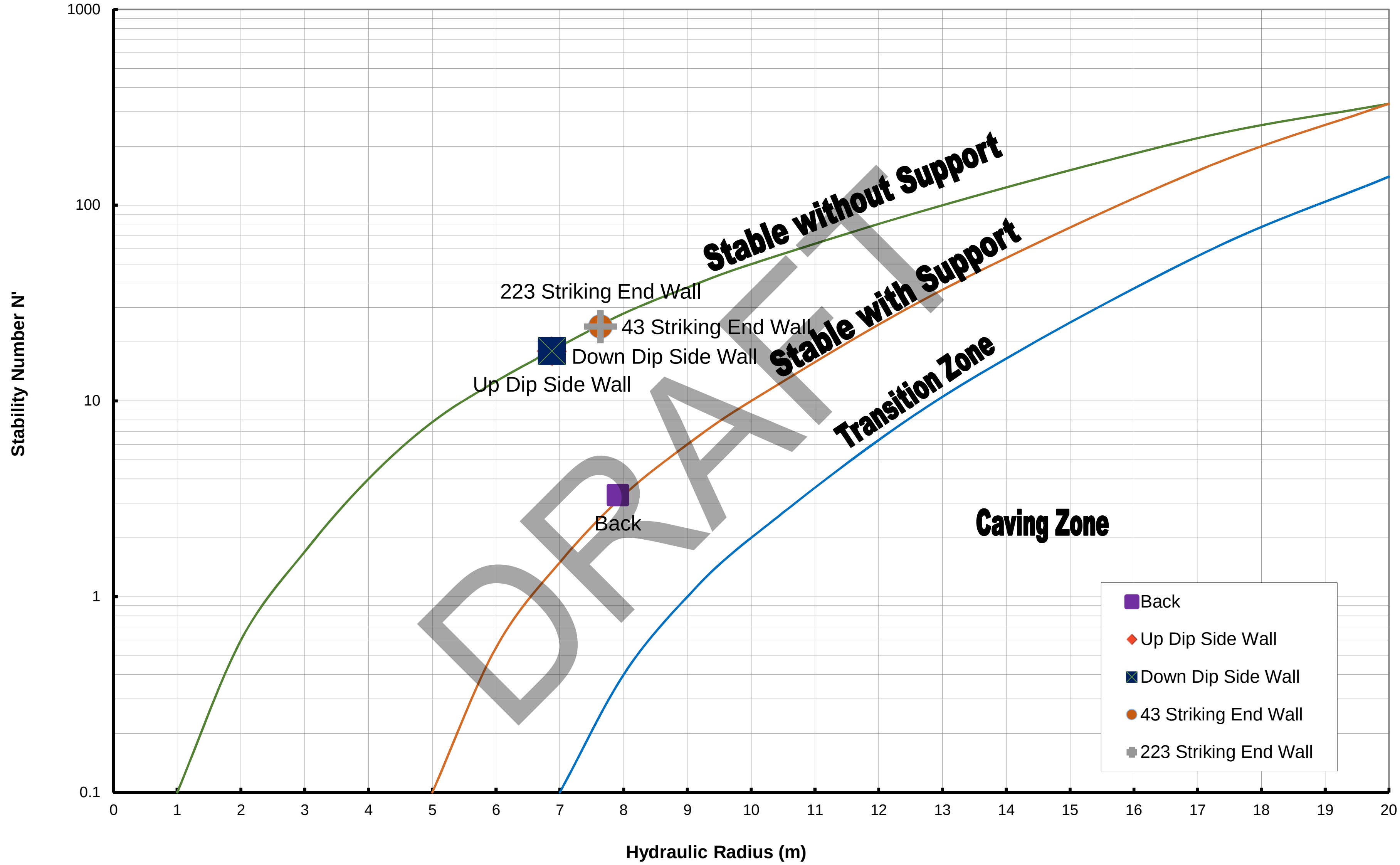


Figure 8-6A. Stability Graph Results for GMT 6 (Q' = 10.0); Longitudinal Mining
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

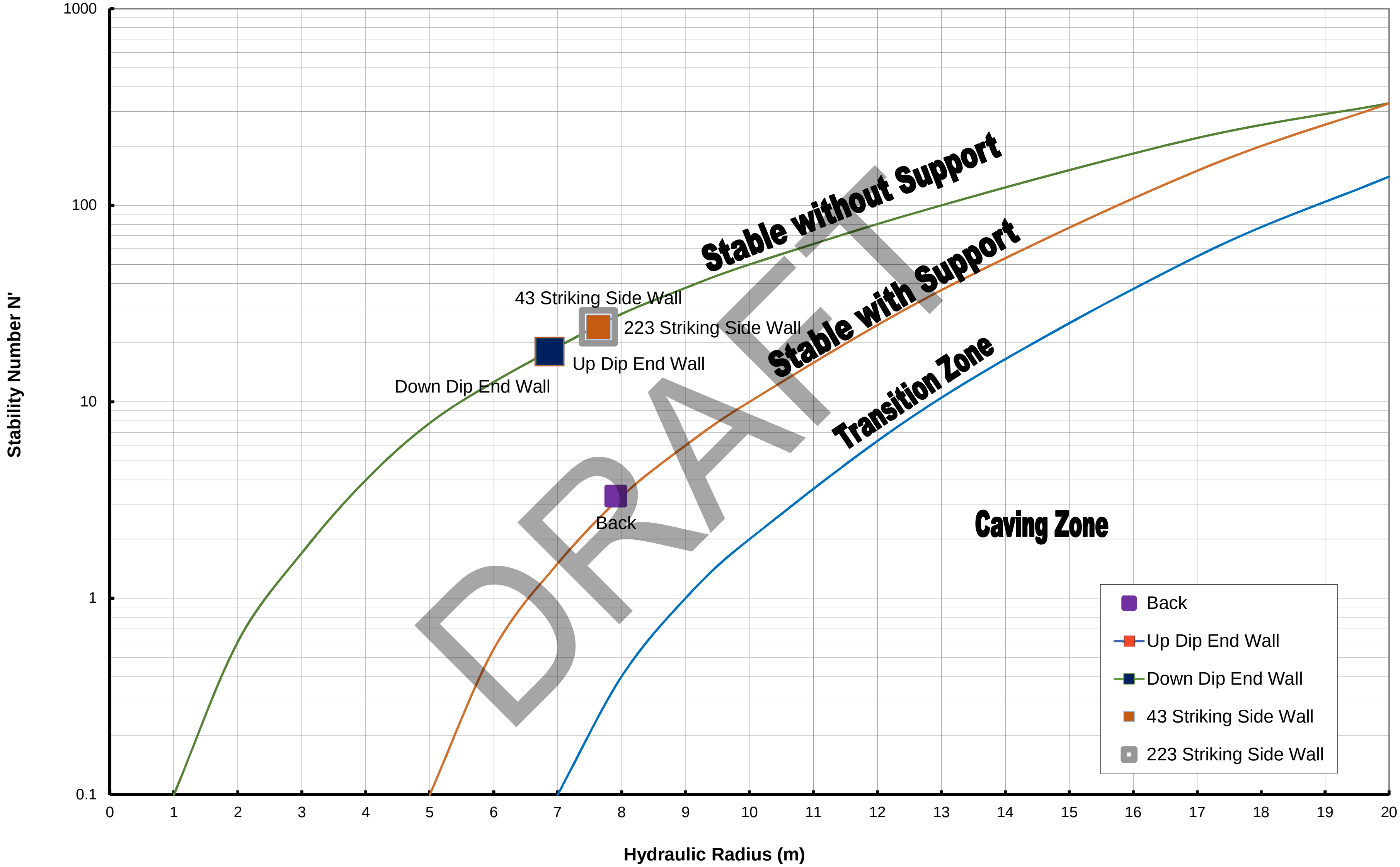


Figure 8-6B. Stability Graph Results for GMT 6 (Q' = 10.0); Transverse Mining
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

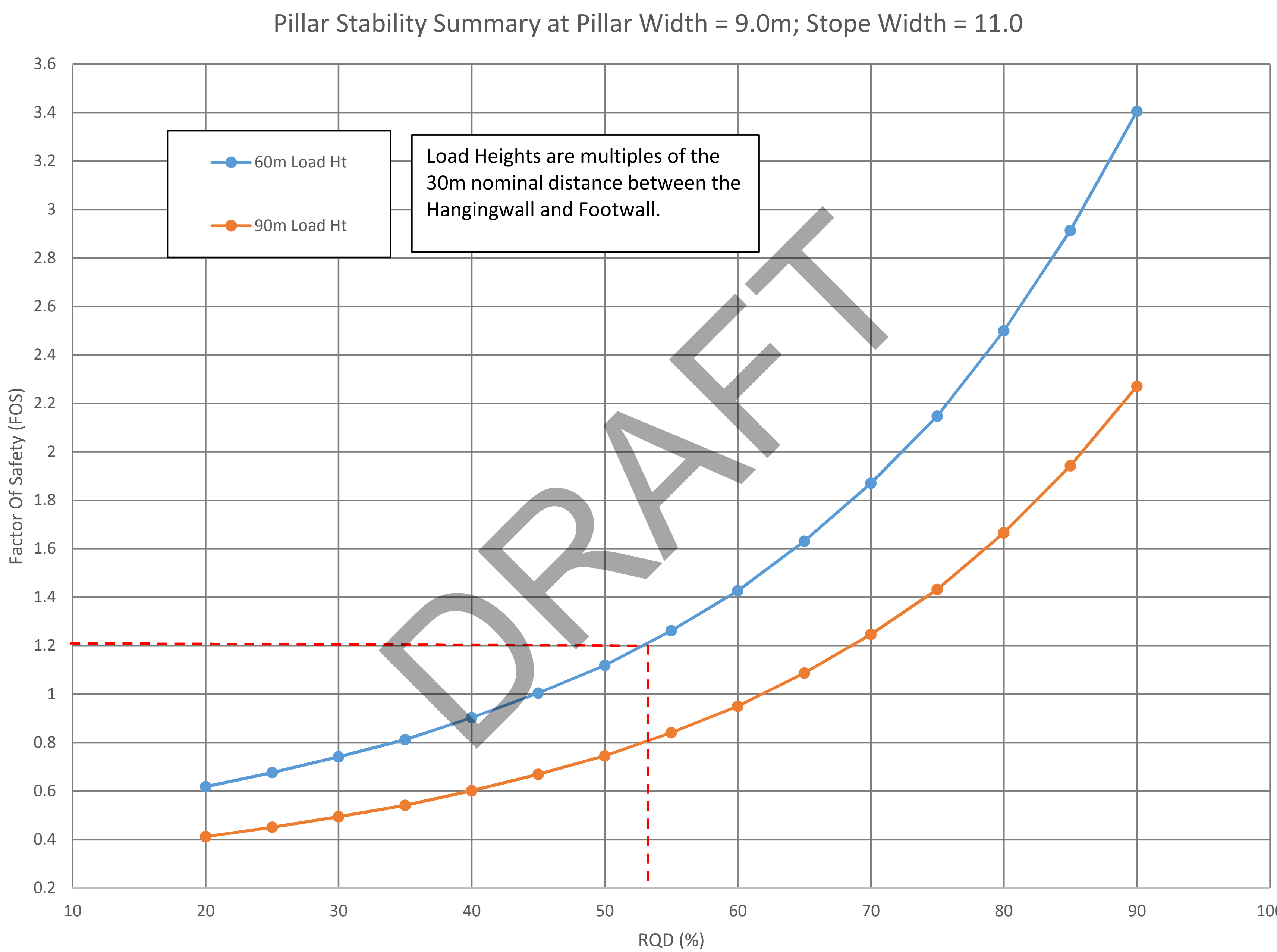


Figure 8-7. Stope Rib Pillar Stability Results
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

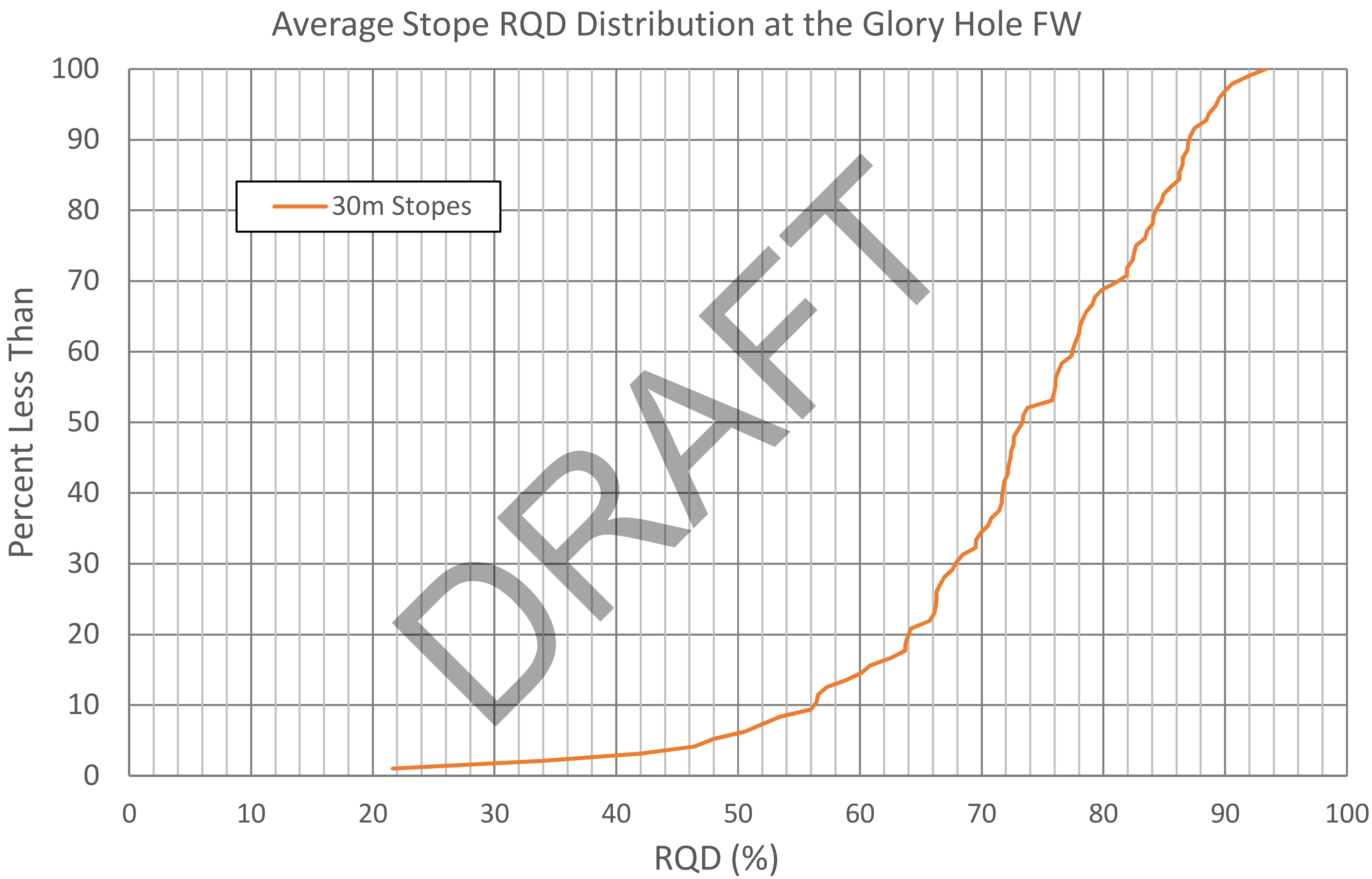


Figure 8-8. Average Stope RQD Distribution at the Glory Hole FW
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

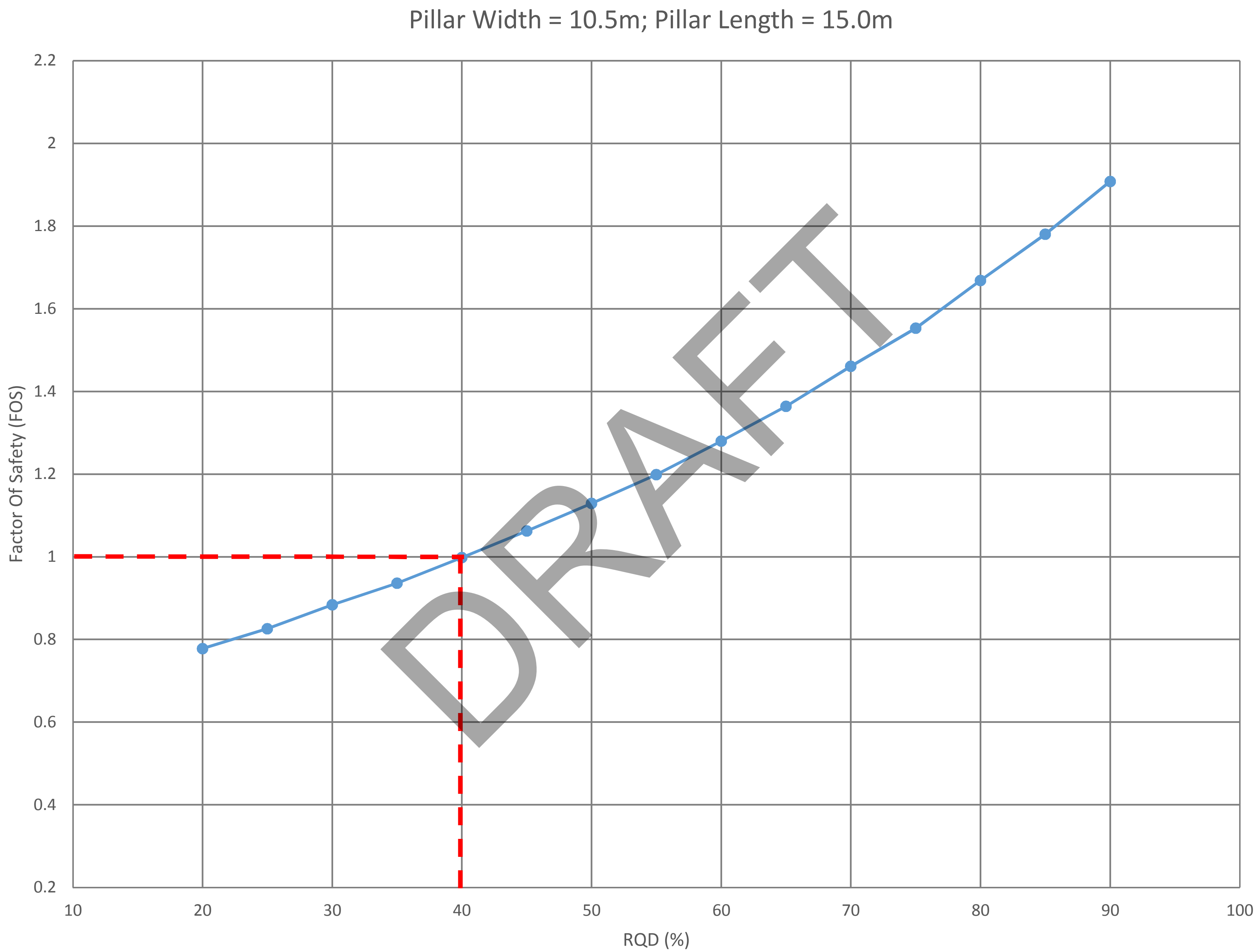


Figure 8-9. Access Pillar Stability Results
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

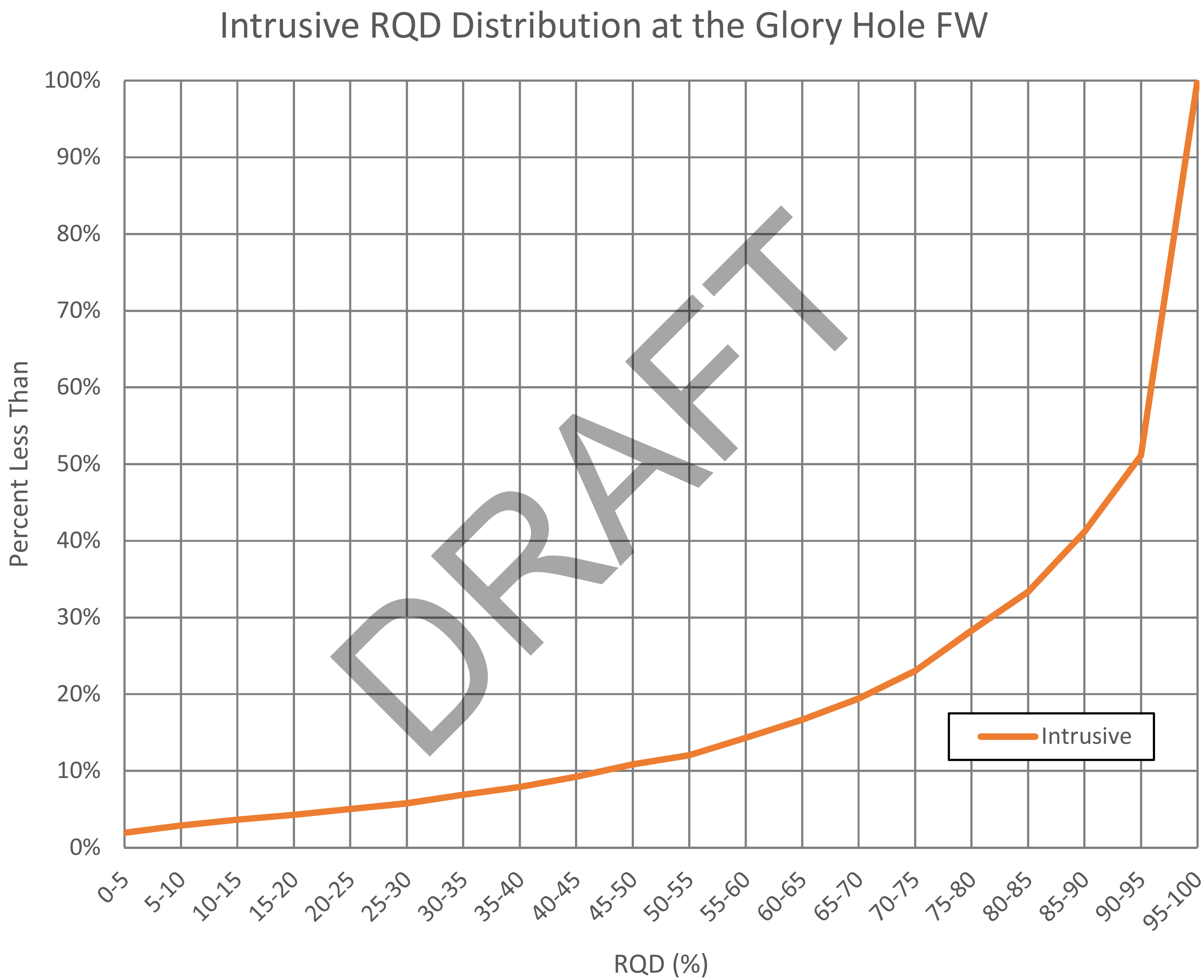


Figure 8-10. Intrusive RQD Distribution at the Glory Hole FW
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

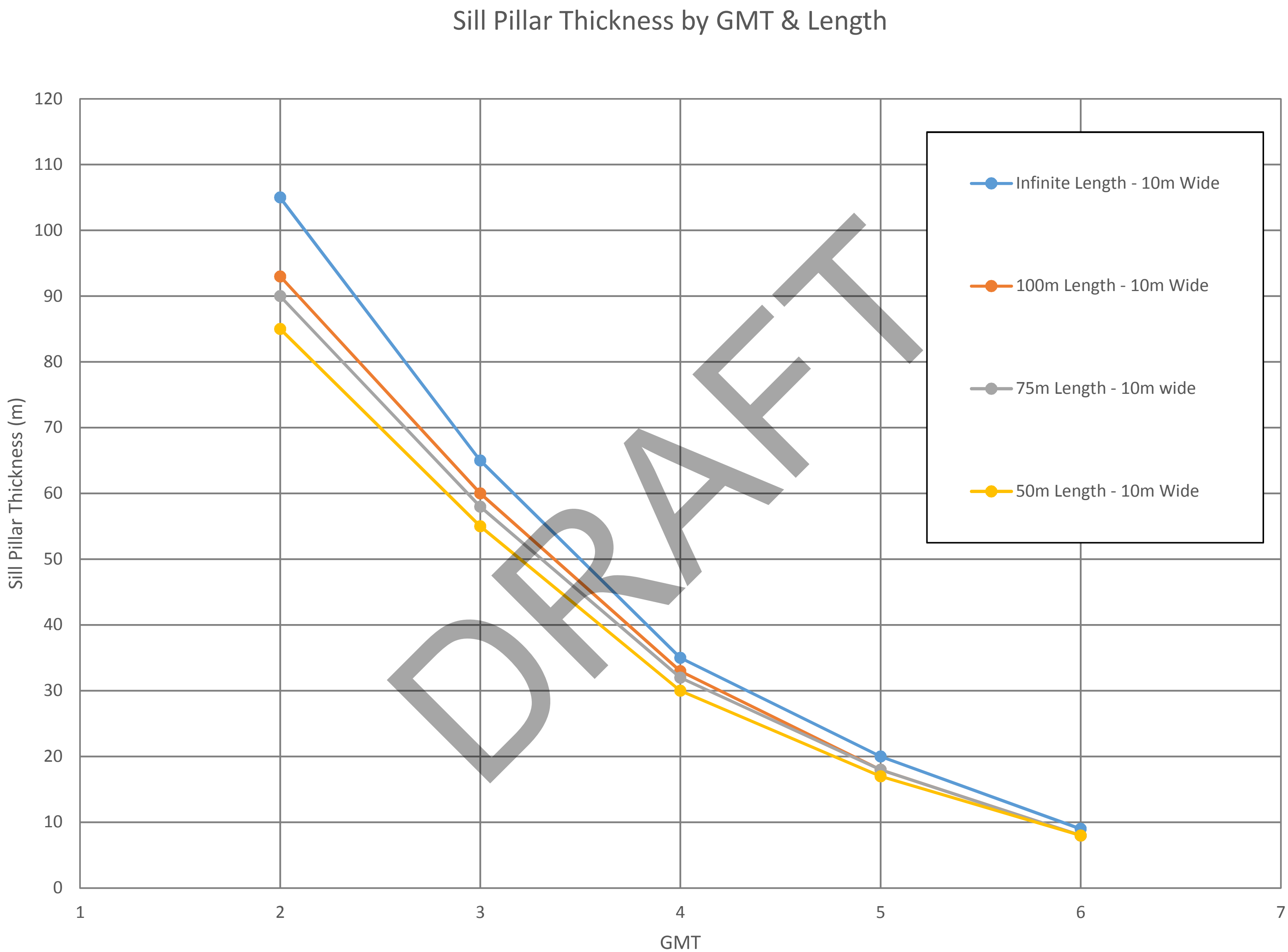


Figure 8-11. Sill Pillar Thickness by GMT
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

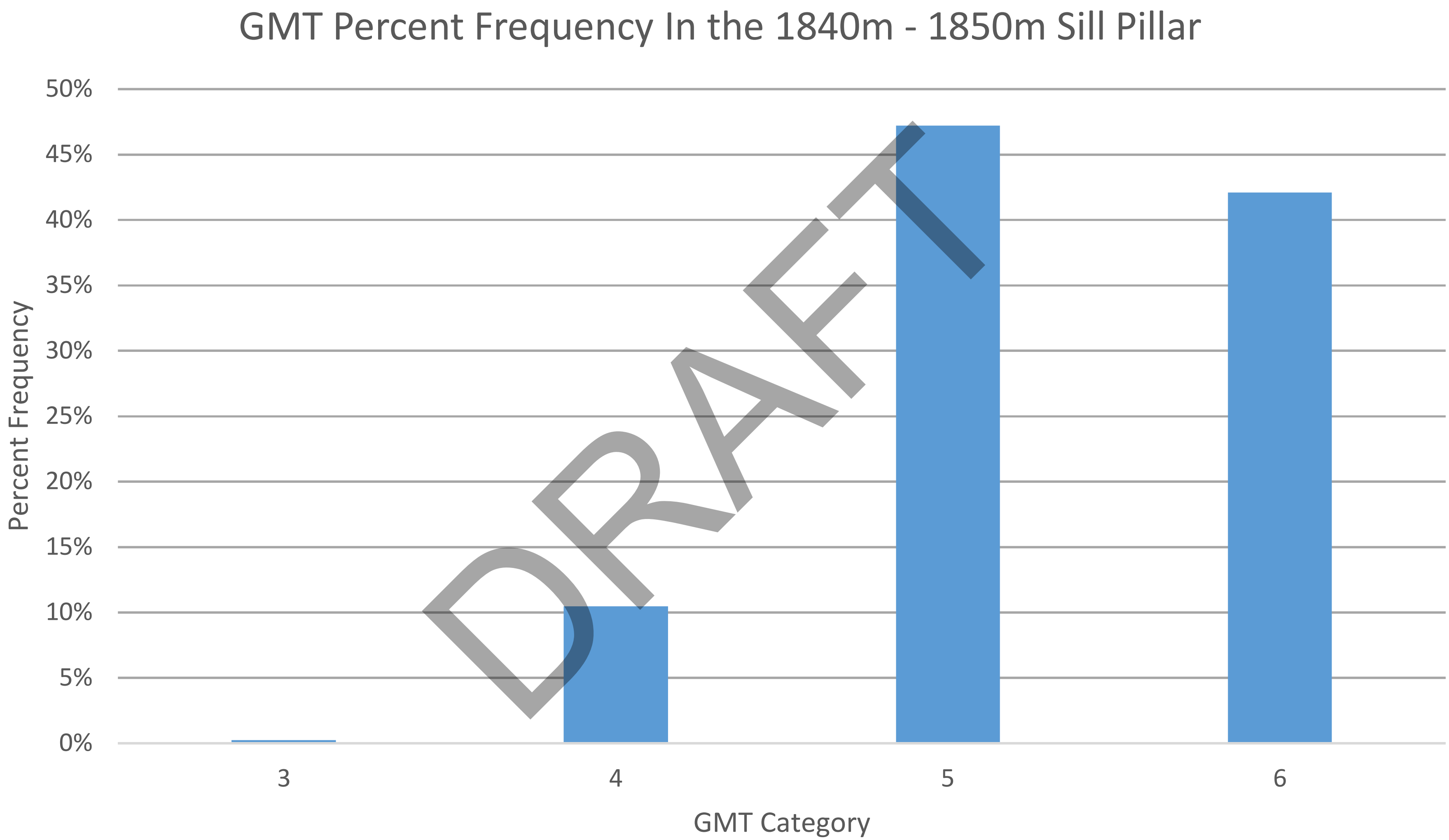


Figure 8-12. GMT Percent Frequency in the 1840m - 1850m Sill Pillar
Aranzazu Mine, Aura Minerals Inc., 2017

CALL & NICHOLAS, INC.

9.0 GROUND SUPPORT AND BACKFILL

Chapter 1 presents a concise summary for the ground support and backfill requirements. This chapter presents the analyses that support those recommendations.

9.1 <u>Ground Support Requirements</u>

The following subsections detail the ground support requirements for both development and production headings at Aranzazu.

9.1.1 Access (Development) Ground Support

Table 9-1 presents the ground support requirements for access (development) drifting at Aranzazu. Ground support requirements were evaluated using the ground reinforcement chart (Figure 9-1) based on the tunneling quality index *Q* developed by Grimstad and Barton. CNI has assumed an excavation support ratio (ESR) of 1.6, which is typical for permanent mine openings. The drift dimensions have been assumed to be 4.5 meters wide. CNI used the chart as a general guideline to estimate ground support requirements at each GMT category using the lower bound of Q’ from each GMT category. Based on CNI’s experience, a tighter density (bolt spacing) and a longer bolt length of 2.4 meters has been recommended. The 2.4-meter length bolt is the existing Aranzazu standard bolt length.

Because the development drifting is intended to be permanent infrastructure (open for durations in excess of a year), fully grouted resin rebar bolts are recommended over a friction-type bolt. Friction type bolts, such as Swellex or split sets, are susceptible to corrosion in environments which are rich in sulfide mineralization.

9.1.2 Stoping (Production) Ground Support

Table 9-2 presents the ground support requirements for stope (production) headings at Aranzazu. Again, ground support requirements were estimated using the ground reinforcement chart (Figure 9-1) based on the tunneling quality index *Q* developed by Grimstad and Barton. CNI has assumed an excavation support ratio (ESR) of 3.0, which is typical for temporary mine openings. CNI used the chart as a general guideline to estimate ground support requirements at the varying GMT (Q’) categories. The span dimension is the 10-meter stope width. Cable bolt support has been included in the recommendation at the request of AMI. Cable bolt length and spacing have been recommended based on the following rules of thumb:

1. Cable bolt length will be half the drift width (10-meter drift width = 5-meter cable length)
2. Cable bolt spacing will be half the cable length (5-meter cable length = 2.5-meter cable spacing)

Swellex, or friction type bolts, may be used in the stoping headings, because these drifts are not expected to be open for a long-term duration before they are mined through.

9.1.3 Fibercrete

Fibercrete has been recommended in development areas which might be open for an extended period of time. The thickness of the fibercrete decreases as the ground quality improves. In areas of extremely poor ground (Q' < 0.06 / GMT 1), advance should include in-cycle shotcrete (20 cm thickness), and spiling should be considered to pre-support the face.

9.2 Backfill Requirements

A primary/secondary stope sequence will be utilized to achieve nearly complete ore extraction at Aranzazu. As part of this stoping method, primary stopes will be backfilled with cemented rock backfill (CRF) following their excavation. These CRF stopes will become the sidewalls and pillars during the subsequent mining of secondary stopes. The secondary stopes can be filled with run of mine waste. Minimum backfill strengths, their corresponding cement contents, and aggregate recommendations are detailed in the following subsections.

9.2.1 Backfill for Primary Stoping

The following are the backfill requirements for primary stopes at Aranzazu:

1. The CRF should achieve a minimum 2.75 MPa compressive strength (UCS).
   a. CNI estimates a 5 percent Portland cement binder requirement
2. The water should be of potable quality.
3. The source aggregate will be unaltered and sulfide-free and have a UCS strength greater than or equal to 40 MPa.
4. The aggregate should be screened so that the material used is less than 2 inches (5 cm) but not less than 0.5 inches (1.25 cm). To achieve this:
   a. First screen the 2 inch (5 cm) passing material
   b. Then screen out the 0.5 inch (1.25 cm) passing material

9.2.2 Backfill Strength Requirements

Backfill quality can vary based on a number of factors: aggregate size distribution, water chemical composition, and mixing method. The cement estimates provided are based upon backfill strength results at similar stoping operations. However, to validate the design, diligent tracking of UCS strengths at 7- and 28-day cure times should be maintained to monitor backfill quality.

The strength of the CRF pillar must be adequate to sustain the overburden load of another CRF pillar (Figure 9-2). CRF pillar stability was evaluated using Wilson's Confined Core Pillar Analysis, which calculates the load carrying capacity (strength) of a pillar and the estimated load upon that pillar. The details of Wilson's Confined Core Pillar Analysis are presented in Section 8.2.1. CNI has assumed that the loading condition is that of a CRF filled stope with the top cut remaining open (Figure 9-2), for a full 25.5-meter height of CRF overburden. The density of the backfill was estimated at 2,563 kg/m^3. A 0.5 K-value has been assumed as the pre-mine stress state, because the backfill is placed within the stopes as a passive pressure.

The strength of the CRF pillar is a function of the CRF cohesion (c) and friction angle (ϕ). A 36-degree friction angle has been assumed, which is a standard friction angle for concrete. The cohesion was varied to meet the safety criteria (1.5 FOS). UCS strength can be calculated from the CRF cohesion using the following relationship:

$$\sigma_{cm} = 2c_m \tan(45 + \frac{\phi_m}{2})$$

Where:

σ_{cm} = UCS strength

C_m = Cohesion

Φ_m = Friction Angle

Figure 9-3 presents the relationship of safety factor plotted against CRF UCS strength for a 10 meter wide CRF pillar. A safety factor of 1.5 results in the recommended backfill strength of 2.75 MPa. A safety factor of 1.5 was used to account for spatial variation in the backfill quality when dumped into an open stope from 25.5 meters height.

If two CRF-filled stopes are stacked atop the active CRF pillar, then a higher-strength CRF of a minimum 9.3 MPa strength (~10 percent Portland cement content) will be required (Figure 9-2). The additional strength CRF is required to accommodate the additional loading condition (55 meters of CRF) being placed upon the active CRF pillar, as presented in Figure 9-2.

Table 9-1. Access Ground Support Requirements (4.5m Width)
Aranzazu Mine, Aura Minerals, Inc., 2017

GMT	Q - Prime	Support	Note
1	< 0.6	2.4m #5 Rebar on 1.2m Spacing & 200mm Fibercrete; Fully Encased Lattice Girders on 1.5m Centers	Ribs and Back; Lattice Girders and Spiling as Needed
2	0.6 - 1.0	2.4m #5 Rebar on 1.2m Spacing & 75mm Fibercrete	Ribs and Back
3	1.0 - 2.0	2.4m #5 Rebar on 1.2m Spacing & 75mm Fibercrete	Ribs and Back
4	2.0 - 4.0	2.4m #5 Rebar on 1.2m Spacing & 50mm Fibercrete	Ribs and Back
5	4.0 - 10.0	2.4m #5 Rebar on 1.4m Spacing & 10cm / 6Ga. Welded Wire Mesh	Ribs and Back
6	> 10.0	2.4m #5 Rebar on 1.8m Spacing & 10cm / 6Ga. Welded Wire Mesh	Back Only

Table 9-2. Stoping Ground Support Requirements
Aranzazu Mine, Aura Minerals, Inc., 2017

GMT	**Q - Prime**	**Stope Ground Support Summary**	
		Width (m)	**Support**
1	< 0.6	Not to be Stoped	
2	0.6 - 1.0	Not to be Stoped	
3	1.0 - 2.0	Not to be Stoped	
4	2.0 - 4.0	10.0	2.4m Rebar / Std. Swellex on 1.2m Spacing & 5m cable bolts on 2.5m Spacing
5	4.0 - 10.0	10.0	3.2m Rebar / Std. Swellex on 1.6m Spacing & 5m cable bolts on 2.5m Spacing
6	> 10.0	10.0	3.2m Rebar / Std. Swellex on 1.6m Spacing & 5m cable bolts on 2.5m Spacing

*All Bolting is Pattern Bolted with 10cm / 6Ga. Welded Wire Mesh

Ground Support Estimation

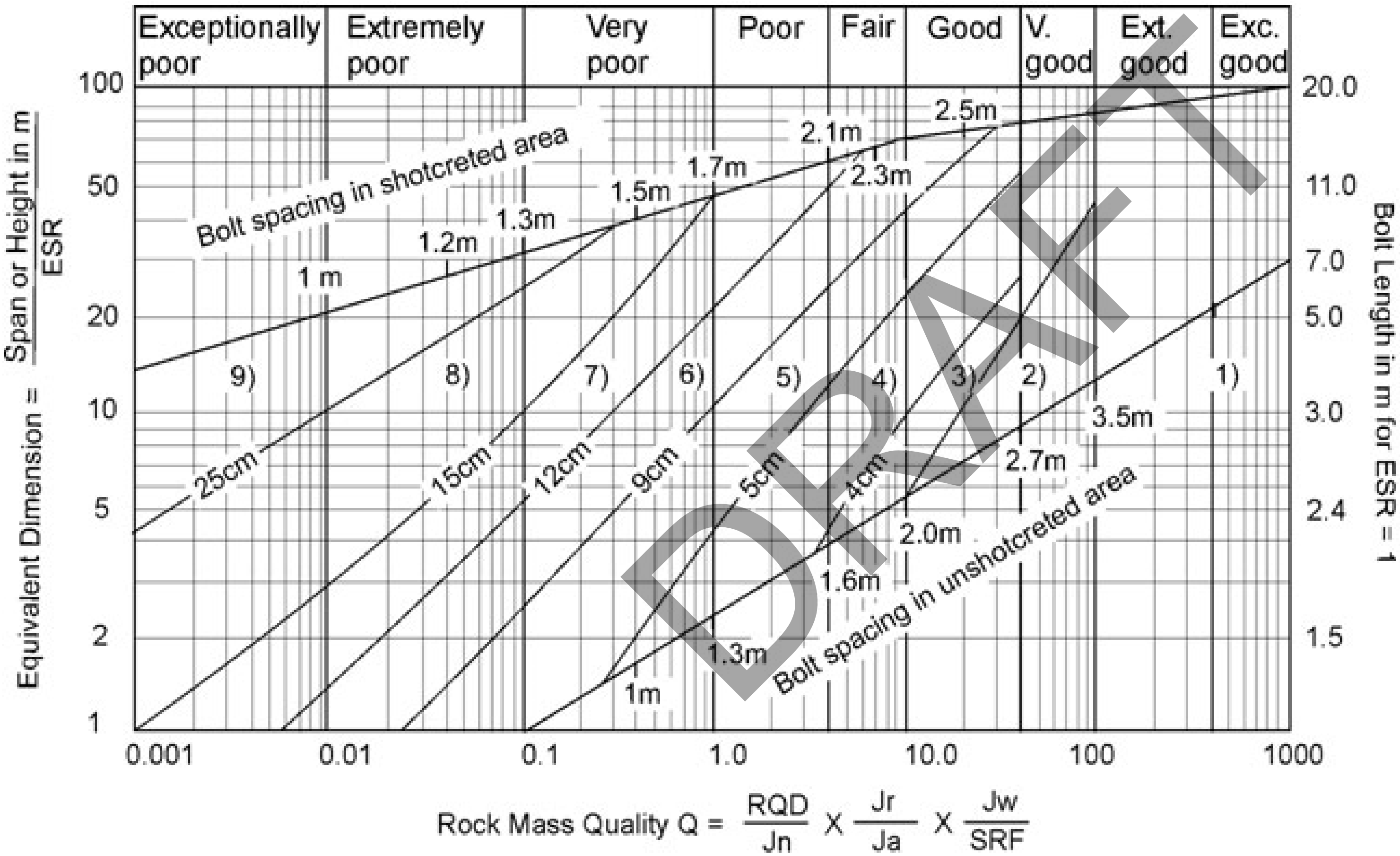
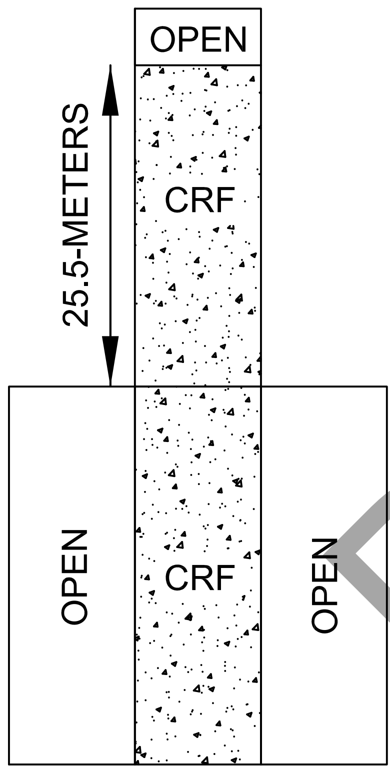


Figure 9-1. Ground Support Chart

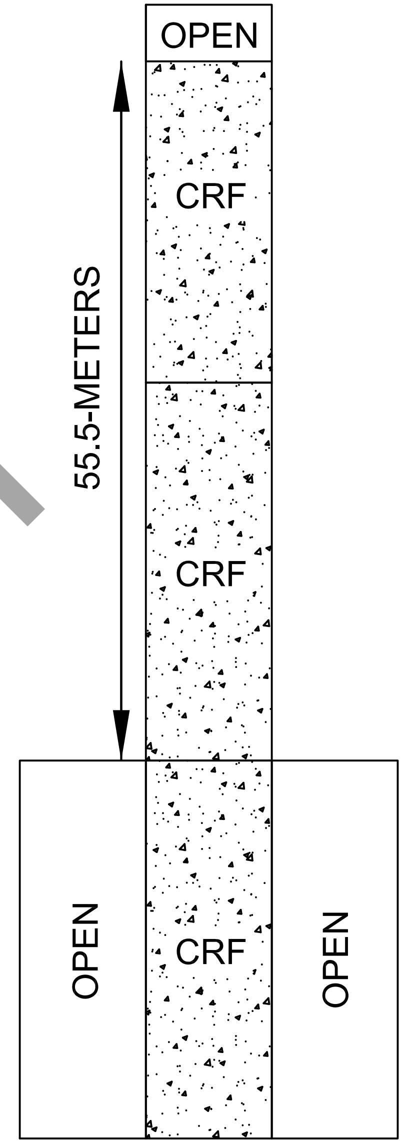
4.5 m drift (in Accesses)
ESR = 1.6
2.4m long bolts
10.0m drift (in Stopes)
ESR = 3.0
Bolt lengths Vary

REINFORCEMENT CATEGORIES

1) Unsupported
2) Spot bolting, sb
3) Systematic bolting, B
4) Systematic bolting (and unreinforced shotcrete, 4-10cm, B(+S)
5) Fiber reinforced shotcrete and bolting, 5-9cm, Sfr+B
6) Fiber reinforced shotcrete and bolting, 9 - 12cm, Sfr+B
7) Fiber reinforced shotcrete and bolting, 12 - 15cm, Sfr+B
8) Fiber reinforced shotcrete > 15cm, reinforced ribs of shotcrete and bolting, Sfr, RRS+B
9) Cast concrete lining,CCA



SINGLE CRF PILLAR OVERBURDEN



DOUBLE CRF PILLAR OVERBURDEN

LEGEND

CALL & NICHOLAS, INC.
TUCSON, ARIZONA USA

CRF PILLAR LOADING SCENARIOS

ARANZAZU

DRAWN RWC	DATE 10/17	REVISED 10/12/2017 12:53 PM	SCALE N.T.S.	FIGURE 9-2

\2017_REPORT\FIGURES\FIG9-2_CRF_PILLARS.DWG

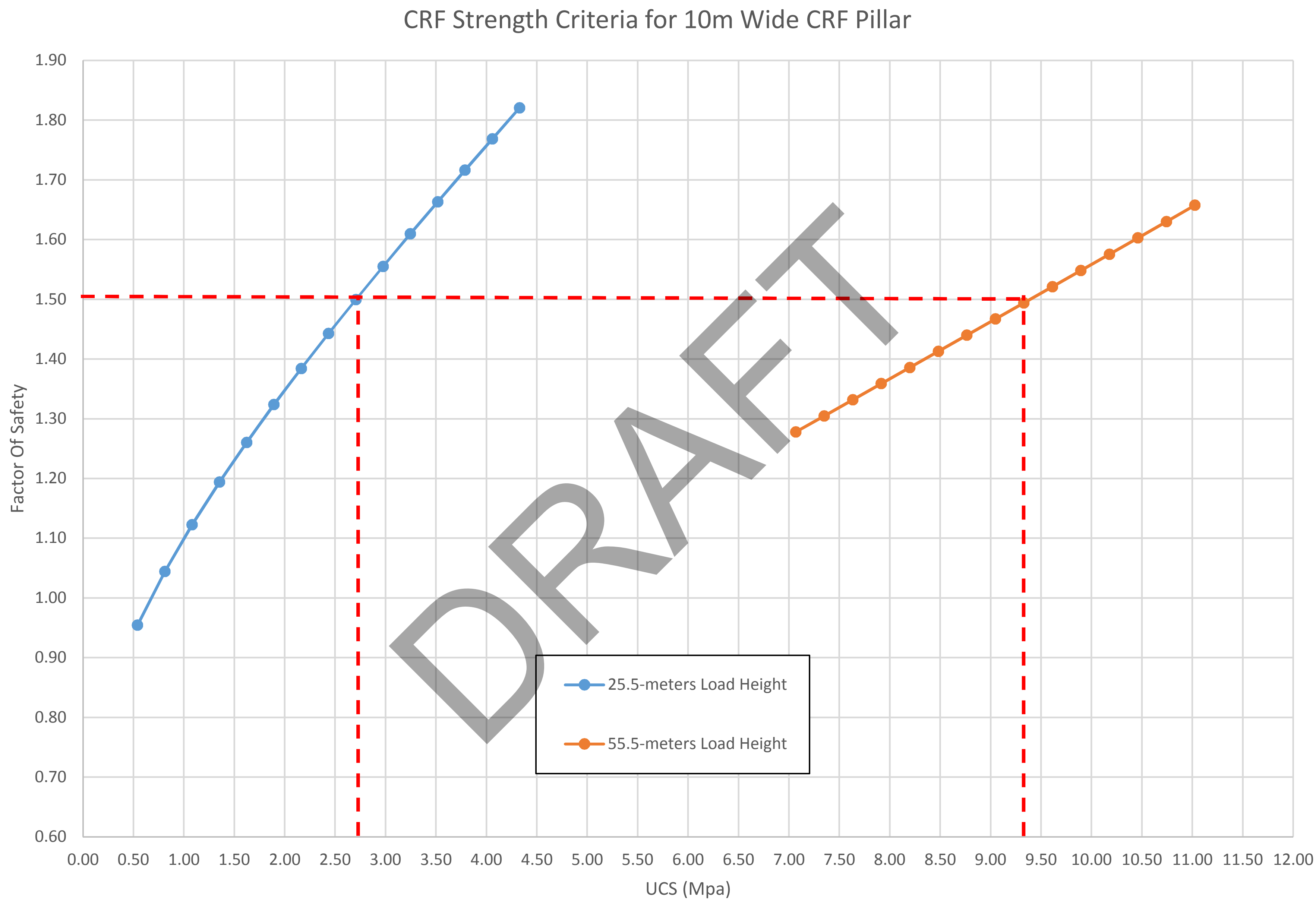


Figure 9-3. CRF Strength Criteria for 10m Wide CRF Pillar
Aranzazu Mine, Aura Minerals Inc., 2017

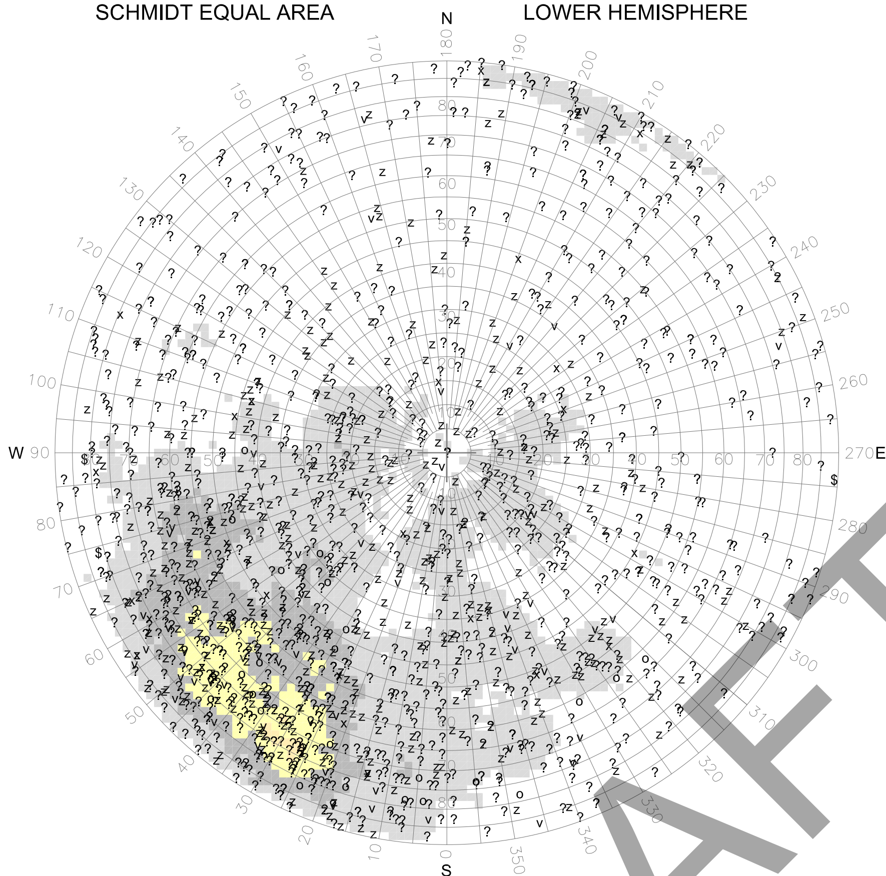
CALL & NICHOLAS, INC.

APPENDIX A

CONTOURED STEREONET PLOTS OF COMBINED CNI AND SRK DATA

SCHMIDT EQUAL AREA

LOWER HEMISPHERE



Aura Minerals Inc. Aranzazu Mine Oriented Core
All Drillholes, Skarn

Call & Nicholas, Inc.

File Used: All_ocore.cnv

NUMBER OF POINTS: 1482

FRAC: all CONF: all

ROCK TYPE	DEPTH	STR. TYPE	FILL TYPE
040	all	all	all

PLOT LEGEND
----
o = Bedding Joint
? = Unknown
x = Fault
z = Single Joint
$ = Shear Zone
v = Vein

STRUCTURE CONCENTRATION:

- 0.0% ~ 1.0%
- 1.0% ~ 2.0%
- 2.0% ~ 3.0%
- 3.0% ~ 4.0%
- 4.0% ~ 5.0%
- 5.0% ~ 6.0%
- 6.0% ~ 7.0%
- 7.0% ~ 8.0%
- 8.0% ~ 9.0%
- 9.0% ~ 10.0%
- >10%

Date: August 16, 2017

File: All-030.scr

LEGEND

CALL & NICHOLAS, INC.
TUCSON, ARIZONA USA

DRAWN SMD | DATE 08/17 | REVISED 10/16/2017 3:02 PM

\2017_REPORT\APPENDICES\APPENDIXA\ALL-GH-030.DWG

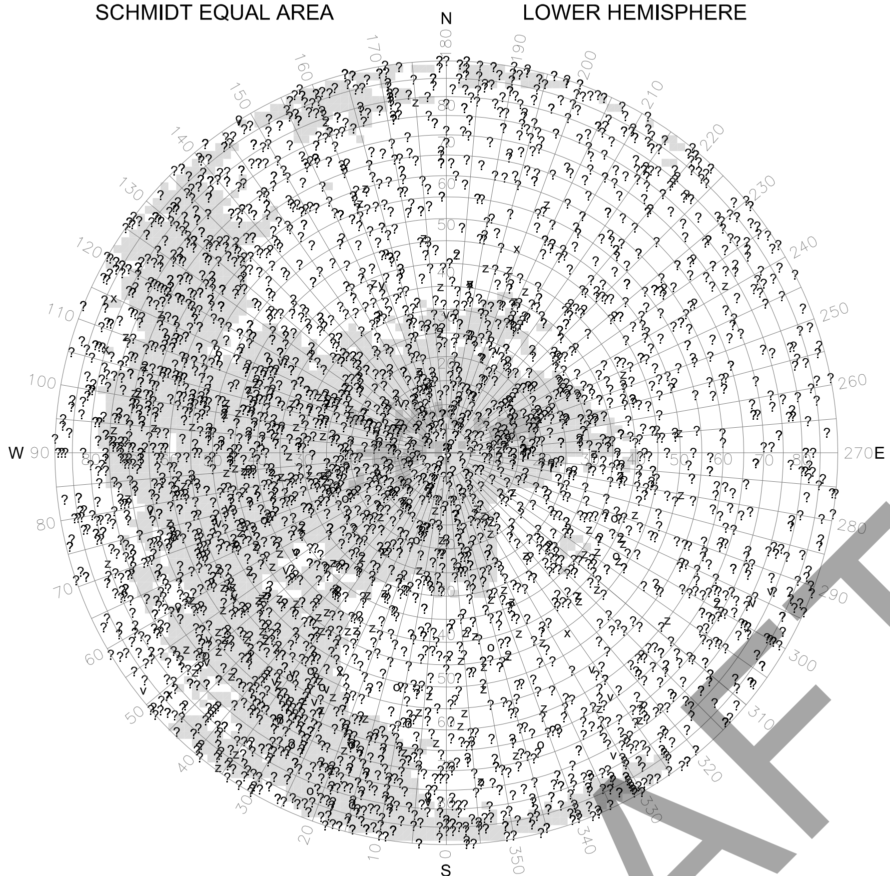
ALL CNI & SRK GLORY HOLE SKARN ORIENTED CORE DATA

ARANZAZU

SCALE N.T.S.

FIGURE 1

SCHMIDT EQUAL AREA LOWER HEMISPHERE



Aura Minerals Inc. Aranzazu Mine Oriented Core
All Drillholes, Intrusive

Call & Nicholas, Inc.

File Used: All_ocore.cnv

NUMBER OF POINTS: 4166

FRAC: all CONF: all

ROCK TYPE	DEPTH	STR. TYPE	FILL TYPE
040	all	all	all

PLOT LEGEND
----
o = Bedding Joint
? = Unknown
x = Fault
z = Single Joint
$ = Shear Zone
v = Vein

STRUCTURE CONCENTRATION:

0.0% ~ 1.0%
1.0% ~ 2.0%
2.0% ~ 3.0%
3.0% ~ 4.0%
4.0% ~ 5.0%
5.0% ~ 6.0%
6.0% ~ 7.0%
7.0% ~ 8.0%
8.0% ~ 9.0%
9.0% ~ 10.0%
>10%

Date: August 16, 2017 | File: All-040.scr

LEGEND

CALL & NICHOLAS, INC.
TUCSON, ARIZONA USA

ALL CNI & SRK GLORY HOLE INTRUSIVE ORIENTED CORE DATA

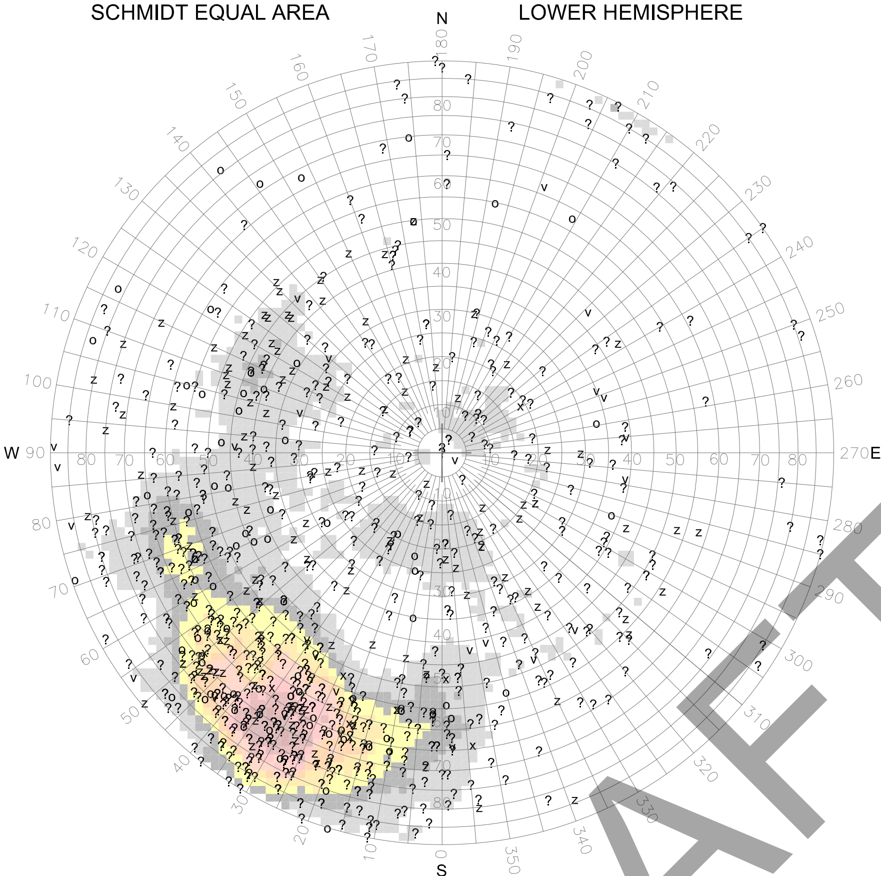
ARANZAZU

DRAWN	DATE	REVISED
SMD	08/17	8/17/2017 2:24 PM

\2017_REPORT\APPENDICES\APPENDIXA\ALL-GH-040.DWG

SCALE N.T.S. FIGURE 2

SCHMIDT EQUAL AREA LOWER HEMISPHERE



Aura Minerals Inc. Aranzazu Mine Oriented Core
All Drillholes, Hornfels

Call & Nicholas, Inc.

File Used: All_ocore.cnv

NUMBER OF POINTS: 914

FRAC: all CONF: all

ROCK TYPE	DEPTH	STR. TYPE	FILL TYPE
040	all	all	all

PLOT LEGEND

----

o = Bedding Joint
? = Unknown
x = Fault
z = Single Joint
$ = Shear Zone
v = Vein

STRUCTURE CONCENTRATION:

0.0% ~ 1.0%
1.0% ~ 2.0%
2.0% ~ 3.0%
3.0% ~ 4.0%
4.0% ~ 5.0%
5.0% ~ 6.0%
6.0% ~ 7.0%
7.0% ~ 8.0%
8.0% ~ 9.0%
9.0% ~ 10.0%
>10%

Date: August 16, 2017

File: All-020.scr

DRAFT

LEGEND

CALL & NICHOLAS, INC.
TUCSON, ARIZONA USA

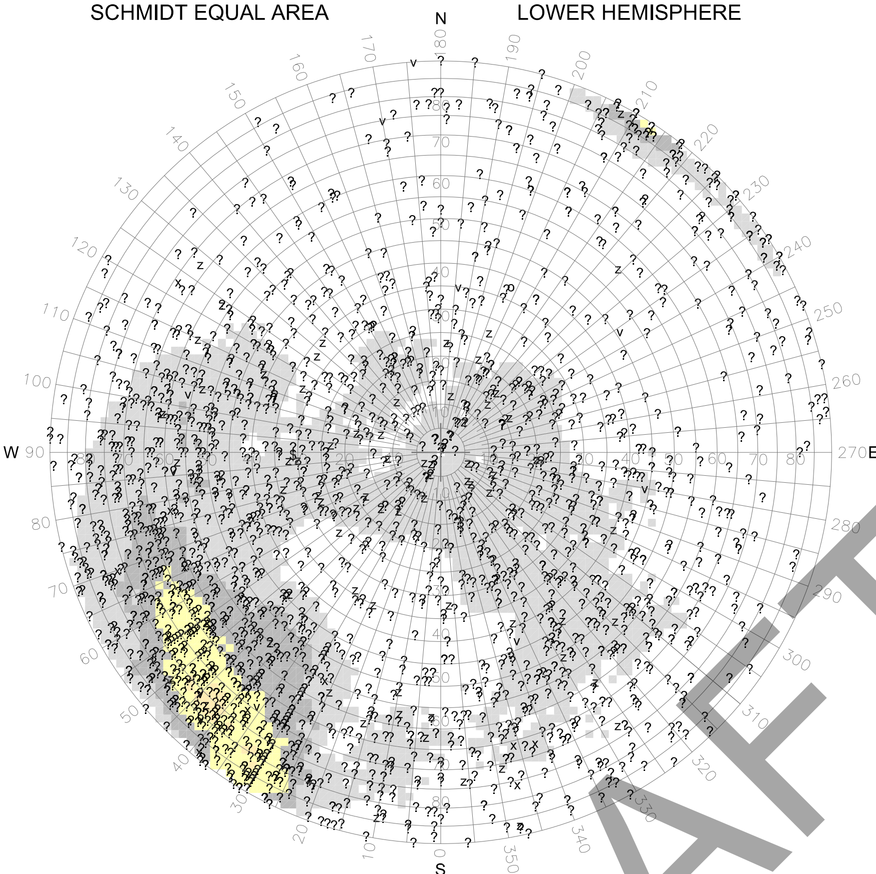
ALL CNI & SRK
GLORY HOLE HORNFELS
ORIENTED CORE DATA
ARANZAZU

DRAWN SMD	DATE 08/17	REVISED 10/16/2017 3:06 PM

\2017_REPORT\APPENDICES\APPENDIXA\ALL-GH-020.DWG

SCALE N.T.S. FIGURE 3

SCHMIDT EQUAL AREA   LOWER HEMISPHERE



Aura Minerals Inc. Aranzazu Mine Oriented Core
All Drillholes, Marble/Limestone

Call & Nicholas, Inc.

File Used: All_ocore.cnv

NUMBER OF POINTS: 2236

FRAC: all CONF: all

ROCK TYPE	DEPTH	STR. TYPE	FILL TYPE
040	all	all	all

PLOT LEGEND

o = Bedding Joint
? = Unknown
x = Fault
z = Single Joint
$ = Shear Zone
v = Vein

STRUCTURE CONCENTRATION:

0.0% ~ 1.0%
1.0% ~ 2.0%
2.0% ~ 3.0%
3.0% ~ 4.0%
4.0% ~ 5.0%
5.0% ~ 6.0%
6.0% ~ 7.0%
7.0% ~ 8.0%
8.0% ~ 9.0%
9.0% ~ 10.0%
>10%

Date: August 16, 2017
File: All-010.scr

LEGEND

CALL & NICHOLAS, INC.
TUCSON, ARIZONA USA

DRAWN SMD | DATE 08/17 | REVISED 10/16/2017 3:07 PM

\2017_REPORT\APPENDICES\APPENDIXA\ALL-GH-010.DWG

ALL CNI & SRK GLORY HOLE LIMESTONE ORIENTED CORE DATA

ARANZAZU

SCALE N.T.S. | FIGURE 4

APPENDIX B

DRILLING AND STRUCTURE DATA

ORIENTED CORE DATA SHEETS

DRILL HOLE GHP_GMX03

CALL & NICHOLAS, INC.

ORIENTED CORE DATA SHEET (MET.)

PROJECT: Aranzazu
LOCATION:
HOLE NO.: GHP-GMX-03
INCLINATION:
NORTHING:
BEARING:
EASTING:
DATE: 6/11/17
ELEVATION:
PAGE 1 OF 17
BY: ZAO
DIA.: HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.00	LMS	SKN						N	.		000.00	016.20					
	16.20	LMS	SKN						N	.		000.00	016.20					
	00.00	SKN							N	.		016.20	017.25					
	01.55	SKN							N	.		016.20	017.25					
	00.00	↓							N	.		017.25	019.25					
	01.50	SKN							N	.		017.25	019.25					
	00.00	↓							N	.		019.25	020.80					
	01.55	SKN							N	.		019.25	020.80					
	00.00	↓							N	.		020.80	022.30					
	01.50	SKN							N	.		020.80	022.30					
	00.00	↓							N	.		022.30	023.80					
	01.50	SKN							N	.		022.30	023.80					
	00.00								N	.		023.80	024.80					
	01.00								N	.		023.80	024.80					
	00.00	↓							N	.		024.80	026.30					
	01.60	SKN							N	.		024.80	026.30					
	00.00								N	.		026.30	026.80					
	00.50								N	.		026.30	026.80					
	00.00								N	.		026.80	028.30					
	01.50	SKN							N	.		026.80	028.30					
	00.00	↓							N	.		028.30	035.85					
	07.55	SKN	HFL						N	.		028.30	035.85					
	0.00	HFL							N	.		035.85	036.15					
	00.30	HFL							N	.		035.85	036.15					
	.									.		.	.					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ARANZAZU

CALL & NICHOLAS. INC. file: ocore_form_toro11-m.dwg

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO.
INCLINATION
NORTHING
BEARING
EASTING
DATE
ELEVATION
BY ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.00	HFL							N			036.15	037.50					
	01.35								N			036.15	037.50					
	00.00								N			037.50	038.90					
	01.40	HFL							N			037.50	038.90					
-180	00.32				VN	B	342	56		02.0	CS	038.90	040.45	N	1	1		
	00.44								N									
	01.00								N									
-180	01.02				SJ	T	198	31	N	00.0	S			N	2	1		
	01.03								N									
	01.55	HFL							N			038.90	040.45					
-262	00.17				SJ	B	154	63		00.0	S	040.45	041.05	N	1	1		
-262	00.18				SJ	T	018	69		00.0	N	040.45	041.05	N	2	1		
	00.00								N			041.05	041.95					
	00.90								N			041.05	041.95					
-194	00.28				SJ	B	010	42		00.0	CS	041.95	043.50	N	2	2		
	00.33				VN	T	214	66		00.1	CS			N	1	1		
	00.78				SJ	T	200	53		00.0	S			N	1	3		
-194	01.20				SJ	B	33[illegible]	68		00.0	S	041.95	043.50	N	2	1		
-240	00.35				VN	B	098	64		00.5	S	043.50	045.00	N	2	2		
-240	00.76				VN	T	118	50		01.0	L	043.50	045.00	N	2	2		
	00.00								N			045.00	046.50					
	00.85								N									
-302	00.53				SJ	T	346	62		00.0	N			N	2	1		
-302	01.00	HFL			SJ	T	324	41		00.0	N			N	2	1		

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PAGE 3 OF 17

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-03

INCLINATION
NORTHING

BEARING
EASTING

DATE
ELEVATION

BY ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.00	HFL							N			046.50	048.05					
	01.55	HFL							N			046.50	048.05					
	00.00								N			048.05	049.55					
	01.50	HFL							N			048.05	049.55					
	0.00	SKN							N			049.55	053.80					
	4.25	SKN							N			049.55	053.80					
	0.00	HFL							N			053.80	054.15					
	0.35	HFL							N			053.80	054.15					
-292	0.34	HFL			SJ	B	284	61		00.0	N	054.15	055.70	N	1	3		
-292	0.50	HFL	Lms		SJ	T	236	34		00.0	L			N	1	2		
	0.51								N									
	0.65								N									
-292	0.73				SJ	T	178	52		00.0	C			Y	1	3		
	1.22				SJ	B	354	34		00.0	L			N	1	3		
	1.28				BD	T	290	57		00.0	L			N	1	2		
	1.35				BD	B	218	58		00.0	L			N	1	2		
	1.45				BD	B	214	57		00.0	L			N	1	3		
-292	1.49	HFL	Lms		SJ	T	228	53		00.0	N	054.15	055.70	N	2	3		
	0.00	LMS							N			055.70	057.20					
	1.50	LMS							N			055.70	057.20					
-314	0.18	LMS			SJ	B	312	17		00.0	CL	057.20	058.75	Y	1	3		
	0.27				BD	T	050	41		00.0	CL			N	1	4		
	0.33				SJ	B	306	57		00.0	LC			N	1	3		
	0.51				VN	B	226	43		01.0	SL			N	1	3		
-314	0.68	Lms			VN	T	262	20		00.5	TLS	057.20	059.15	N	1	3		

MISCELLANEOUS

REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS

SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS

N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ARAN7A7U

CALL & NICHOLAS. INC.   file: ocore_form_toro11–m.dwa

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-03

INCLINATION
NORTHING

BEARING
EASTING

DATE 6/12/17
ELEVATION

BY ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-314	00.86	LMS			SJ	T	306	43		00.0	LCS	057.20	058.75	N	1	3		
	00.98				SJ	T	262	23		00.0	LC	.	.	N	1	3		
	01.03				BD	B	128	35		00.0	L	.	.	N	1	4		
-314	01.38	LMS			BD	T	044	48		00.0	L	057.20	058.75	N	1	3		
	00.00	LMS	SKN						N	.		058.75	060.25					
	01.50	LMS	SKN						N	.		058.75	060.25					
-338	00.33	PPB			VN	B	312	51		00.5	LS	060.25	061.80	N	1	4		
	00.42				SJ	B	124	68		00.0	N	.	.	N	1	4		
	00.83				SJ	B	260	55		00.0	L	.	.	N	1	4		
	00.89				VN	T	296	43		00.3	S	.	.	N	1	3		
	01.17				VN	B	166	57		01.5	TL	.	.	N	1	3		
	01.26				SJ	B	074	17		00.0	S	.	.	N	1	4		
-338	01.30	PPB			SJ	B	148	55		00.0	S	060.25	061.80	N	2	2		
	00.00	PPB	SKN						N	.		061.80	063.30					
	01.50	PPB	SKN						N	.		061.80	063.30					
-268	00.00	SKN			BD	T	148	56	N	00.0	N	063.30	063.60	N	1	3		
-268	00.14	SKN			BD	T	180	47		00.0	N	063.30	063.60	N	1	2		
	00.00	LMS	SKN						N	.		063.60	064.85					
	01.25	LMS	SKN						N	.		063.60	064.85					
	00.00	LMS							N	.		064.85	066.35					
	00.45								N	.		.	.					
-122	00.60				BD	B	050	49		00.0	N	.	.	N	1	3		
	00.67				SJ	T	324	49		00.0	L	.	.	N	1	3		
	00.94				SJ	B	150	35		00.0	L	.	.	N	1	3		
-122	00.98	LMS			BD	T	128	59		00.0	L	064.85	066.35	N	1	3		

DRAFT

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ARAN7A7U

CALL & NICHOLAS. INC. file: ocore_form_toro11-m.dwa

ORIENTED CORE DATA SHEET (MET.)

PAGE 5 OF 17

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-03
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/12/17
ELEVATION
BY ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.00	LMS							N	.		066.35	067.90					
	01.55	LMS							N	.		066.35	067.90					
-102	0.10	LMS			BD	B	220	64		00.0	N	067.90	068.35	N	2	2		
	00.00								N	.		068.35	072.20					
	03.45	LMS							N	.		068.35	072.20					
	00.00	LMS								.		072.20	073.60					
	00.80									.		.	.					
+190	00.85				SJ	T	252	75		00.0	CL	.	.	N	1	1		
+196	00.94				BD	B	192	60		00.0	LS	.	.	N	1	2		
	00.95								N	.		.	.					
	01.15								N	.		.	.					
+190	01.27	LMS			SJ	T	266	66		00.0	L	072.20	073.60	N	1	1		
	00.00	HFL	LMS						N	.		073.60	075.15					
	01.55								N	.		073.60	075.15					
	00.00								N	.		075.15	076.65					
	00.50	HFL	LMS						N	.		075.15	076.65					
	00.00	PPB							N	.		076.65	077.25					
	00.22								N	.		.	.					
-338	00.28	PPB			SJ	T	092	54	W	00.0	LS	.	.	N	1	3		
-338	00.38				SJ	T	172	58	W	00.0	LS	.	.	N	1	3		
	00.50								N	.		.	.					
	00.60	PPB							N	.		076.65	077.25					
	.									.		.	.					
	.									.		.	.					
	.									.		.	.					

DRAFT

MISCELLANEOUS

REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS

SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS

N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

CALL & NICHOLAS. INC. file: ocore_form_toro11–m.dwa ARAN7A7U

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-03
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/13/17
ELEVATION
BY ~~ZAO~~ SMD
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-038	00.14	LMS			BD	T	038	57		00.5	CS	077.25	077.85	N	1	3		SD
	00.25				BD	B	154	65		00.0	LS	.	.	N	1	3		
	00.33				BD	T	052	56		00.0	LS	.	.	Y	1	3		
-038	00.48				SJ	B	242	68		.0	C	077.25	077.85	N	1	3		SD
	00.00								N	.		077.85	078.50					
	00.57								N	.		077.85	078.50					
-022	00.06	PPB			SJ	T	142	38		00.0	SL	078.50	079.70	N	1	2		
	00.10	PPB			SJ	B	030	68		00.0	CLS	.	.	N	2	2		
	00.14				SJ	T	130	66		00.0	LS	.	.	N	1	2		
	00.28				SJ	T	135	70		00.0	CS	.	.	N	1	2		
	00.68	PPB			SJ	B	036	45		00.0	LS	.	.	Y	1	3		
	00.76	HFL			BD	T	096	52		00.0	LS	.	.	N	1	3		
	~~00.80~~	~~HFL~~			BD	B	310	55		00.0	CS	.	.	N	1	3		
	00.94	HFL			SJ	T	212	41		00.0	CLS	.	.	N	1	3		
-022	01.03	HFL			SJ	T	089	75		00.0	LS	078.50	079.70	N	1	3		SD
	00.06								N	.		079.70	081.90					
-350	00.23	PPB			SJ	T	358	56		00.2	CL	.	.	N	1	3		
	00.27	PPB			SJ	B	170	64		00.0	CLS	.	.	N	1	3		
	00.28								N	.		.	.					
	00.47								N	.		.	.					
	00.48				SJ	B	168	69		00.2	CLS	.	.	N	1	3		
	00.59	PPB			SJ	T	130	64		00.0	CL	.	.	N	1	3		
	00.76	HFL			CT	T	038	60		00.0	CLS	.	.	N	1	3		
	00.84				BD	B	152	62		00.0	CLS	.	.	N	1	3		
	00.96				BD	B	138	56		00.0	CLS	.	.	N	1	3		

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N—NON ORIENTABLE W—WHOLE CORE
SLIC	SLICKENSIDES — YES OR NO
FRAC	1—Natural 2—Maybe (Natural or Mech.) 3—Mechanical
CONF	CONFIDENCE — 1—Poor . . . 4—Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-03
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/14/17
ELEVATION
BY ZAO SMD
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-35.0	0.99	HFL			BD	B	138	56		00.0	CLS	079.70	081.90	N	1	3		SD
	1.02	↓			BD	T	046	48		00.0	CLS			N	1	3		
	1.10	HFL			BD	B	180	60		00.0	CS			N	1	3		
	1.11	↓							N									
	1.30	HFL							N									
	1.31	PPB			SJ	T	018	60		00.0	CLS			N	1	3		
-35.0	1.48	PPB			SJ	B	196	77		00.0	CLS	079.70	081.90	N	1	3		
	00.00								N			081.90	082.75					
	00.85								N			081.90	082.75					
	00.00								N			082.75	084.30					
	01.55								N			082.75	084.30					
	00.00								N			084.30	085.85					
	01.40								N			0						
-23.6	01.41				SJ	T	280	69		00.0	CL	084.30	085.85	N	2	3		
	00.00								N			085.85	087.30					
	01.45								N			085.85	087.30					
	00.00								N			087.30	088.85					
	01.55								N			087.30	088.85					
	00.00								N			088.85	090.40					
	01.55								N			088.85	090.40					
	00.00								N			090.40	091.40					
	00.32	P							N									
-03.4	00.47	PPB			SJ	B	218	48		.0	CS			N	1	3		
↓	00.52	PPB			SJ	T	272	62		.0	C			N	1	3		
	00.66	LMS			CT	T	222	64		.0	CS	090.40	091.40	N	1	3		

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ARANZAZU

CALL & NICHOLAS, INC.

file: ocore_form_toro11-m.dwg

ORIENTED CORE DATA SHEET (MET.)

PROJECT: Aranzazu | PAGE: 8 OF: 17
LOCATION: | INCLINATION: | BEARING: | DATE: 6/14/17 | BY: ZAO SMD
HOLE NO.: GHP-GMX-03 | NORTHING: | EASTING: | ELEVATION: | DIA.: HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-034	0.73	LMS			SJ	T	312	70		.0	CS	090.40	091.40	N	1	3		SD
	0.81	↓			SJ	B	228	72		.0	C	↓	↓	N	2	3		
-034	0.98	LMS			BD	B	198	66		.0	C	090.40	091.40	N	1	3		
	0.00								N	.		091.40	091.90					
	0.50								N	.		091.40	091.90					
	0.00								N	.		091.90	092.60					
	0.70								N	.		091.90	092.60					
	0.00								N	.		092.60	093.65					
	1.05								N	.		092.60	093.65					
	0.06								N	.		093.65	095.20					
	02.22								N	.		↓	↓					
-252	01.23	ESK			SJ	B	270	78		00.0	LS			N	1	3		
↓	01.47	↓			SJ	B	108	36		00.1	LS	↓	↓	N	1	3		
	01.50				SJ	T	098	67		00.0	L			N	1	3		
-252	01.55	ESK			SJ	T	020	71		00.0	L	093.65	095.20	N	1	3		
	00.00	ESK							N	.		095.20	096.70					
	01.09	↓							N	.		↓	↓					
-264	01.26				BD	B	276	70		00.0	L			N	1	3		
-264	01.46	ESK			SJ	B	002	84		00.0	LS	095.20	096.70	N	2	3		
-156	00.22				BD	B	138	66		00.0	LS	096.70	098.10	N	1	3		
↓	00.33	↓			SJ	T	149	65		00.0	LS	↓	↓	N	1	3		
	00.60				VN	B	100	64		00.3	L			Y	1	3		
	00.66				SJ	T	090	70		00.2	LC			N	1	3		
	00.83				SJ	T	190	62		00.2	LC			Y	1	3		
-156	01.00	ESK			VN	B	020	63		00.1	LC	096.70	098.10	Y	1	3		

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

CALL & NICHOLAS, INC. file: ocore_form_toro11–m.dwg ARANZAZU

ORIENTED CORE DATA SHEET (MET.)

PROJECT	Aranzazu						
LOCATION		INCLINATION		BEARING		DATE	6/15/17
HOLE NO.	GHP-GMX-03	NORTHING		EASTING		ELEVATION	

BY ZAO SMD

DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-1.56	01.21	ESK			VN	B	032	67		00.5	LS	096.70	098.10	N	1	3		SD
-1.56	01.29	↓			SJ	T	164	84		00.0	L	096.70	098.10	N	1	3		
	00.00								N	.		098.10	099.70					
	01.05								N	.		↓	↓					
-3.06	01.10				SJ	T	264	68		00.0	L	.	.	N	2	3		
	01.23	ESK			SJ	B	230	86		00.0	L	.	.	N	2	3		
-3.06	01.43	↓			VN	B	290	54		01.0	LTS	098.10	099.70	N	1	3		
+0.44	00.08				BD	B	272	72		00.0	CLT	099.70	101.25	N	1	3		
↓	00.25				SJ	T	250	48		00.5	CLS	↓	↓	N	1	3		
+0.44	00.35				BD	B	274	66		00.0	LS	099.70	101.25	N	1	3		
	00.36								N	.		↓	↓					
	01.35								N	.		099.70	101.25					
	00.00								N	.		101.25	102.75					
	01.50								N	.		101.25	102.75					
	00.00								N	.		102.75	104.30					
	01.55								N	.		102.75	104.30					
	00.00								N	.		104.30	105.80					
	01.50	ESK							N	.		104.30	105.80					
	00.00	LMS							N	.		105.80	107.30					
	01.44	↓							N	.		↓	↓					
-30.6	01.45	LMS	ESK		SJ	B	338	65		.	CT	105.80	107.30	N	1	3		
	00.00	↓							N	.		107.30	108.80					
	01.50								N	.		107.30	108.80					
	00.00								N	.		108.80	110.35					
	01.55								N	.		108.80	110.35					

MISCELLANEOUS

REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS

SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS

N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-03
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/15/17
ELEVATION
BY ZAO SMD
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.00	LMS	ESK						N	.		110.35	110.95					
	00.60								N	.		110.35	110.95					
	00.00								N	.		110.95	112.25					
	01.30								N	.		110.95	112.25					
	00.00								N	.		112.25	113.40					
	01.15								N	.		112.25	113.40					
	00.00								N	.		113.40	114.55					
	01.15								N	.		113.40	114.55					
	00.00								N	.		114.55	116.05					
	01.50								N	.		114.55	116.05					
	00.00	ESK							N	.		116.05	117.50					
	00.17								N	.		.	.					
-078	00.18				SJ	B	230	53		00.0	CS	.	.	N	1	2		
	00.25				SS	T	138	38		00.0	CL	.	.	N	1	2		
	00.30				BD	T	252	63		00.0	L	.	.	N	1	2		
	00.40				BD	T	292	60		00.0	C	.	.	Y	1	2		
	06.54				BD	B	292	66		00.0	CS	.	.	N	1	2		
	00.55								N	.		.	.					
	00.68								N	.		.	.					
	00.69				SJ	T	148	80		00.0	C	.	.	N	1	2		
	00.70								N	.		.	.					
	01.05								N	.		.	.					
	01.06				SJ	T	240	60		00.2	C	.	.	Y	1	2		
	01.17				BD	B	310	74		00.0	C	.	.	N	1	2		
-078	01.27				SJ	B	154	55		00.0	C	116.05	117.50	N	1	2		

MISCELLANEOUS

REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS

SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS

N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

CALL & NICHOLAS. INC.   file: ocore_form_toro11-m.dwg   ARANZAZU

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-03
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/15/17
ELEVATION
BY ZAO SMD
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-078	01.30	ESK			BD	T	262	60		.0	CL	116.05	117.50	N	1	2		SD
	00.00	ESK							N	.		117.50	118.15					
	00.65	ESK							N	.		117.50	118.15					
	00.00								N	.		118.15	119.50					
	01.35								N	.		118.15	119.50					
	00.00								N	.		119.50	121.05					
	00.70								N	.		.	.					
-256	00.71				BD	T	150	72		00.0	T	.	.	N	1	3		SD
	00.80				BD	B	038	59		00.0	T	.	.	N	1	2		
	00.82				BD	B	044	60		00.0	N	.	.	N	1	2		
	00.86				BD	B	037	57		00.0	N	.	.	N	1	2		
	00.88				BD	T	180	57		00.0	T	.	.	N	1	3		
	00.94		HFL		VN	T	040	17		00.4	LX	.	.	N	1	3		
	00.96				BD	B	050	55		00.0	LX	.	.	N	1	2		
	01.13				BD	B	030	58		00.2	LT	.	.	N	1	3		
	01.18				BD	B	342	55		00.0	LT	.	.	N	1	3		
	01.20				SJ	T	160	65		00.0	L	.	.	N	1	3		
-256	01.22				SJ	T	104	74		00.0	CL	119.50	121.05	N	1	3		
	00.00	HFL							N	.		121.05	122.55					
	01.50								N	.		121.05	122.55					
	00.55				VN	B	348	70		01.0	QX	122.55	124.10	N	1	3		
	00.83				BD	B	324	66		00.0	CL	.	.	N	1	3		
	00.93				BD	B	343	70		00.0	L	.	.	N	1	3		
	01.05				SJ	T	333	62		00.0	LX	.	.	Y	1	3		
	01.25				BD	B	324	57		00.0	LS	.	.	N	1	3		

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N—NON ORIENTABLE W—WHOLE CORE
SLIC	SLICKENSIDES — YES OR NO
FRAC	1—Natural 2—Maybe (Natural or Mech.) 3—Mechanical
CONF	CONFIDENCE — 1—Poor . . . 4—Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT: Aranzazu
LOCATION:
HOLE NO.: GHP-GMX-03
INCLINATION:
NORTHING:
BEARING:
EASTING:
DATE:
ELEVATION:
PAGE 12 OF 17
BY: ZAO SMD
DIA.: HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-256	01.31	HFL			VN	T	188	56		00.2	T	122.55	124.10	N	1	3		SD
-340	00.13				VN	B	072	54		00.5	QL	124.10	125.60	Y	1	3		
	00.23				SJ	B	068	54		00.0	L			Y	1	3		
	00.49				SJ	T	214	61		00.0	SX			N	1	3		
	00.81				SJ	B	050	44		00.0	LTS			Y	1	3		
	00.86				ST	T	098	57		00.0	ST			N	1	3		
	01.08				VN	B	070	59		00.5	TS			N	1	3		
-340	01.32	HFL			SJ	T	114	64		00.0	CS	124.10	125.60	N	1	3		
+000	00.06				SJ	B	272	50		00.0	N	125.60	127.15	N	1	3		
	00.17				SJ	T	242	45		00.0	S			N	1	3		
	00.26				SJ	B	272	58		00.2	S			N	1	3		
	00.31				SJ	T	280	60		01.0	SC			N	1	3		
	00.45				VN	B	242	74		00.5	S			N	1	3		
	00.52				SJ	T	272	58		00.2	STL			N	1	3		
	00.70				VN	B	194	72		00.0	ST			N	1	3		
	01.09				VN	T	278	55		00.2	ST			N	1	3		
+0000	01.22	HFL			VN	B	258	54		01.0	S	125.60	127.15	N	1	3		
	00.00				FT	B	276	60	N	00.5	S	127.15	128.70	N	1	3		
	01.55								N			127.15	128.70					
	00.00								N			128.70	130.20					
	00.18								N									
-080	00.19				FT	B	276	60		00.5	S			N	1	3		
	00.52				SJ	B	240	25		00.0	SL			N	1	3		
	00.53								N									
	00.87								N									

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ARANZAZU

CALL & NICHOLAS. INC.   file: ocore_form_toro11-m.dwa

ORIENTED CORE DATA SHEET (MET.)

PROJECT: Aranzazu
LOCATION:
HOLE NO.: GHP-GMX-03
INCLINATION:
NORTHING:
BEARING:
EASTING:
DATE:
ELEVATION:
PAGE 13 OF 17
BY: ZAO / SMD
DIA.: HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-0.80	00.88	HFL			SJ	T	172	69		00.1	CL	128.70	130.20	N	1	3		SD
-0.80	01.02	HFL			VN	B	280	44		01.0	ST	128.70	130.20	N	1	3		
	00.00				~~VN~~	~~B~~	~~260~~	~~42~~	N	~~00.~~	~~ST~~	130.20	131.75		~~1~~	~~3~~		
	01.55				~~SJ~~	~~B~~	~~22~~	~~75~~	N	00.0	N	130.20	131.75		~~2~~	~~3~~		
-1.30	00.48		SKN		VN	B	260	42	N	00.2	ST	131.75	133.20	N	2	3		
	00.69				SJ	B	228	75	N	00.0	N			N	2	3		
	00.98				SJ	B	252	60		00.0	N			N	2	3		
	01.04				SJ	T	320	71		00.0	N			N	2	3		
	01.10				SJ	T	326	64		00.0	N			N	2	3		
-1.30	01.16	HFL			VN	B	332	45		00.2	ST	131.75	133.20	N	1	3		
-1.38	~~00.06~~	~~HFL~~										~~133.20~~	~~134.75~~					
	00.39				SJ	B	142	20		00.0	S			N	1	3		
	~~00.70~~																	
-1.38	01.46	HFL			VN	T	316	70		00.3	ST	133.20	134.75	N	1	3		
-2.42	01.28	SKN			SJ	T	184	54		00.0	S	134.75	136.25	N	1	3		
-0.90	00.38				SJ	B	154	42		00.0	S	136.25	137.80	N	1	4	08	
-0.90	01.13	SKN			VN	T	044	61		00.5	S	136.25	137.80	N	1	4	08	
	00.00								N			137.80	139.30					
	00.19								N									
-1.74	00.27				VN	B	247	60		00.1	S			N	1	3		
	01.30				VN	T	276	55		00.0	SC			N	1	3		
-1.74	01.43	SKN			FT	B	264	56		00.0	SC	137.80	139.30	Y	1	3		
+0.00	00.29				VN	B	226	55		00.5	SI	139.30	140.80	N	1	4		
	00.67				SJ	B	216	65		00.0	SCT			N	1	4		
+0.00	01.40				SJ	T	330	68			L	139.30	140.80	Y	1	4		

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ARANZAZU

CALL & NICHOLAS. INC. file: ocore_form_toro11-m.dwa

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-03
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/16/17
ELEVATION
BY ZAO SMD
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
+0.00	01.49	SKN			SJ	B	176	70		00.0	L	139.30	140.80	Y	1	3		SP
-3.66	01.01	↓			VN		172	55		00.3	ST	140.80	142.35	N	1	4	00	
	00.00	SKN							N	.		142.35	143.90					
	01.37	↓							N	.		↓	↓					
	01.38								W	.								
	01.55								W	.		142.35	143.90					
-3.24	00.92	SKN			VN	T	198	56		00.0	S	143.90	145.40	N	1	3		
	00.00								N	.		145.40	146.90					
	01.56								N	.		145.40	146.90					
-0.20	00.23	SKN			SJ	B	208	31		00.0	SL	146.90	148.05	N	1	3		
	00.67	↓							N	.		↓	↓					
	00.80	SKN							N	.		146.90	148.05					
-3.08	00.24	SKN			SJ	B	215	49		00.1	SL	148.05	149.60	N	1	3		
↓	00.52	↓			FT	T	296	43		01.0	CLS	↓	↓	Y	1	3		
	00.74				SJ	T	310	42		00.0	L			N	1	3		
	00.88				FT	B	[illegible]	58		01.0	LCS			Y	1	3		
	00.91				SJ	T	290	45		00.1	L			N	1	3		
	01.24				SJ	B	224	52		06.0	CL			Y	1	3		
-3.08	01.35	SKN			SJ	B	234	52		00.0	CL	148.05	149.60	N	1	3		
	00.00	↓							N	.		149.60	151.15					
	00.54								N	.		↓	↓					
-1.92	00.55				SJ	T	152	58		00.1	LS			N	1	3		
↓	00.65				SJ	B	032	57		00.0	LS			N	1	3		
	00.89				SJ	B	010	62		00.2	LC			N	1	2		
-1.92	01.18	↓			SJ	B	064	46		00.1	LS			N	1	3		

DRAFT

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-03
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/17/17
ELEVATION
BY ZAO SMD
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-1.92	01.43	ESK			SJ	B	088	52		00.2	LC	149.60	151.15	N	1	3		SD
-1.87	0.70				SJ	B	098	52		00.1	CLS	151.15	152.70	N	1	3		
-1.82	0.96				SJ		032	52		02.0	CLS	151.15	152.70	N	1	3		
	0.00	ESK							N	.		152.70	154.25					
	0.13								N	.		.	.					
-01.0	0.58				SJ	B	148	41		00.2	CLT	.	.	N	1	3		
	0.64				SJ	T	050	28		00.0	LS	.	.	N	1	3		
	0.83				SJ	B	272	32		00.1	C	.	.	N	1	3		
	0.94				SJ	T	350	40		00.1	LSC	.	.	N	1	3		
-01.0	1.34				SJ	B	220	41		00.1	CLS	152.70	154.25	N	1	3		
-1.22	0.06	ESK			SJ	T	006	50		00.1	LCS	154.25	155.80	N	1	3		
	0.22				SJ	T	044	48		00.1	L	.	.	N	1	3		
-1.22	1.50	ESK			SJ	B	256	49		00.0	LS	154.25	155.80	N	1	3		
	0.00								N	.		155.80	157.35					
	1.55								N	.		155.80	157.35					
	0.00								N	.		157.35	158.80					
	0.10								N	.		.	.					
-26.0	0.20				SJ	B	278	41		00.0	CLS	.	.	N	1	3		
	0.24				SJ	T	276	34		00.1	CS	.	.	N	1	3		
	1.03				SJ	B	110	62		00.0	S	.	.	N	1	3		
	1.07	ESK			FT	T	284	44		00.4	CS	.	.	N	1	3		
-26.0	1.47	PPB			SJ	T	270	49		00.0	S	157.35	158.80	N	1	3		
-1.82	0.61	PPB			SJ	B	152	39		00.0	LS	158.80	160.30	N	1	2	28	
-1.82	1.40				SJ	T	056	46		00.0	S	158.80	160.30	N	1	2	28	
-1.56	0.25				SJ	B	218	40		00.0	LS	160.36	161.85	N	1	3		

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ARANZAZU

CALL & NICHOLAS. INC. file: ocore_form_toro11–m.dwa

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-Amx-03
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/17/17
ELEVATION
BY ZAO-SMD
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-1.56	0.77	PPB			SJ	T	254	64		00.0	LS	160.30	161.85	N	1	3		SD
↓	1.00	↓			VN	B	232	43		00.1	S	↓	↓	N	1	3		
↓	1.23				VN	B	352	52		00.1	S			N	1	3		
-1.56	1.34	PPB			SJ	T	306	40		00.0	CS	160.30	161.85	N	1	3		
	0.18				SJ	T	246	28		00.0	CS	161.85	163.30	N	1	3		
	0.21				SJ	T	260	26		00.0	CS			N	1	3		
	0.86				SJ	B	158	53		00.0	N			N	1	3		
	1.13				SJ	B	208	57		00.1	C			N	1	3		
	1.22				SJ	B	170	34		00.0	A			N	1	3		
↓	1.26	↓			SJ	T	130	63		00.0	S			N	1	3		
-1.56	1.49	PPB			SJ	B	204	68		00.0	N	161.85	163.30	N	2	3		
-1.88	1.09	PPB			SJ	B	084	31		00.0	SL	163.30	164.80	N	1	3	08	
	0.00								N			164.80	166.35					
	1.55								N			164.80	166.35					
+0.00	0.85				SJ	T	066	66		00.0	N	166.35	167.85	N	2	3		
	0.00								N			167.85	169.35					
	1.50								N			167.85	169.35					
+0.00	0.73				VN	B	110	57		00.0	S	169.35	170.85	N	1	2	30	
-1.22	0.62				VN	T	176	19		00.2	LS	170.85	172.35	N	1	2	20	
↓	1.09	↓			SJ	T	220	52		00.0	N	↓	↓	N	1	2	20	
-1.22	1.18	PPB			VN	B	079	59		00.1	S			N	1	2	20	
-1.22	1.32	PPB			SJ	T	160	80		00.0	N	170.85	172.85	N	2	2	20	
+0.00	0.24				VN	B	606	53		00.0	LS	172.35	173.85	N	1	3	14	
↓	0.58				VN	B	068	44		00.1	LS	↓	↓	N	1	3	14	
+0.00	0.89				SJ	B	078	46		00.0	S			N	1	3	14	

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-03
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/17/17
ELEVATION
BY SMD ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
+0.72	0.29	PPB			SJ	B	236	48		00.0	LS	173.85	175.40	N	1	4	06	SD
-0.72	1.46	PPB			SJ	T	078	64		00.0	N	173.85	175.40	N	2	4	06	
+0.00	0.94				VN	T	306	59		00.2	L	175.40	176.90	N	1	4	00	
	1.30				SJ	B	058	41		00.0	N			N	1	4	00	
+0.00	1.34	PPB			SJ	T	138	66		00.0	N	175.40	176.90	N	1	4	00	
-0.30	0.16				SJ	T	290	42		00.0	N	176.90	178.45	N	1	1	90+	
	0.23				VN	B	060	41		00.5	LT			Y	1	1		
	0.38				SJ	T	250	50		00.0	N			N	1	1		
+0.30	0.73				SJ	B	094	68		00.1	L	176.90	178.45	N	1	1		
									W			178.45	178.95					
									N			178.45	179.95					
-1.00	0.49	PPB			SJ	T	350	73		00.1	C	179.95	181.50	N	1	2		
-1.00	0.86				SJ	B	352	54		00.0	N	179.95	181.50	N	1	2		
	0.64	PPB			SJ	T	078	59		00.0	N	181.50	183.00	N	2	3		
	1.01				SJ	B	124	39		00.0	N	181.50	183.00	N	1	3		
-2.88	0.66				SJ	B	273	54		00.1	C	183.00	184.55	N	1	3		
	6.71				SJ	T	288	17		00.0	C			N	1	3		
	0.83				SJ	B	2[illegible]0	32		00.0	N			N	1	3		
	0.89				SJ	T	250	22		00.1	C			Y	1	3		
	0.98				SJ	B	342	45		00.0	C			N	1	3		
-2.88	1.11				SJ	B	272	48		00.0	C			N	1	3		
	1.12								N									
	1.55	PPB							N			183.00	184.55					
TD	0.00	PPB							N			184.55	186.05					
TD	1.50	PPB							N			184.55	186.05					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEETS

DRILL HOLE GHP_GMX04

CALL & NICHOLAS, INC.

PROJECT Aranzazu

ORIENTED CORE DATA SHEET (MET.)

PAGE 1 OF 31

LOCATION

INCLINATION

BEARING

DATE 6/19/17

BY ZAO SND

HOLE NO. GHP-GMX-04

NORTHING

EASTING

ELEVATION

DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	0.00	MBL							N	.		000.00	001.00					SD
	1.00								N	.		000.00	001.00					
	0.00								N	.		001.00	002.35					
	1.35								N	.		001.00	002.35					
	0.00								N	.		002.35	003.75					
	1.40								N	.		002.35	003.75					
	00.00								N	.		003.75	005.30					
	00.35								N	.		.	.					
-298	00.82	MBL			SJ	B	016	45		00.1	X	.	.	N	1	3		
	00.93				VN	T	324	18		00.2	X	.	.	N	1	3		
	01.03				SJ	T	118	80		00.0	N	.	.	N	2	3		
	01.10				SJ	T	098	16		00.1	X	.	.	N	1	3		
	01.19				SJ	T	128	47		00.1	X	.	.	N	1	3		
-298	01.53				SJ	B	089	72		00.0	N	003.75	005.30	N	3	3		
	00.00	MBL							N	.		005.30	006.80					
	00.48								N	.		005.30	006.80					
-008	00.52				SJ	T	324	63		00.0	N	.	.	N	2	3		
-008	01.85				SJ	B	174	31		00.1	SL	005.30	006.80	N	1	3		
~~[illegible]~~	00.00								N	.		006.80	007.40					
	00.60								N	.		006.80	007.40					
+000	00.49	MBL			SJ	B	038	70		00.0	N	007.40	008.95	N	2	3		
-064	00.00								W	.		008.95	010.05					
-064	01.10								W	.		008.95	010.05					
	00.00								W	.		010.05	011.55					
	01.26								W	.		010.05	011.55					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT: Aranzazu | PAGE 2 OF 31
LOCATION: | INCLINATION: | BEARING: | DATE: 6/19/17 | BY: ~~ZAO~~ CMD
HOLE NO.: GHP-GMX-04 | NORTHING: | EASTING: | ELEVATION: | DIA.: HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	01.27	MBL							N	.		010.05	011.55					SD
	01.50								N	.		010.05	011.55					
-064	00.05	MBL			SJ	T	324	36		00.2	C	011.55	013.05	N	1	3		
-064	00.70				SJ	B	007	47		00.0	N	011.55	013.05	N	2	3		
-064	01.31				VN	T	182	39		00.1	T	011.55	013.05	N	1	3		
	00.00								N	.		013.05	014.55					
	00.65								N	.		.	.					
-025	01.05				SJ	T	030	49		00.0	N	013.05	014.55	N	2	3		
-324	01.06				SJ	B	201	58		00.0	N	014.55	016.10	N	2	3		
-276	00.27	MBL			SJ	B	089	62		00.0	N	016.10	017.60	N	2	2	30	
	00.66	MBL			SJ	B	112	49		00.0	N	016.10	017.60	N	3	2	30	
	00.00				~~SJ~~	~~B~~	~~030~~	~~4?~~	N	~~00.0~~	N	017.60	019.15	~~N~~	~~1~~	~~3~~		
	00.63				~~SJ~~	~~T~~	~~116~~	~~44~~	N	~~00.0~~	N	.	.	~~N~~	~~1~~	~~3~~		
	00.64				~~SJ~~	~~B~~	~~212~~	~~44~~	W	~~00.5~~	C	.	.	~~N~~	~~1~~	~~3~~		
	01.55				~~SJ~~	~~T~~	~~144~~	~~29~~	W	~~00.0~~	N	017.60	019.15	~~N~~	~~1~~	~~3~~		
-083	00.34				SJ	B	030	40		00.0	CT	019.15	020.70	N	1	3		
	00.39				SJ	T	180	44		00.0	N	.	.	N	1	3		
	00.56				SJ	B	112	44		00.5	C	.	.	N	1	3		
	00.62				SJ	T	144	29		00.0	N	.	.	N	1	3		
	00.70				FT	B	168	39		00.5	CT	.	.	N	1	3		
	00.97				SJ	B	140	43		00.1	C	019.15	020.70	Y	1	3		
-083	01.40	MBL			SJ	T	350	70		00.0	N	019.15	020.70	N	2	3		
+200	00.70				FT	T	206	38		00.1	N	020.70	022.20	Y	1	3		
	00.00								N	.		022.20	023.20					
	00.20								N	.		022.20	023.20					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N—NON ORIENTABLE W—WHOLE CORE
SLIC	SLICKENSIDES — YES OR NO
FRAC	1—Natural 2—Maybe (Natural or Mech.) 3—Mechanical
CONF	CONFIDENCE — 1—Poor . . . 4—Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-04
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/14/17
ELEVATION
BY ~~ZAO~~ SMJ
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-270	00.84	MBL			BD	T	088	32		01.0	N	022.20	023.20	N	1	3		SD
-065	01.00	MBL			SJ	T	244	43		00.0	N	023.20	024.75	N	1	3		
-232	00.28				SZ	T	128	60		00.5	C	024.75	026.30	N	1	3		
	00.40				SJ	B	146	69		00.0	N			N	1	3		
	00.45				SJ	T	054	75		00.0	N			N	2	3		
	00.86				EJ	B	266	40		00.0	N			Y	1	3		
-232	01.08	MBL			SJ	B	065	77		00.0	N	024.75	026.30	N	2	3		
-308	00.11				FT	T	346	30		00.3	CS	026.30	027.85	Y	1	2		
	00.74				SJ	T	278	53		00.0	N			Y	1	2		
	00.31				SJ	B	048	73		00.0	N			N	2	2		
	00.41				FT	B	252	21		00.1	C			N	1	2		
	60.45				SJ	T	300	18		00.4	C			N	1	2		
-308	00.56				SJ	B	084	67		00.0	N	026.30	027.85	N	2	2		
-308	01.16	MBL			SJ	T	174	65		00.0	N	026.30	027.85	N	1	2		
-320	00.24				VN	B	068	27		01.0	LC	027.85	029.40	N	1	2		
	00.69				SJ	B	228	75		00.0	C			N	1	2		
-320	01.31	MBL			SJ	B	322	77		00.0	N	027.85	029.40	N	1	2		
	00.00								N	.		029.40	029.80					
	00.40								N	.		029.40	029.80					
	00.00								N	.		029.80	031.35					
	01.55								N	.		029.80	031.35					
	00.00								N	.		031.35	032.90					
	00.10								N	.		.	.					
	00.11								W	.		.	.					
	01.55								W	.		031.35	032.90					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP- GMX-04

INCLINATION
NORTHING

BEARING
EASTING

DATE 6/19/17
ELEVATION

BY SMD-ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-027	00.31	MBL			SJ	B	358	72		00.0	N	032.90	034.90	N	2	3		SD
	00.67	↓			SJ	B	142	26		00.1	C			N	1	3		
	00.86				VN	B	182	32		00.3	L			N	1	3		
	01.13				SJ	B	179	31		00.0	N			N	2	3		
-027	01.27	MBL			SJ	B	180	75		00.0	N	032.90	034.40	N	3	3		
	00.00	↓							N			034.60	035.90					
	01.50	MBL							N			034.60	035.90					
+000	00.00	↓							N			035.90	036.30					
	00.40	MBL							N			035.90	036.30					
+000	00.00	↓							N			036.30	037.40					
↓	00.09	↓							N			↓	↓					
+000	00.52	MBL			FT	T	350	55		00.2	C	036.30	037.40	Y	1	3		
-268	~~0.20~~											037.40	038.95	—				
	00.22				VN	B	296	28		01.0	L			N	1	3		
	00.36				SJ	B	[illegible]	57		00.2	X			N	1	3		
	00.41				FT	T	248	38		00.4	CL			N	1	3		
	00.66				VN	B	008	34		00.5	T			N	1	3		
↓	01.04				VN	B	292	40		00.5	L			N	1	3		
-268	01.25				SJ	B	250	47		00.2	CL			N	1	3		
	01.26	↓							N			↓	↓					
	01.52	MBL							N			037.40	038.95					
-224	01.29	MBL			SJ	T	076	72		00.0	N	38.95	040.45	N	1	3		
-113	00.23	MBL			SJ	B	243	58		00.0	N	040.45	042.08	N	1	3		
	00.91	↓			SJ	B	238	73		00.0	N	04 ↓	↓	N	2	3		
-113	01.33				SJ	B	248	49		00.0	N	040.45	042.60	N	1	3		

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

PROJECT Aranzazu

ORIENTED CORE DATA SHEET (MET.)

LOCATION
INCLINATION
BEARING
DATE 6/20/17
BY SMD ZAO

HOLE NO. GHP-GMX-04
NORTHING
EASTING
ELEVATION
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-075	00.21	MBL			SJ	B	296	54		00.0	N	042.00	043.50	N	1	3		SD
↓	00.25	↓			SJ	B	112	53		00.0	N	↓	↓	N	2	3		
	00.29				SJ	B	224	64		00.0	N			N	1	3		
	00.58				SJ	B	139	28		00.2	L			N	1	3		
	00.71				SJ	B	068	36		00.2	T			N	1	3		
-075	01.34	MBL			SJ	B	070	20		00.1	T	042.00	043.50	N	1	3		
	00.00	↓							W			043.50	045.00					
	01.50								W			043.50	045.00					
-233	01.18	MBL			FT	T	176	42		00.4	C	045.00	046.50	Y	1	3		
	00.00	↓							N			046.50	048.05					
	00.29								N			↓	↓					
-163	00.36				SJ	T	048	16		00.2	C.S.			N	1	2		
↓	00.52				SJ	B	002	53		00.0	N			N	1	2		
-163	01.06				SJ	B	163	67		00.0	N	046.50	048.05	N	2	2		
-306	01.21	MBL			SJ	B	338	62		00.0	N	048.05	049.55	N	1	2	40	
	00.00	↓							N			049.55	051.05					
	00.71								N									
-280	00.72				SJ	T	350	36		00.1	N	049.55	051.05	N	1			
+000	01.03						318	65				051.05	052.55	N	2	1	90	
	00.00	MBL							N			052.55	054.05	N				
	00.58	MBL							N			↓	↓					
-320	01.03	ESK			FT	T	280	22		01.0	L	052.55	054.05	N	1	3		
	00.82	↓			SJ	T	354	10		00.3	L	054.05	055.55	N	1	3		
	01.28				SJ	T	192	22		00.1	L	054.05	055.55	N	2	3		
-072	00.13	ESK			SJ	T	109	39		00.2	L	055.55	057.10	N	1	2		

DRAFT

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "-" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N-NON ORIENTABLE W-WHOLE CORE
SLIC	SLICKENSIDES - YES OR NO
FRAC	1-Natural 2-Maybe (Natural or Mech.) 3-Mechanical
CONF	CONFIDENCE - 1-Poor . . . 4-Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-04

INCLINATION
NORTHING

BEARING
EASTING

DATE 6/20/17
ELEVATION
BY SD ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-0.72	00.30	ESK			SJ	T	209	54		00.5	CLS	055.55	057.10	Y	1	2		SD
↓	00.37	↓			VN	T	246	44		00.4	L	↓	↓	N	1	3		
↓	00.94	ESK			SJ	T	356	69		00.2	L	↓	↓	N	1	3		
-0.72	00.94	ESK			FT	B	288	26		00.4	LS	055.55	057.10	Y	1	3		
	00.00	↓							N	.		057.10	058.60					
	01.50	ESK							N	.		057.10	058.60					
	00.15	↓			~~SJ~~	~~T~~	~~234~~	~~38~~	N	~~00.0~~	~~STC~~	058.60	060.15	~~N~~	~~N~~	~~3~~		
	[illegible]	↓			~~SJ~~	~~B~~	~~306~~	[illegible]	N	~~00.0~~	~~S~~	.	.	~~N~~	~~N~~	~~3~~		
	01.50	ESK			~~SJ~~		~~022~~	~~78~~	N	~~00.0~~	~~S~~	058.60	060.15	~~N~~	~~2~~	~~3~~		
-0.88	00.64	↓			SJ	T	274	72		00.0	S	060.15	061.65	N	2	3		
↓	01.24	↓			SJ	T	083	57		00.0	N	↓	↓	N	2	3		
-0.88	01.39	ESK			SJ	B	043	44		00.0	N	060.15	061.65	N	1	3		
	00.00	ESK							W	.		061.65	062.75					
	01.25	ESK							W	.		061.65	062.75					
	00.00	ESK							N	.		062.75	064.30					
	01.50	ESK							N	.		062.75	064.30					
-30.0	00.68	ESK			SJ	T	338	64		00.0	S	064.30	065.80	N	2	3		
	00.00								N	.		065.80	067.35					
	00.28								N	.		.	.					
-30.2	00.37				SJ	T	138	29		00.5	L	.	.	N	1	3		
-30.2	00.67				VN	B	348	75		01.0	S	.	.	N	1	3		
	01.45				~~SJ~~	~~B~~	~~050~~	~~50~~	N	.		.	.					
	01.55								N	.		065.80	067.35					
	01.40	ESK			~~SJ~~	~~B~~	~~050~~	~~50~~	N	~~00.0~~		067.35	068.90	~~N~~	~~N~~	~~3~~		
	01.42	ESK			~~SJ~~	~~B~~	~~224~~	~~49~~	N	~~00.0~~		067.35	068.90	~~N~~	~~N~~	~~3~~		

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT: Aranzazu
LOCATION:
HOLE NO.: GHP-GMX-041
INCLINATION:
NORTHING:
BEARING:
EASTING:

DATE: 6/20/17
ELEVATION:
BY: ZAO
DIA.: HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.00	ESK							N			068.90	070.40					SD
	01.50	ESK							N			068.90	070.40					SD
	00.00	ESK							N			070.40	071.95					
	01.55	ESK							N			070.46	071.95					
	00.00	↓							N			071.95	072.65					
	01.55								N			071.95	073.65					
	00.00	↓							N			072.65	074.15					
	01.50	ESK							N			072.65	074.15					
	00.00								N			074.15	075.70					
	01.55								N			074.15	075.70					
	00.00								N			075.70	077.25					
	01.10								N			075.70	077.25					
-120	01.18				SJ	T	098	63		00.2	CL	↓	↓	N	1	3		
↓	01.32	↓			SJ	B	054	43		00.2	CSL	↓	↓	Y	1	3		
-120	01.46	ESK			SJ	B	092	23		00.2	CLS	075.86	077.25	N	1	3		
	0.00	↓										077.25	078.80					
	1.40																	
+000	1.41	ESK			BN	T	322	20		00.5	CSL	077.25	078.80	N	1	3		
	00.00	↓							N			078.80	080.35					
	01.55	ESK							N			078.80	080.35					
	00.00								N			080.35	081.35					
	01.00								N			080.35	081.35					
	00.00								N			081.35	082.55					
	00.36	↓							N			↓	↓					
	00.37	ESK			SJ	T	054	47		00.1	L	081.35	082.55	N	1	2		

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT: Aranzazu | INCLINATION: | BEARING: | DATE: 6/20/17

LOCATION: | NORTHING: | EASTING: | ELEVATION:

HOLE NO.: GHP-GMX-04 | PAGE 8 OF 31 | BY: Sun ZAO | DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-266	00.56	ESK			SJ	B	092	61		00.1	L	081.35	082.55	N	2	1		SD
	00.63				SJ	T	004	59		00.0	L			N	1	1		
	00.85				SJ	B	314	22		00.1	L			N	1	1		
	01.04				SJ	B	308	20		00.0	L			N	1	1		
-266	01.17	ESK			SJ	B	312	28		00.0	L	081.35	082.55	N	1	1		
	00.00								N			082.55	083.95					
	01.40								N			082.55	083.95					
	00.06	ESK							N			083.95	085.40					
	01.00								N									
-174	01.01				SJ	T	259	16		00.0	L			N	1	3		
	01.26				SJ	B	022	34		00.0	L			N	1	3		
-174	01.42	ESK			SJ	B	276	33		00.0	N	083.95	085.40	N	1	3		
	00.00								N			085.40	086.95					
	01.55								N			085.40	086.95					
	00.00								N			086.95	088.50					
	01.55								N			086.95	088.50					
	00.00								N			088.50	090.05					
	01.55	ESK							N			088.50	090.05					
	00.00								N			090.05	091.60					
	01.55								N			090.05	091.60					
-116	00.00								N			091.60	093.15					
	00.18								N									
	00.19				SJ	T	046	39		00.1	C			Y	1	2		
	00.30				FT		057	50		00.5	CL			Y	1	2		
-116	00.59	ESK			SJ		346	46		00.0	C	091.60	093.15	N	1	2		

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-04
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/21/17
ELEVATION
BY ~~SUD~~ ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-116	00.69	ESK			FT	T	055	71	N	00.1	C	091.60	093.15	Y	1	2		
-116	00.73	↓			FT	B	078	44	N	02.0	CL	↓	↓	Y	1	2		
	00.74	↓							N									
	01.55	ESK							N			091.60	093.15					
	00.00								N			093.15	094.65					
	00.63								N									
-072	00.64				SJ	T	222	76		00.0	CL			N	1	2		
	00.83				SJ	B	198	23		00.0	CL			N	1	2		
	00.97								N									
↓	01.10								N									
-072	01.20	ESK			FT	T	314	29		00.1	CL	093.15	094.65	Y	1	2		
	00.00								N			094.65	096.15					
	01.50								N			094.65	096.15					
	00.00								N			096.15	097.65					
	01.50								N			096.15	097.65					
	00.60								N			097.65	099.10					
	00.70								N									
-262	00.78																	
	00.83																	
	00.84								N									
	00.94								N									
	00.95				FT	T	062	43		00.2	CL			Y	1	2		
	01.19				FT	B	128	48		00.0	L			N	1	2		
↓	01.41				SJ	B	100	44		00.0	LC	↓	↓	N	1	2		
-262	01.47				SJ	B	246	55		00.0	LC	097.65	099.10	N	1	2		

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT: Aranzazu
LOCATION:
HOLE NO.: GHP-GMX-04
INCLINATION:
NORTHING:
BEARING:
EASTING:

DATE: 6/21/17
BY: ~~ZAO~~ SMD
ELEVATION:
DIA.: HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.00	ESK							N			099.10	100.60					SD
	01.50								N			099.10	100.60					
	00.00								N			100.60	102.10					
	01.50								N			100.60	102.10					
	00.00								N			102.10	103.65					
	01.55	ESK							N			102.10	103.65					
	00.00								N			103.65	105.15					
	01.50								N			103.65	105.15					
	00.00								N			105.15	106.70					
	01.48								N			↓	↓					
+0.00	01.49	ESK			SJ	T	346	32		00.2	L	105.15	106.70	N	1	3		
	00.00								N			106.70	108.20					
	01.42								N			↓	↓					
-107	01.43				FT	T	106	47		04.0	CL	106.70	108.20	Y	1	3		
↓	01.47				SJ	B	086	46		00.1	L	↓	↓	N	1	3		
-107	01.50	ESK			SJ	T	100	49		00.1	L	106.70	108.20	N	1	3		
	00.00	ESK							N			108.20	109.70					
	01.50	LMS							N			108.20	109.70					
	00.00	LMS							N			109.70	111.20					
	01.50	LMS							N			109.70	111.20					
	00.00								N			111.20	112.75					
	01.55								N			111.20	112.75					
-230	00.83	LMS			SJ	B	087	30		00.1	L	112.75	114.36	N	1	3		
↓	00.90	ESK			SJ	T	250	60		00.0	L	↓	↓	N	1	3		
-230	01.05	ESK			FT	B	318	57		02.0	LC	112.75	114.36	Y	1	3		

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "-" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N-NON ORIENTABLE W-WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu | PAGE 11 OF 31
LOCATION | INCLINATION | BEARING | DATE 6/21/17 | BY SMO ZAO
HOLE NO. GHP-GMX-04 | NORTHING | EASTING | ELEVATION | DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-230	01.23	ESK			SJ	B	318	58		00.2	L	112.75	114.36	N	1	3		SD
	01.24								N									
-230	01.55	ESK							N			112.75	114.36					
	00.00								N			114.36	115.80					
	01.50								N			114.36	115.80					
	00.00								N			115.80	117.35					
	01.55								N			115.80	117.35					
+000	00.15	ESK	HFL		FT	B	286	45		00.1	CL	117.35	118.85	Y	1	3		SD
	00.50				SJ	B	226	53		00.1	L			N	1	3		
	01.05				BD	B	196	62		00.1	CL			N	1	3		
	01.16				BD	B	198	67		00.1	L			Y	1	3		
+000	01.28	ESK	HFL		SJ	B	200	41		00.1	L	117.35	118.85	N	1	3		
-154	00.06	ESK	HFL		SJ	B	312	40		00.1	L	118.85	120.35	N	1	2	30	
	00.57				SJ	B	316	44		00.1	L			N	1	2		
	00.85				FT	B	310	44		00.1	C			Y	1	2		
	01.02				FT	T	108	57		00.1	LC			Y	1	2		
	01.06				SJ	B	304	47		00.1	LC			N	1	2		
	01.21		HFL		FT	B	1[illegible]4	56		00.1	LC			Y	1	2		
	01.26				SJ	T	322	74		00.1	LC			N	1	2		
-154	01.30	ESK			SJ	T	176	40		00.1	LC	118.85	120.35	N	1	2		
	00.00								N			120.35	121.90					
	01.55								N			120.35	121.90					
	00.00								N			121.90	123.40					
	01.50								N			121.90	123.40					
	00.00								N			123.40	124.45					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu | PAGE 12 OF 31
LOCATION | INCLINATION | BEARING | DATE 6/21/17 | BY SMD ZAO
HOLE NO. GHP-GMX-04 | NORTHING | EASTING | ELEVATION | DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	STRUCTURE T/B	STRUCTURE CIRC. ANG.	STRUCTURE DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	DRILL RUN DEPTHS FROM COLLAR (M) TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	01.55	ESK							N	.		123.40	124.95					
	00.00								N	.		124.95	126.50					
	01.55								N	.		124.95	126.56					
	00.00								N	.		126.50	128.05					
	01.55								N	.		126.50	128.05					
	00.00								N	.		128.05	129.60					
	01.33								N	.		.	.					
-018	01.34				FT	T	328	26		00.3	L	.	.	Y	1	2		SD
	01.44				FT	B	234	18		00.3	L	.	.	Y	1	2		
-018	01.48	ESK			SJ	T	060	20		00.2	LC	128.05	129.60	N	1	2		
+000	00.06				FT	T	260	44		00.5	LC	129.60	131.10	Y	1	3		
	00.17				BD	B	274	50		00.0	N	.	.	N	1	3		
	00.30				BD	B	252	52		00.1	SL	.	.	N	1	3		
	00.62				SJ	B	255	58		00.3	SLC	.	.	N	1	3		
	00.99				SJ	B	234	65		00.2	CS	.	.	N	1	3		
	01.15				SJ	B	306	45		00.1	CS	.	.	N	1	3		
	01.25				SJ	T	302	41		00.1	LS	.	.	N	1	3		
+000	01.44				SJ	B	061	41		00.1	CL	.	.	N	1	3		
	00.00								N	.		131.10	132.50					
	01.40								N	.		131.10	132.50					
-045	00.23	ESK	HFL		SJ	T	003	44		00.2	CL	132.50	134.00	N	1	3		
	00.34				SJ	B	338	46		00.1	CL	.	.	N	1	3		
-045	00.48				BD	B	154	39		00.1	C	.	.	N	1	3		
	00.49								N	.		.	.					
	01.50								N	.		132.50	134.00					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "-" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N-NON ORIENTABLE W-WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1-Natural 2-Maybe (Natural or Mech.) 3-Mechanical
CONF	CONFIDENCE – 1-Poor . . . 4-Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-041
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/21/17
ELEVATION
BY ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.00	ESK	HFL						N			134.00	135.55					
	01.55	ESK							N			134.00	135.55					
	00.00	HFL							N			135.55	137.10					
	01.55	HFL							N			135.55	137.10					
+318	00.06				BD	T	028	50		00.0	CL	137.10	138.65	N	1	3		SD
	00.16				BD	T	026	48		00.0	CL	138.65	140.20	N	1	3		
	00.26				BD	B	153	48		00.0	CL			N	1	3		
	00.43				VN	T	070	44		00.2	T			N	1	3		
	00.52				BD	B	108	51		00.0	L			N	1	3		
	00.55				FT	T	056	54		00.2	CL			Y	1	3		
	00.65				BD	B	122	54		00.0	N			N	1	3		
	00.81				BD	B	113	53		00.0	N			N	1	3		
	00.89				BD	T	072	54		00.0	N			N	1	3		
	01.00				BD	B	106	60		00.1	L			Y	1	3		
+318	01.08	HFL			BD	T	090	52		00.0	N	138.65	140.20	N	1	3		
-298	0.06	HFL			VN	T	310	54		00.5	SL	140.20	141.75	N	1	3		
	0.17				SJ	B	026	44		00.0	N			N	1	3		
	0.22				BD	B	290	44		00.0	L			N	1	3		
	0.39				SJ	B	054	34		00.2	L			N	1	3		
	0.40				~~BD~~	~~T~~	~~240~~	~~46~~	N	~~00.0~~	~~N~~			~~N~~	~~1~~	~~3~~		
	0.50				~~BD~~	~~B~~	~~309~~	~~52~~	N	~~00.0~~	~~N~~			~~N~~	~~1~~	~~3~~		
	0.51				BD	T	240	46		00.0	N			N	1	3		
	0.57				BD	B	309	52		00.0	N			N	1	3		
	0.58								N									
-248	0.80	HFL							N			140.20	141.75					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N−NON ORIENTABLE W−WHOLE CORE
SLIC	SLICKENSIDES − YES OR NO
FRAC	1−Natural 2−Maybe (Natural or Mech.) 3−Mechanical
CONF	CONFIDENCE − 1−Poor . . . 4−Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-04
INCLINATION
BEARING
DATE 6/22/17
BY SMDZAO
NORTHING
EASTING
ELEVATION
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-24.8	00.81	HFL			VN	T	230	58		00.5	T	140.20	141.75	N	1	3		SD
	01.09				FT	B	297	58		00.5	C			Y	1	3		
	01.16				BD	B	292	46		00.0	U			N	1	3		
	01.20				BD	T	260	47		00.0	N			N	1	3		
	01.23				BD	B	311	34		00.1	L			N	1	3		
	01.34				BD	B	292	54		00.0	N			N	1	3		
	01.40				BD	B	294	44		00.0	N			N	1	3		
	01.45				BD	B	240	44		00.0	N			N	1	3		
-24.8	01.52	HFL			BD	T	234	50		00.0	N	140.20	141.75	N	1	3		
	00.00	PPB			SJ	T	208	36	N	00.0	N	141.75	143.25	N	1	3		
	01.56	PPB							N			141.75	143.25					
-34.4	00.09	PPB			SJ	T	208	36		00.00	N	143.25	144.80	N	1	3		
	00.21				VN	B	196	45		00.4	T			N	1	3		
	00.52				SJ	B	304	38		00.0	N			N	1	3		
	00.70				SJ	B	231	53		00.0	N			N	1	3		
	01.20				VN	B	261	54		00.0	T			N	1	3		
	01.30				SJ	B	210	46		00.0	N			N	1	3		
-34.4	01.51	PPB			SJ	B	054	55		00.0	N	143.25	144.80	N	1	3		
-27.5	00.18				SJ	B	264	41		00.0	N	144.80	146.30	N	1	3		
	00.26	PPB			SJ	T	246	40		00.2	CT			N	1	3		
	00.37	HFL			SJ	T	262	54		00.0	N			N	1	3		
	00.54				BD	B	276	53		00.0	N			N	1	3		
	00.63				SJ	B	278	48		00.0	N			N	1	3		
	00.72				SJ	T	040	45		00.0	N			N	1	3		
+27.5	00.97	HFL			BD	B	163	48		00.0	N	144.80	146.30	N	1	3		

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-04
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/22/17
ELEVATION
BY SMDZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	DRILL RUN DEPTHS FROM COLLAR (M) TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-2.75	01.13	HFL			SJ	B	162	52		00.0	N	144.80	146.30	N	1	3		SD
↓	01.17	↓			BD	B	152	48		00.0	N	↓	↓	N	1	3		
	01.21				SJ	T	022	47		00.2	N			N	1	3		
-2.75	01.30				SJ	T	020	46		00.0	N	144.80	146.30	N	1	3		
	00.00	HFL							N			146.30	147.80					
	00.50								N			146.30	147.80					
	00.34				FT	T	132	37		00.4	C			N	1	3		
	00.44				SJ	B	082	67		00.1	L			N	1	3		
	00.54				FT	B	040	44		00.2	C			Y	1	3		
	00.75				SJ	B	055	44		00.1	T			N	1	3		
-2.75	01.34	HFL			BD	T	144	41		00.0	N	146.30	147.80	N	1	3		
-1.80	00.00								N			147.80	149.35					
	00.33								N									
	00.34	HFL			SJ	B	030	64		00.0	N			N	2	3		
	00.43				SJ	B	094	71		00.1	L			N	1	3		
	00.47				SJ	B	008	48		00.0	N			N	1	3		
	00.53				FT	B	008	58		00.0	C			Y	1	3		
	00.59				SJ	B	012	68		00.0	N			N	1	3		
	00.74				BD	T	163	54		00.0	N			N	1	3		
	00.44				BD	B	015	41		00.0	L			N	1	3		
	01.00				SJ	B	161	41		00.0	L			N	1	3		
	01.08				VN	T	169	49		00.5	T			N	1	3		
	01.38				BD	B	036	38		00.1	L			N	1	3		
-1.80	01.47				BD	B	020	50		00.0	N	147.80	149.35	N	1	3		
-3.15	00.00											149.35	150.85					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS

SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS

N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT: Aranzazu
LOCATION:
HOLE NO.: GHP-GMX-04
INCLINATION:
NORTHING:
BEARING:
EASTING:

DATE: 6/22/17
ELEVATION:
BY: SMDZAO
DIA.: HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-3.15	00.16	HFL							N	.		149.35	150.85					
	00.17				BD	T	318	43		00.0	N	.	.	N	1	3		SD
	00.24				SJ	B	232	52		00.0	N	.	.	N	2	3		
	00.46				BD	B	208	50		00.0	N	.	.	N	1	3		
	00.55				SJ	B	246	47		00.0	N	.	.	N	2	3		
	00.67				BD	B	212	59		00.0	L	.	.	N	1	3		
	01.00				SJ	T	300	67		00.0	N	.	.	N	1	3		
-3.15	01.23	HFL			SJ	B	270	47		00.0	N	149.35	150.85	N	1	3		SD
	00.00								N	.		150.85	152.35					
	01.50								N	.		150.85	152.35					
	00.00								N	.		152.35	153.85					
	01.50	HFL							N	.		152.35	153.85					
-1.26	00.11				BD	B	166	46		00.0	N	153.85	155.35	N	1	3		
	00.47				BD	T	033	46		00.0	N	.	.	N	1	3		
	00.60				BD	B	157	45		00.0	N	.	.	N	1	3		
	00.69				VN	B	148	49		00.1	T	.	.	N	1	3		
	00.96				BD	T	014	42		00.1	C	.	.	N	1	3		
	01.03				BD	B	178	46		00.0	N	.	.	N	1	3		
	01.21				SJ	T	004	47		00.2	C	.	.	N	1	3		
-1.26	01.41	HFL			SJ	B	243	47		00.1	Q	153.85	155.35	N	1	3		
	00.00								N	.		155.35	156.90					
	01.55								N	.		155.35	156.90					
	00.00								N	.		156.90	158.40					
	01.50								N	.		156.90	158.40					
	00.00									.		158.40	159.95					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ARAN7A7U

CALL & NICHOLAS. INC. file: ocore_form_toro11-m.dwa

ORIENTED CORE DATA SHEET (MET.)

PROJECT: Aranzazu
LOCATION:
HOLE NO.: GHP-GMX-04
INCLINATION:
NORTHING:
BEARING:
EASTING:
DATE: 6/22/17
ELEVATION:
PAGE 17 OF 31
BY: SMB ZAO
DIA.: HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	01.55	HFL							N			158.40	159.95					SD
	00.00								N			159.95	161.45					
	00.10								N									
-1.75	00.20		ESK		SJ	B	230	50		00.1	L			Y	1	3		
	00.25				SJ	B	308	44		00.1	C			N	1	3		
	00.26								N									
	00.43								N									
	00.44				FT	T	178	45		00.5	CLS			N	1	3		
	00.52				SJ	B	042	45		00.2	CL			N	1	3		
	00.70				SJ	B	064	44		00.1	LS			N	1	3		
	00.85				SJ	B	023	37		00.1	TS			N	1	3		
	00.88				SJ	T	054	41		00.0	S			N	1	3		
	00.96				SJ	B	020	32		00.0	S			N	1	3		
	01.18				SJ	B	280	42		00.0	N			N	1	3		
	01.21				SJ	T	125	42		00.1	CL			N	1	3		
-1.75	01.40	HFL			SJ	B	008	38		00.0	N	159.95	161.45	N	1	3		
-1.39	00.10				SJ	B	168	36		00.0	N	161.45	162.95	N	1	3		
	00.25				SJ	T	076	43		00.0	N			N	1	3		
	00.37				SJ	B	198	58		00.0	N			N	1	3		
	00.45				SJ	B	185	28		00.0	N			N	1	3		
	00.58				SJ	T	347	29		00.0	N			N	1	3		
	00.74				SJ	B	157	35		00.0	N			N	1	3		
	00.75								N									
	00.96								N									
-1.39	00.99	HFL			SJ	T	070	66		00.0	N	161.45	162.95	N	1	3		

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-04
INCLINATION
NORTHING
BEARING
EASTING

DATE 6/22/17
ELEVATION
BY SMDZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-139	01.06	ESK			SJ	T	032	46		00.0	N	161.45	162.95	N	1	3		SM
↓	01.16				FT	B	061	46		00.2	L	↓	↓	N	1	3		
-139	01.37	↓			SJ	B	086	56		00.2	CLS	161.45	162.95	N	1	3		
	00.00								N			162.95	164.50					
	01.55	ESK	LMS						N			162.95	164.50					
	00.00								N			164.50	166.00					
	01.50								N			164.50	166.90					
	00.00								N			166.00	167.50					
	01.50								N			166.00	167.50					
	00.00								N			167.50	169.05					
	01.55								N			167.50	169.05					
	00.00								N			169.05	170.40					
	01.35								N			169.05	170.40					
	00.00								N			170.40	171.95					
	01.55	↓	↓						N			170.40	171.95					
	00.00								N			171.95	173.50					
	00.97	ESK	LMS						N			↓	↓					
-127	00.98				SJ	T	163	44		00.0	N			N	2	3		
↓	01.08				SJ	B	306	34		00.0	N			N	1	3		
	01.14				VN	T	100	34		00.2	T	↓	↓	N	1	3		
-127	01.17	ESK	LMS		SJ	T	116	47		01.0	CL	171.95	173.50	N	1	3		
-350	0.09				SJ	T	222	53		00.0	N	173.50	175.05	N	1	3		
↓	0.20				BD	B	271	48		00.0	N			N	1	3		
	0.38				SJ	T	205	75		00.0	N	↓	↓	N	2	3		
-356	0.47	ESK	LMS		BD	B	277	51		00.0	N	173.50	175.05	N	2	3		

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

CALL & NICHOLAS. INC. file: ocore_form_toro11-m.dwa ARANZAZU

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-04

INCLINATION
NORTHING

BEARING
EASTING

DATE 6/22/17
ELEVATION

BY ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-350	0.56	ESK	LMS		BD	T	243	57		00.0	N	173.50	175.05	N	1	3		SD
-	.75				SJ	B	288	49		00.0	N			N	1	3		
	.90				SJ	B	282	54		00.1	C			N	1	3		
	.91								N									
	1.05								N									
	1.06				SJ	T	242	50		00.0	N			N	1	3		
	1.23				SJ	B	312	33		00.0	N			N	1	3		
	1.32				SJ	B	169	40		00.0	N			N	1	3		
-350	1.38	ESK	LMS		SJ	T	282	40		00.0	N	173.50	175.05	N	1	3		
	00.00								N			175.05	176.60					
	01.55								N			175.05	176.60					
	00.00								N			176.60	178.10					
	01.50	ESK	LMS						N			176.60	178.10					
	00.00								N			178.10	179.65					
	01.55	ESK	LMS						N			178.10	179.65					
	00.00	ESK	LMS						N			179.65	181.20					
	01.55	ESK	LMS						N			179.65	181.20					
-665	00.11	HFL			BD	B	156	42		00.0	N	181.20	182.70	N	1	3		
	00.18				BD	B	124	33		00.0	N			N	1	3		
	00.29				BD	B	102	44		00.0	N			N	1	3		
	00.74				FT	B	082	44		00.1	C			Y	1	3		
	00.91				FT	B	113	48		00.5	CL			Y	1	3		
	01.05				SJ	B	100	54		00.0	N			N	1	3		
	01.06								N									
-665	01.23								N			181.20	182.70					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-04
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/22/17
ELEVATION

BY SMO ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-065	01.24	HFL			SJ	T	250	40		00.0	N	181.20	182.70	N	2	3		SD
-065	01.38	HFL			SJ	B	233	47		00.0	N	181.20	182.70	N	2	3		
-046	00.03	HFL	LMS		BD	T	346	44		00.0	N	182.70	184.50	N	1	2		
-046	0.10				BD	B	206	43		00.0	N	.	.	N	1	2		
	0.27				BD	T	352	44		00.0	N	.	.	N	1	2		
	0.38				BD	B	206	33		00.1	L	.	.	N	1	2		
	0.49				BD	T	186	44		00.0	N	.	.	N	1	2		
	0.57				FT	T	206	53		02.0	CLS	.	.	N	1	2		
	0.79				BD	B	168	37		00.0	N	.	.	N	1	2		
	1.03				BD	T	354	47		00.0	N	.	.	N	1	2		
	1.15				BD	B	174	46		00.0	N	.	.	N	1	2		
	1.24				SJ	T	038	39		00.0	N	.	.	N	1	2		
	1.37				SJ	B	166	38		00.0	N	.	.	N	1	2		
	1.38								N	.		.	.			2		
	1.47								N	.		.	.			2		
-046	1.48				BD	T	032	38		00.0	N	182.70	184.50	N	1	2		
	00.00								N	.		184.50	185.75					
	00.55								N	.		.	.					
-242	00.56				FT	T	206	39		01.0	C	.	.	Y	1	3		
	00.64				BD	B	338	39		00.0	N	.	.	N	1	3		
	00.78				BD	T	214	34		00.0	N	.	.	N	1	3		
	00.83	HFL			VN	B	055	55		00.3	T	.	.	N	1	3		
-242	01.08	LMS			SJ	T	352	45		00.0	N	184.50	185.75	N	1	3		
	00.00	LMS							N	.		185.55	187.30					
	01.55	LMS							N	.		185.55	187.30					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N—NON ORIENTABLE W—WHOLE CORE
SLIC	SLICKENSIDES — YES OR NO
FRAC	1—Natural 2—Maybe (Natural or Mech.) 3—Mechanical
CONF	CONFIDENCE — 1—Poor . . . 4—Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GNY-04
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/23/17
ELEVATION
BY ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.00	LMS	HFL						N	.		187.30	188.80					
	00.14				~~SJ~~	~~T~~	~~256~~	~~50~~	N	00.4	C	.	.	~~N~~	~~1~~	~~3~~		SD
-261	00.15				SJ	T	256	50		00.4	C	.	.	N	1	3		
	00.29				SJ	B	290	42		00.0	N	.	.	N	1	3		
	00.43				SJ	B	311	36		00.0	N	.	.	N	1	3		
	00.56	LMS	HFL		SJ	B	281	36		00.2	SL	.	.	N	1	3		
	00.62	PPB			SJ	T	223	44		00.1	SL	.	.	N	1	3		
	00.77				VN	B	050	34		00.1	SL	.	.	N	1	3		
	01.00	PPB			SJ	B	087	53		00.0	S	.	.	N	1	3		
-261	01.22	PPB	HFL		SJ	T	264	48		00.0	N	187.30	188.80	N	1	3		
-261	01.35	LMS	HFL		BD	B	271	44		00.0	N	187.30	188.80	N	1	3		
-268	00.12				SJ	B	242	28		00.5	CS	188.80	190.30	N	1	3		
	00.54				BD	T	246	36		00.0	N	.	.	N	1	3		
	00.67				BD	B	298	36		00.0	N	.	.	N	1	3		
	00.78				BD	T	250	39		00.0	N	.	.	N	1	3		
	00.96				SJ	B	020	32		00.0	N	.	.	N	1	3		
	01.02				SJ	T	013	29		00.0	N	.	.	N	1	3		
-268	01.14	LMS	HFL		BD	B	[illegible]	44		00.0	N	.	.	N	1	3		
	01.25				SJ	B	282	47		00.4	C	.	.	N	1	2		
	1.34				SJ	T	131	32		00.0	N	.	.	N	1	3		
-268	1.44	LMS	HFL		SJ	B	040	37		00.0	N	188.80	190.30	N	1	3		
	00.00	LMS	HFL						N	.		190.30	191.85					
	01.55								N	.		190.30	191.85					
-255	06.00								N	.		191.85	193.40					
-255	00.08								N	.		191.85	193.40					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ARANZAZU

CALL & NICHOLAS. INC. file: ocore_form_toro11-m.dwa

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-04
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/23/17
ELEVATION
BY ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-255	00.04	LMS	HFL		BD	T	148	43		00.0	N	191.85	193.90	N	1	3		SD
	00.27				BD	B	023	32		00.0	N			N	1	3		
	00.28				BD	T	156	37	N	00.0	N			N	1	3		
	00.55								N									
	00.56				BD	T	156	37						N	1	2		
	00.71				SJ	B	204	40		00.0	N			N	1	3		
	01.13				BD	B	037	25		00.0	N			N	1	3		
	01.14								N									
-255	01.55	LMS	HFL						N			191.85	193.40					
+340	00.05				SJ	T	112	36		00.1	C	193.90	194.90	N	1	2		
	00.25				BD	B	146	38		00.1	L			N	1	2		
	00.42				BD	B	188	32		00.0	C			N	1	2		
	00.54				SJ	T	278	19		00.0	L			N	1	2		
	00.66				BD	B	185	39		00.1	C			N	1	2		
+340	00.78				SJ	B	266	38		00.0	N			N	1	2		
	00.79								N									
	01.50	LMS	HFL						N			193.40	194.90					
	00.90								N			194.90	196.45					
	00.99	LMS	HFL						N									
-280	01.00	LMS	HFL		SJ	T	250	40		00.1	L			N	1	1		
	01.05				FT	B	242	44		01.0	LC			N	1	1		
	01.20				SJ	B	270	45		00.0	N			N	1	1		
	01.37				SJ	T	264	63		00.0	N			N	1	2		
-280	01.49	LMS	HFL		SJ	B	292	39		00.0	N	194.90	196.45	N	1	2		
	00.00								N			196.45	198.00					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N—NON ORIENTABLE W—WHOLE CORE
SLIC	SLICKENSIDES — YES OR NO
FRAC	1—Natural 2—Maybe (Natural or Mech.) 3—Mechanical
CONF	CONFIDENCE — 1—Poor . . . 4—Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ARANZAZU

ORIENTED CORE DATA SHEET (MET.)

PROJECT: Aranzazu
LOCATION:
HOLE NO.: GHP-GMX-04
INCLINATION:
NORTHING:
BEARING:
EASTING:

DATE: 6/23/17
BY: SMDZAO
ELEVATION:
DIA.: HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	01.55	LMSESK							N			196.45	198.00					SD
	00.00	ESK							N			198.00	199.50					
	00.41								N									
-356	00.42				SJ	T	313	77		00.2	CS			N	1	2		
	00.82				SJ	B	324	18		00.2	CSL			N	1	3		
	01.03				SJ	B	217	35		00.1	C			N	1	3		
	01.10				BD	T	325	26		00.2	C			N	1	3		
	01.15				SJ	T	123	65		00.1	L			N	1	3		
	01.37				SJ	B	104	60		00.0	N			N	1	3		
-356	01.44	ESK			SJ	T	118	67		00.0	N	198.00	199.50	N	1	5		
	00.00								N			199.50	201.00					
	01.50								N			199.50	201.00					
	00.00	BRX							W			201.00	202.55					
	01.55	BRX			SJ	B			W			201.00	202.55					
-125	00.24	ESK			SJ	B	182	28		00.2	CS	202.55	204.10	N	1	3		
	00.38				SJ	T	020	40		00.4	CS			N	1	3		
-125	01.55	ESK			SJ	T	014	68		00.2	N	202.55	204.10	N	2	3		
-308	00.08	ESK			SJ	B	048	77		00.0	N	204.10	205.60	N	2	2		
	00.47				SJ	B	231	67		00.0	N			N	2	2		
-308	01.19	ESK			SJ	T	054	75		00.0	N	204.10	205.60	N	2	2		
	00.00	ESK							W			205.60	207.10				25	
	01.56	ESK							W			205.60	207.10				25	
	00.90	ESK			SJ	B	244	19		00.2	C	207.10	208.65	N	1	3	15	
-116	00.12	ESK			SJ	B	248	50		00.1	L	208.65	210.15	N	1	3	15	
-116	00.39	ESK			SJ	T	254	66		00.1	S	208.65	210.15	N	2	3	15	

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ARAN7A7U

CALL & NICHOLAS. INC.   file: ocore_form_toro11-m.dwa

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-04

ORIENTED CORE DATA SHEET (MET.)

INCLINATION
NORTHING
BEARING
EASTING
DATE 6/23/17
ELEVATION
BY ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-116	00.53	ESK			SJ	B	071	68		00.1	S	208.65	210.15	N	2	3	15	SD
↓	00.93	↓			SJ	B	016	77		00.1	S	↓	↓	N	2	3	↓	↓
↓	01.00				SJ	B	008	59		00.1	S			N	1	3		
-116	0[illegible].37	ESK			SJ	T	008	51		00.1	S	208.65	210.15	N	1	3	15	SD
-181	00.99	ESK			SJ	T	252	64		00.2	SC	210.15	211.70	N	2	3		
-181	01.45	ESK			SJ	B	204	17		00.4	S	210.15	211.70	N	1	3		
	00.00	ESK							N	.		211.70	212.60					
	00.90	ESK							N	.		211.70	212.60					
	00.00	↓							N	.		212.60	213.20					
-346	00.09								N	.		↓	↓					
-346	00.38	ESK			SJ	T	138	79		00.1	N	212.60	213.20	N	2	2		SD
	00.00	↓							N	.		213.20	213.90					
	00.36	ESK							N	.		213.20	213.90					
-236	00.46	ESK			SJ	B	270	68		00.2	N	213.90	215.45	N	2	3		
↓	00.58	↓			SJ	B	253	86		00.0	N	.	.	N	2	3		
-236	01.40	ESK			SJ	T	354	53		00.4	S	213.90	215.45	N	1	3		
	00.00				FT	T	125	17	N	.		215.45	217.00					
	01.06								N	.		↓	↓					
-195	01.07				FT	T	125	47		80.0	SCL	.	.	N	1	3		
↓	01.31	↓			SJ	B	056	50		00.0	N	.	.	N	1	3		
-195	01.47	ESK			SJ	B	107	74		00.1	CS	215.45	217.00	N	2	3		
	00.00	ESK							N	.		217.00	218.55					
	01.55	ESK	BRX						N	.		217.00	218.55					
	00.00	↓	↓						N	.		218.55	220.10					
	01.05	ESK	BRX						N	.		218.55	220.10					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-04

INCLINATION
NORTHING

BEARING
EASTING

DATE 6/24/17
ELEVATION

BY SD ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-1.08	1.06	ESK	BRX		SJ	T	014	25		00.0	N	218.55	220.10	N	1	3		SD
↓	1.14	↓	↓		SJ	B	234	32		00.2	N	↓	↓	N	1	3		
↓	1.22				SJ	T	005	46		00.2	CS			N	1	3		
-1.08	1.30	ESK	BRX		SJ	B	142	47		00.0	N	218.55	220.10	N	1	3		
-1.28	00.29	↓	↓		SJ	B	242	32		00.1	S	220.10	221.65	N	1	3		
-1.28	00.33	ESK	BRX		SJ	B	158	68		00.2		220.10	221.65	N	2	3		SD
	00.00	ESK							W	.		221.65	222.25					
	00.60	ESK							W	.		221.65	222.25					
-0.18	00.22	↓			SJ	T	205	65		00.0	N	222.25	223.80	N	2	3		
-0.18	00.66	ESK			SJ	B	203	39		00.1	S	222.25	223.80	N	1	3		
	00.00	↓							W	.		223.80	225.30					
	01.50	ESK							W	.		223.80	225.30					
-0.39	00.19	↓			SJ	B	107	43		00.0	N	225.30	226.85	N	1	2		
↓	00.32				SJ	B	064	44		00.0	N	↓	↓	N	1	2		
	00.45				SJ	B	023	20		00.5	S			N	2	2		
↓	00.63	↓			SJ	B	305	48		00.3	S			N	1	4		
-0.39	01.02	ESK			SJ	B	277	73		00.2	S	225.30	226.85	N	2	4		
-0.22	01.33	↓			SJ	T	328	75		00.0	N	226.85	228.40	N	2	4	1.0	
↓	01.43				SJ	T	070	73		00.0	N	↓	↓	N	2	4	1.0	
-0.22	01.53	ESK			SJ	T	088	80		00.0	N	226.85	228.40	N	3	4	1.0	
-0.84	00.20	↓			SJ	B	064	82		00.0	N	228.40	229.95	N	2	4	06	
↓	00.63				SJ	T	135	44		00.0	N	↓	↓	N	1	4	06	
-0.84	00.92	ESK			SJ	B	130	48		00.0	N	228.40	229.95	N	1	4	06	
-1.88	00.64				SJ	T	042	43		00.0	N	229.95	231.45	N	1	4	08	
-1.88	01.06	ESK			SJ	B	184	48		00.0	N	224.95	231.45	N	1	4	08	

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-04
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/24/17
ELEVATION
BY SUD ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-1.45	00.25	ESK			SJ	B	329	45		00.1	S	231.45	232.95	N	1	4		SD
	00.97				SJ	T	269	51		00.1	S			N	1	4		
-1.45	01.26	ESK			SJ	B	217	34		00.1	S	231.45	232.95	N	1	4		SD
-1.04	00.67				SJ	T	011	37		00.0	1	232.95	234.45	N	1	3	20	
	00.00								W			234.45	235.95					
	01.55								W			234.45	235.95					
-0.40	00.32				SJ	T	016	40		00.2	T	235.95	237.40	N	1	2	30	
	00.58				SJ	B	075	46		00.2	LSC			N	1	2	30	
	00.82	ESK			SJ	T	038	50		00.1	C			N	1	2	30	
	01.16				SJ	B	154	68		00.1	CL			N	1	2	30	
-0.40	01.25	ESK			SJ	T	040	50		00.2	CL	235.95	237.40	N	1	2	30	
+1.66	00.24				SJ	T	182	68		00.5	CS	237.40	238.95	N	1	2		
	00.66				SJ	B	324	68		00.0	N			N	2	2		
	01.18				SJ	B	294	47		00.4	T			N	1	2		
	01.26				SJ	T	259	69		00.3	CS			N	1	2		
+1.66	01.37	ESK			SJ	B	020	33		00.4	N	237.40	238.95	N	2	2		
+2.00	00.28				SJ	B	125	43		00.2	C	238.95	240.45	N	2	2		
	00.79				SJ	B	124	22		00.2	C	-		N	1	2		
	01.07				SJ	T	026	43		00.2	C			N	2	2		
	01.08								N									
+2.00	01.50								N			238.95	240.45					
	00.00								N			240.45	242.00					
	01.55								N			240.45	242.00					
-1.06	00.25				SJ	B	145	32		00.1	S	242.00	243.50	Y	1	4	00	
-1.06	00.42	ESK			SJ	T	056	25		00.2	C	242.00	243.50	N	1	4	00	

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-041
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/24/17
ELEVATION
BY SMT ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-1.06	00.55	ESK			SJ	T	062	38		00.2	CS	242.00	243.50	N	1	4	00	SD
+1.24	00.04	↓			VN	T	213	29		01.5	S	243.50	245.05	N	1	4		
↓	00.50				SJ	T	097	62		00.0	N	↓	↓	N	1	4		
	00.83	↓			SJ	T	206	26		00.0	N			N	1	4		
+1.24	00.96	ESK			SJ	B	317	40		00.1	N	243.50	245.05	N	1	4		
	00.97	↓							N	.		↓	↓					
	01.55	ESK							N	.		243.50	245.05					
+0.00	00.83	ESK	PPB		VN	B	246	38		01.0	S	245.05	246.55	N	1	3		
-0.98	00.52	PPB			VN	T	106	37		00.1	S	246.55	248.10	N	1	3	18	
↓	00.65	↓			SJ	T	024	37		00.2	N	↓	↓	N	1	3	18	
	00.79				SJ	B	147	46		00.5	T			N	1	3	↓	
↓	00.85	↓			SJ	T	066	37		00.2	N	↓	↓	N	1	3	↓	
-0.98	01.02	PPB			VN	B	125	64		00.4	S	246.55	248.10	N	1	3	18	
-0.85	01.13	PPB			VN	T	044	25		00.2	T	248.10	249.60	N	1	4	03	
	00.00	↓							W	.		249.60	251.15					
	01.55	PPB							W	.		249.60	251.15					
+0.00	00.84	↓			SJ	T	190	42		00.0	N	251.15	252.50	N	2	4	10	
	00.00								N	.		252.50	254.05					
	00.97	↓							N	.		↓	↓					
+0.00	01.38	PPB			SJ	T	024	64		00.0	N	252.50	254.05	N	1	3		SD
	00.00	↓							W	.		254.05	255.15					
	01.10	PPB							W	.		254.05	255.15					
	00.52	↓			VN	T	212	20		00.5	T	255.15	256.70	N	1	3		
	00.80	PPB			SJ	B	088	85		00.0	N	255.15	256.70	N	3	3		
-0.74	00.93	↓			SJ	T	009	35		00.0	N	256.70	258.25	N	1	3		

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "-" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N-NON ORIENTABLE W-WHOLE CORE
SLIC	SLICKENSIDES - YES OR NO
FRAC	1-Natural 2-Maybe (Natural or Mech.) 3-Mechanical
CONF	CONFIDENCE - 1-Poor . . . 4-Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

263

ORIENTED CORE DATA SHEET (MET.)

PROJECT: Aranzazu
LOCATION:
HOLE NO.: GHP-GMX-04
INCLINATION:
NORTHING:
BEARING:
EASTING:
DATE: 6/24/17
ELEVATION:
BY: SMD ZAO
DIA.: HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-020	01.12	PPB			SJ	T	028	48		00.0	N	258.25	259.80	N	1	3		SD
↓	01.29	↓			SJ	B	266	64		00.0	N	↓	↓	N	1	3		
-020	01.47	PPB			SJ	B	162	38		00.0	N	258.25	259.80	N	1	3		
-268	00.66	↓			SJ	B	050	50		00.0	N	259.80	261.35	N	1	3		
-268	01.38	↓			SJ	T	220	72		00.0	N	259.80	261.35	N	1	3		
	00.00	↓							N	.		261.35	262.35					
	01.00	PPB							N	.		261.35	262.35					
	00.00	↓							N	.		262.35	263.10					
	00.75	PPB							N	.		262.35	263.10					
-338	01.06	↓			SJ	T	346	37		00.0	N	263.10	264.65	N	1	4		
-338	01.49	↓			SJ	B	014	68		00.0	N	263.10	264.65	N	2	4		
-314	01.13	↓			VN	T	297	36		00.4	QS	264.65	266.20	N	1	3	03	
-314	01.44	PPB			SJ	B	240	42		00.0	N	264.65	266.20	N	1	3	03	
-296	01.21	↓			SJ	T	067	60		00.0	N	266.20	267.75	N	1	4	13	
-296	01.42	↓			SJ	B	107	64		00.0	S	266.20	267.75	N	1	4	13	
-089	00.91	↓			SJ	T	658	45		00.2	CLS	267.75	269.30	N	1	3		
↓	01.03				SJ	B	131	44		00.2	CLS	↓	↓	N	1	3		
-089	01.34	PPB			SJ	B	327	43		00.0	N	267.75	269.30	N	1	3		
-144	00.84	↓			SJ	T	006	33		00.0	N	269.30	270.85	N	1	3		
↓	00.96	↓			SJ	B	047	40		00.4	L	↓	↓	Y	1	3		
-144	01.33	PPB			VN	T	114	35		00.5	TLS	269.30	270.85	N	1	3		
-098	00.98	↓			SJ	T	039	55		00.0	N	270.85	272.40	N	1	2	36	
-098	01.31	↓			SJ	W	137	39		.		270.85	272.40	N	1	2	36	
-140	00.41	PPB			SJ	B	290	50		00.0	N	272.40	273.90	N	2	1	90+??	
	00.00									.		273.90	275.45					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "-" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N-NON ORIENTABLE W-WHOLE CORE
SLIC	SLICKENSIDES - YES OR NO
FRAC	1-Natural 2-Maybe (Natural or Mech.) 3-Mechanical
CONF	CONFIDENCE - 1-Poor . . . 4-Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT: Aranzazu
LOCATION: GHP-GMX-04
HOLE NO.:
INCLINATION:
NORTHING:
BEARING:
EASTING:
DATE: 6/25/17
BY: SMD ZAO
ELEVATION:
DIA.: HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	01.55	PPB			SJ	T	069	47	W	00.3	L	273.90	275.45	N	1	3		SP
-112	01.33	PPB			SJ	T	069	47		00.3	L	275.45	276.95	N	1	2		
-112	01.40	↓			VN	T	083	52		00.4	T	275.45	276.95	N	1	2		
-178	00.17				SJ	B	184	54		00.0	N	276.95	278.50	N	1	4	28	
↓	00.55				VN	T	154	55		00.1	S	↓	↓	N	1	4	28	
	00.79				SJ	B	097	46		00.1	N			N	2	4	28	
	01.09	↓			SJ	T	138	59		00.1	S			N	1	4	28	
-178	01.32	PPB			SJ	B	124	63		00.0	N	276.95	278.50	N	1	4	28	
-066	00.63	↓			SJ	T	330	66		00.0	N	278.50	280.00	N	1	4	05	
-066	01.16	PPB			SJ	B	055	53		00.0	S	278.50	280.00	N	1	4	05	
-244	00.84	↓			SJ	T	224	57		00.0	N	280.00	281.50	N	1	3	18	
	00.00				SJ		288	41	W	00.1	L	281.50	283.00	N	1			
	01.50	PPB							W			281.50	283.00					
-324	00.95				SJ	T	288	41		00.1	N	283.00	284.55	N	1	4	07	
-324	01.05	↓			SJ	B	281	53		00.0	N	283.00	284.55	N	1	4	07	
-259	00.79	PPB			SJ	B	009	52		00.0	S	284.55	286.05	N	1	4	06	
-292	00.51				SJ	B	310	62		00.1	LS	286.05	287.60	N	1	3	16	
↓	00.58	↓			SJ	T	246	55		00.1	LS	↓	↓	N	1	3	16	
-292	00.97	PPB			SJ	B	352	54		00.0	N	286.05	287.60	N	1	3	16	
	00.00								W			287.60	289.10				13	
	01.50								W			287.60	289.10				13	
+288	00.21				SJ	B	154	56		00.0	N	289.10	290.65	N	1	3	13	
↓	01.05	↓			SJ	B	143	52		00.0	N	↓	↓	N	1	3	13	
+288	01.08	PPB			SJ	T	028	59		00.0	N	289.10	290.65	N	1	3	13	
	00.00								N			290.65	292.15					

MISCELLANEOUS

REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS

SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS

N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

PROJECT Aranzazu
LOCATION GHP-GMX-04
HOLE NO.

ORIENTED CORE DATA SHEET (MET.)

INCLINATION
NORTHING
BEARING
EASTING

DATE 6/25/17
ELEVATION
BY SMD ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	01.50	PPB							N	.		290.65	292.15					SD
-146	00.67				SJ	T	090	60		00.1	S	292.15	293.70	N	1	4		
	00.28				SJ	B	139	67		00.0	N	.	.	N	2	4		
	00.70				SJ	B	181	81		00.0	N	.	.	N	3	4		
-146	01.43	PPB			SJ	T	001	74		00.0	N	292.15	293.70	N	2	4		
-244	00.77				SJ	T	141	68		00.0	N	293.70	295.20	N	2	4	10	
-244	01.10				SJ	B	348	57		00.1	S	293.70	295.20	N	2	4	10	
-256	00.36				SJ	T	181	67		00.0	N	295.20	296.75	N	2	4	04	
	00.73				SJ	B	304	76		00.0	N	.	.	N	3	4	04	
-256	01.38	PPB			SJ	B	339	55		00.0	N	295.20	296.75	N	2	4	04	
-048	1.11	PPB			VN	T	346	65		01.0	QS	296.75	298.25	N	2	4	04	
-092	00.31				SJ	B	121	33		00.1	T	298.25	299.80	N	1	4	10	
-092	01.22	PPB			SJ	T	652	93		00.4	TLS	298.25	299.80	N	1	4	10	
-155	01.27				SJ	T	045	44		00.0	N	299.80	301.30	N	1	4	10	
-155	01.31	PPB			SJ	T	098	22		00.0	N	299.86	301.30	N	2	4	10	
	00.00								N	.		301.30	302.85					
	01.55								N	.		301.30	302.85					
-138	00.76				SJ	B	127	48		00.0	N	302.85	304.35	N	1	4	05	
-124	00.21				SJ	B	217	54		00.0	N	304.35	305.90	N	1	4		
	00.42				SJ	B	240	32		00.0	N	.	.	N	1	4		
	00.98				VN	B	104	37		00.3	T	.	.	N	1	4		
	01.05				SJ	T	318	46		00.0	N	.	.	N	1	4		
-124	01.46	PPB			SJ	T	139	44		00.0	N	304.35	305.90	N	1	4		
-114	00.21				SJ	B	026	38		00.0	L	305.90	307.45	N	1	4	13	
-114	00.70	PPB			SJ	T	007	67		00.0	N	305.90	307.45	N	1	4	13	

MISCELLANEOUS

REF. ANGLE	"+" FOR TOP END OF CORE, "-" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N-NON ORIENTABLE W-WHOLE CORE
SLIC	SLICKENSIDES - YES OR NO
FRAC	1-Natural 2-Maybe (Natural or Mech.) 3-Mechanical
CONF	CONFIDENCE - 1-Poor . . . 4-Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS

SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS

N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

DRAFT

ARANZAZU

CALL & NICHOLAS. INC.

file: ocore_form_toro11-m.dwa

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-04
INCLINATION
NORTHING
BEARING
EASTING

DATE 6/26/17
ELEVATION
BY SHD ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	DRILL RUN DEPTHS FROM COLLAR (M) TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-114	00.91	PPB			SJ	T	062	84		00.0	N	305.90	307.45	N	2	4	13	SD
-114	01.22	PPB			SJ	B	260	82		00.0	N	305.90	307.45	N	2	4	13	
-308	00.11	PPB			SJ	B	095	67		00.0	N	307.45	308.95	N	2	3	20	
↓	00.36	↓			SJ	B	333	45		00.0	N	↓	↓	N	2	3	↓	
	00.74				SJ	B	358	56		00.0	N			N	2	3		
	01.15				SJ	B	055	35		00.0	N			N	1	3		
-308	01.52	PPB			VN	B	143	15		00.4	LTS	307.45	308.95	N	1	3	20	
-347	00.15				SJ	B	242	41		00.1	CL	308.95	310.50	N	1	4	13	
↓	00.27				VN	T	325	47		00.7	Q			N	1	4	13	
	00.60				SJ	B	317	54		00.0	N			N	1	4	↓	
-347	01.13	PPB			VN	T	078	11		00.5	QLS	308.95	310.50	N	1	4	13	
-055	00.20	PPB			SJ	B	094	84		00.0	N	310.50	312.00	N	2	4	02	
-272	00.82	↓			SJ	T	242	67		00.0	N	312.00	313.55	N	2	4	00	
↓	00.94				SJ	B	278	78		00.0	N	↓	↓	N	2	4	↓	
	01.06				SJ	T	170	59		00.0	N			N	1	4		
-272	01.37	PPB			VN	B	278	53		00.1	S	312.00	313.55	N	1	4	00	
	00.04	↓							N			313.55	315.10			3		
	00.55	PPB							N			313.55	315.10			3		
TD	01.15	↓											TD			3		
	01.25	PPB										313.55	315.10			3		
	0	P																

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEETS

DRILL HOLE GHP_GMX05

CALL & NICHOLAS, INC.

ORIENTED CORE DATA SHEET (MET.)

PROJECT: Aranzazu
LOCATION: 2000 Lvl
HOLE NO.: GHP-GMX-05
INCLINATION:
NORTHING:
BEARING:
EASTING:
DATE: 1/6/17
ELEVATION:
PAGE 1 OF
BY: ~~ZAD~~ JRG
DIA.: HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	0.00								N	.		0.00	165.76					
	165.76								W	.		0.00	165.76					
	0.00								N	.		165.76	168.75					
	2.85								N	.		165.76	168.75					
-072	2.87				SJ	B	050	64		00.0	S	165.76	168.75	N	1	1		
-072	2.90				SJ	B	315	43		00.0	S	165.76	168.75	N	1	1		
	0.00								N	.		168.75	173.35					
	4.60								N	.		168.75	173.35					
	0.00								N	.		173.35	176.35					
	2.75								W	.		173.35	176.35					
-084	2.83				SJ	T	052	37		00.0	CS	173.35	176.35	Y	2	1		
-084	2.89				SJ	B	286	46		00.0	CS	173.35	176.35	Y	3	1		
	0.00								W	.		176.35	179.45					
	1.95				~~SJ~~	~~B~~	~~223~~	~~30~~	N	~~00.0~~	~~CS~~	176.35	179.45	N	2	1		
-088	2.03				SJ	B	232	30		00.0	CS	↓ . ↓	↓ . ↓	N	2	1		
-088	2.11				SJ	T	196	39		00.0	C	176.35	179.45	N	1	1		
	0.00								N	00.		179.45	182.55					
	1.57								N	.		179.45	182.55					
-082	1.59				SJ	T	180	72		00.0	S	.	.	N	2	1		
-082	2.59				SJ	B	196	60		00.0	C	.	.	N	1	1		
-082	2.67				SJ	T	154	75		00.0	C	.	.	N	1	1		
-082	2.95				SJ	B	058	33		00.0	CS	.	.	N	2	1		
	0.00								N	.		182.55	183.25					
	0.75								N	.		182.55	183.25					
	.									.		.	.					

MISCELLANEOUS

REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS

SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS

N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT	Aranzazu	INCLINATION		BEARING		PAGE	2 OF
LOCATION	2000 Lvl	NORTHING		EASTING		DATE	1/6/17
HOLE NO.	GHP-GMX-05					BY	~~ZAO~~ JRG
						ELEVATION	
						DIA	HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-252	0.70				SJ	T	338	54		01.0	CS	183.25	186.35	N	2	1		JG
↓ ↓	1.30				SJ	T	105	62		00.0	SC	↓ ↓	↓ ↓	N	2	1		
-252	1.50				SJ	B	220	25		00.0	T	183.25	186.25	N	1	1		
-081	0.05				SJ	B	005	35		00.0	S	186.25	189.15	N	1	3		
↓ ↓	00.06					W						↓ ↓	↓ ↓					
-081	02.90					W						186.25	189.25					
~~-320~~	0.00								W			189.25	192.40					
	1.64								W									
-320	1.65				SJ	B	066	70		00.0	S			N	2	3		
↓ ↓	2.88				SJ	T	252	41		00.0	T	↓ ↓	↓ ↓	N	1	4		
-320	2.98				SJ	T	076	64		00.0	ST	189.25	192.40	N	2	3		
+300	0.17				SJ	T	098	57		00.0	ST	192.40	195.45	N	1	3		
	0.41				SJ	B	354	76		00.0	ST			N	1	4		
	0.67				SJ	B	172	63		00.0	ST			N	1	4		
	1.06				SJ	B	172	27		00.0	TS			N	1	3		
	1.20				SJ	B	027	20		00.0	ST			N	1	2		
	1.81				SJ	T	284	44		00.0	S			N	1	3		
	2.04				SJ	B	138	32		00.0	S			N	1	4		
	2.09				SJ	T	070	32		00.0	ST			N	1	3		
	2.30				SJ	B	154	34		00.0	S			N	1	4		
	2.36				SJ	T	156	21		00.0	S			N	1	1		
	2.37								N									
	2.57								N									
↓ ↓	2.58								W			↓	↓					
+300	3.05								W			192.40	195.45					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "-" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N-NON ORIENTABLE W-WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1-Natural 2-Maybe (Natural or Mech.) 3-Mechanical
CONF	CONFIDENCE – 1-Poor . . . 4-Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu PAGE 5 OF
LOCATION 2000 Lvl INCLINATION BEARING DATE 1/6/17 BY ~~ZAO~~ JRG RG
HOLE NO. GHP-GMX-05 NORTHING EASTING ELEVATION DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	STRUCTURE T/B	STRUCTURE CIRC. ANG.	STRUCTURE DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	DRILL RUN DEPTHS FROM COLLAR (M) TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-086	00.06				VN	T	050	38		00.0	SLT	195.45	198.51	N	1	4		JG
	00.25				VN	B	096	59		00.0	S	.	.	N	1	4		
	00.66				VN	B	130	54		00.0	LS	.	.	N	1	4		
	00.76				SJ	B	036	70		00.0	LS	.	.	N	2	3		
	00.81				VN	T	036	35		00.0	CSL	.	.	N	1	2		
	00.91				VN	B	038	36		01.0	SCL	.	.	N	1	3		
	01.21								N	.		.	.					
	02.01								N	.		.	.					
	02.14				VN	B	058	12		01.0	CSL	.	.	N	1	2		
	02.20				FT	T	350	08		01.0	CLS	.	.	Y	1	3		
	02.47				SJ	B	146	43		00.0	LS	.	.	Y	1	4		
	02.63				VN	B	126	34		00.0	LS	.	.	N	1	3		
	02.84				VN	T	038	55		01.0	STL	.	.	N	1	3		
-086	02.94				SJ	B	122	50		00.0	S	195.45	198.51	N	1	4		
-264	00.08				SJ	B	286	43		00.0	LSC	198.51	201.46	N	2	2		
	00.11				SJ	T	246	60		00.0	L	.	.	N	2	3		
	~~00.36~~				~~SJ~~	~~B~~	~~330~~	~~40~~		~~00.0~~	~~SL~~	.	.	~~N~~	~~2~~	~~3~~		
	00.36				SJ	T	196	33		00.0	SL	.	.	N	2	3		
	00.57				SJ	T	224	47		00.0	CLS	.	.	Y	1	4		
	00.70				SZ	B	350	18		01.0	CLS	.	.	Y	1	3		
	00.85				SZ	T	290	08		01.0	CLS	.	.	Y	1	3		
	01.16				SJ	B	038	63		00.0	LS	.	.	N	1	4		
	01.31				SJ	B	200	32		00.0	L	.	.	N	1	3		
	01.36				SZ	B	336	26		01.0	CLS	.	.	Y	1	3		
-264	01.61				VN	T	216	40		01.0	SL	198.51	201.46	N	1	4		

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT: Aranzazu | PAGE: 4 OF
LOCATION: 2000 Lvl | INCLINATION: | BEARING: | DATE: 1/6/17 | BY: ~~ZAG~~ JK
HOLE NO.: GHP-GMX-05 | NORTHING: | EASTING: | ELEVATION: | DIA.: HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-264	02.00				SJ	B	330	35		00.0	LS	198.51	201.46	N	1	4		JK
	02.29				SJ	B	252	57		00.0	LCS			Y	1	3		
	02.39				SJ	T	218	35		00.0	LS			Y	1	4		
	02.72				SJ	B	218	27		00.0	CL			N	1	3		
-264	02.87				SJ	T	264	47		00.0	LS	198.51	201.46	N	1	4		
-346	00.00				~~SJ~~	~~B~~	~~278~~	~~47~~	N			201.46	204.09					
	00.70								N									
	00.73				SJ	T	278	47		00.0	LS			N	1	3		
	01.18				SJ	B	268	55		00.0	LS			N	1	4		
	02.13				SJ	B	270	23		00.0	LS			Y	1	3		
-346	02.63				SJ	B	244	18		00.0	LS	201.46	204.09	N	1	3		
~~114~~	00.00								N			204.09	207.14					
	00.60								N									
-114	01.05				SJ	T	246	22		00.0	LS			N	1	2		
	01.59				SJ	B	276	24		00.0	LS			N	1	2		
	01.66				SJ	T	208	33		00.0	LS			N	1	2		
	01.82				SJ	T	218	52		00.0	LS			N	1	2		
	02.02				SJ	B	314	44		00.0	LCS			Y	1	3		
	02.20				SJ	B	330	22		00.0	LS			Y	1	3		
-114	02.92				SJ	B	304	38		00.0	LS	204.09	207.14	N	1	3		
	00.00								N			207.14	208.30					
	01.16								N			207.14	208.30					
	00.00								N			208.30	210.15					
	01.85								N			208.30	210.15					
	.									.		.	.					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

PROJECT Aranzazu

ORIENTED CORE DATA SHEET (MET.)

PAGE 5 OF

LOCATION

INCLINATION

BEARING

DATE

BY ZAO

HOLE NO.

NORTHING

EASTING

ELEVATION

DIA HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.00								N	.		210.15	21 . 2					
	01.0?								N	.		210.15	212.42					
-160	01.02				SJ	T	284	48		00.0	S	.	.	N	2	2		
	01.22				SJ	B	310	40		00.0	SL	.	.	N	2	2		
	01.35				VN	B	202	35		01.0	LS	.	.	N	1	3		
	01.60				SJ	B	198	18		00.0	LS	.	.	N	1	3		
	02.10				SJ	T	202	57		00.0	LS	.	.	N	2	1		
-160	02.23				VN	B	188	31		00.5	LS	210.15	212.42	N	1	2		
4	. 1				SJ	B	952	41		00.0	LS	212.42	215.50	N	2	3		
	.				VN	B	072	38		00.0	L	.	.	N	1	3		
	0 .89				VN	T	092	26		00.2	L	.	.	N	1	2		
	01.				SJ	T	ø94	61		00.0	L	.	.	N	1	4		
	01.45				VN	B	020	37		00.5	LS	.	.	N	1	3		
	01.58				SJ	B	006	55		00.0	L	.	.	N	1	4		
	01.80				VN	B	350	49		00.2	SL	.	.	N	1	4		
	01.95				SJ	T	168	54		00.0	SL	.	.	N	1	3		
	02.15				VN	B	004	57		00.4	LC	.	.	N	2	3		
-234	.				SJ	T	152	57		00.0	S	212.42	215.50	N	2	3		
-001	. 4				VN	T	338	61		00.0	SL	215.50	218.50	N	1	4	10	
	.				SJ	B	102	63		00.0	LS	.	.	N	2	3		
1	02.47				SJ	T	010	61		00.0	LS	215.50	218.50	N	2	3	10	
001	0 . 6				SJ	B	276	37		00.0	LTS	218.50	221.45	N	1	4	20	
	.				VN	T	280	52		00.5	LTS	.	.	N	1	3		
	.				VN	B	252	68		00.5	SLT	.	.	N	1	4		
1	.								W	.		.	.					

DRAFT

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-05

INCLINATION
NORTHING

BEARING
EASTING

DATE
ELEVATION

BY ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-001	2.95								W	.		218.50	221.45				20	
	0.00					N			N	.		221.45	224.53					
	2.90					N			N	.		.	.					
-120	2.95				SJ	T	030	31		00.00	S	221.45	224.53	N	2	1		
	0.00								N	.		224.53	227.55					
	2.40								N	.		.	.					
-188	2.49				VN	B	272	46		00.5	LS	.	.	N	1	3		
-188	2.77				SJ	B	2[illegible]2	31		00.0	S	224.53	227.55	N	2	2		
	0.00								N	.		227.55	230.05					
	2.29								N	.		.	.					
-288	2.30				SJ	T	244	52		00.0	SL	227.55	230.05	N	2	2		

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

CALL & NICHOLAS, INC.   file: ocore_form_toro11-m.dwg   ARAN7A7U

ORIENTED CORE DATA SHEETS

DRILL HOLE GHP_GMX06

CALL & NICHOLAS, INC.

ORIENTED CORE DATA SHEET (MET.)

PROJECT: Aranzazu
LOCATION:
HOLE NO.: GHP-GMX-06

INCLINATION: -50°
NORTHING: 2724023

BEARING: 205°
EASTING: 254118

DATE:
ELEVATION: 2000

BY: ~~ZAO~~ JRG
DIA.: HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.00	LMS	SKN						N			000.00	003.10					JG
	03.10	LMS	SKN						N			000.00	003.10					
	00.00	LMS							N			003.10	006.15					
	03.05	LMS							N			003.10	006.15					
	00.00	LMS	PPB						N			006.15	009.20					
	03.05	LMS	PPB						N			006.15	009.20					
	00.00	LMS							N			009.20	012.25					
	03.05	LMS							N			009.20	012.25					
	00.00	LMS							N			012.25	015.30					
	03.05	LMS							N			012.25	015.30					
	00.00	LMS							N			015.30	018.35					
	03.05	LMS							N			015.30	018.35					
	00.00	LMS							N			018.35	021.40					
	03.05	LMS							N			018.35	021.40					
	00.00	LMS							N			021.40	023.40					
	02.00	LMS							N			021.40	023.40					
	00.00	LMS							N			023.40	026.50					
	03.10	LMS							N			023.40	026.50					
	00.00	LMS	SKN						N			026.50	028.50					
	02.00	LMS	SKN						N			026.50	028.50					
	00.00	LMS	SKN						N			028.50	030.50					
	02.00	LMS	SKN						N			028.50	030.50					
	00.00	LMS							N			030.50	033.35					
	02.85	LMS							N			030.50	033.35					

MISCELLANEOUS

REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES — YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE — 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

MBL	Marble
LMS	Limestone
PBQ	Intrusive
PPB	Intrusive
HFL	Hornfells
ESK	Skarn
CSS	Fill

STRUCTURE TYPE ABBREVIATIONS

SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS

N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHR-GMX-06
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/6/17
ELEVATION
BY ~~ZAO~~
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.00	LMS							N			033.35	036.40					
	03.05	LMS							N			033.35	036.40					
	00.00	LMS							N			036.40	037.75					
	01.35	LMS							N			036.40	037.75					
	00.00	LMS							N			037.75	039.35					
	01.60	LMS							N			037.75	039.35					
	00.00	LMS							N			039.35	040.85					
	01.50	LMS							N			039.35	040.85					
	00.00	LMS							N			040.85	042.85					
	02.00	LMS							N			040.85	042.85					
	00.00	LMS							N			042.85	044.60					
	01.35	LMS							N									
+200	01.37				SJ	B	342	55		00.05	L			N	1	1		
	01.44				SJ	B	280	47		00.05	S			N	1	1		
+200	01.59	LMS			SJ	T	038	36		00.05	L	042.85	044.60	N	1	1		
	00.00	LMS							N			044.60	046.10					
	01.50	LMS							N			044.60	046.10					
	00.00	LMS							N			046.10	048.10					
	02.00	LMS							N			046.10	048.10					
	00.00	LMS	SKN						N			048.10	050.10					
	02.00	LMS	SKN						N			048.10	050.10					
	00.00	MBL	SKN						N			050.10	053.10					
	03.00	MBL	SKN						N			050.10	053.10					
	00.00	MBL							N			053.10	056.20					
	03.10	MBL							N			053.10	056.20					

MISCELLANEOUS

REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N-NON ORIENTABLE W-WHOLE CORE
SLIC	SLICKENSIDES − YES OR NO
FRAC	1-Natural 2-Maybe (Natural or Mech.) 3-Mechanical
CONF	CONFIDENCE − 1-Poor . . . 4-Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS

SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS

N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-06
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/7/17
ELEVATION
BY ~~ZAO~~ JRS
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.00	MBL				N			N	.		056.20	059.30					JG
	02.50	↓				N			N	.		056.20	059.30					
-166	02.55				VN	T	212	32		01.0	T	.	↓	N	1	2		
↓	02.66	↓			SJ	B	188	65		00.0	T	↓	↓	N	2	2		
-166	02.87	MBL			SJ	B	076	65		00.0	T	056.20	059.30	N	1	3		
	00.00	↓							N	.		059.30	061.20					
	01.90	MBL							N	.		059.30	061.20					
	00.00	↓							N	.		061.20	062.50					
	00.30	MBL							N	.		↓	↓					
-006	00.35	↓			SJ	T	254	24		00.0	T	.	.	N	1	3		
↓	00.52	↓			SJ	B	132	49		00.0	T	↓	↓	N	2	2		
-006	01.13	mBL			SJ	T	054	66		00.0	T	061.20	062.50	N	2	2		
	00.00	↓							N	.		062.50	065.35					
	02.85	MBL							N	.		062.50	065.35					
	00.00	↓							N	.		065.35	068.40					
	03.05	MBL							N	.		065.35	068.40					
	00.00	MBL	SKN						N	.		068.40	070.45					
	02.05	MBL	SKN						N	.		068.40	070.45					
	00.00	SKN							N	.		070.45	071.75					
	01.30	SKN							N	.		070.45	071.75					
	00.00	↓							N	.		071.75	074.45					
	02.70	SKN							N	.		071.75	074.45					
	00.00	↓							N	.		074.45	076.45					
	02.00	SKN							N	.		074.45	076.45					

DRAFT

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ARAN7A7U

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-06

INCLINATION
NORTHING

BEARING
EASTING

DATE 6/7/17
ELEVATION

BY ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.00	SKN				N			N			076.45	077.95					
	01.50	SKN				N			N			076.45	077.95					
	00.00	↓				N			N			077.95	078.95					
	01.00	SKN				N			N			077.95	078.95					
	00.00	↓				N			N			078.95	080.95					
	02.00	SKN				N			N			078.95	080.95					
	00.00	↓				N			N			080.95	081.95					
	01.00	SKN				N			N			080.95	081.95					
	00.00	↓							N			081.95	084.95					
	03.00	SKN							N			081.95	084.95					
	00.00	↓							N			084.95	086.65					
	01.70	SKN							N			084.95	086.65					
	00.00	↓							N			086.65	088.00					
	01.35	SKN							N			086.65	088.00					
	00.00								N			088.00	089.85					
	01.85	SKN							N			088.00	089.85					
	00.00								N			089.85	091.05					
	01.20								N			089.85	091.05					
	00.00								N			091.05	094.10					
	03.05	↓							N			091.05	094.10					
	00.00	SKN	HFL						N			094.10	097.15					
	03.05	SKN	HFL						N			094.10	097.15					
	00.00	HFL							N			097.15	099.30					
	02.15	HFL							N			097.15	099.30					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS	

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-06

INCLINATION
NORTHING

BEARING
EASTING

DATE 6/9/17
ELEVATION

PAGE 5 OF 7
BY ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.00	HFL							N	.		099.30	102.35					
	03.05	HFL							N	.		099.30	102.35					
	00.00								N	.		102.35	105.05					
	02.20	HFL							N	.		102.35	105.05					
	00.00								N	.		105.05	108.05					
	00.91								N	.		.	.					
-206	01.23				SJ	T	180	61		00.0	LS	.	.	N	2	1		
	01.37				SJ	T	024	69		00.0	LS	.	.	N	2	1		
	01.55				VN	B	338	35		01.5	SL	.	.	N	1	2		
-206	01.74	HFL			SJ	T	060	63		00.0	N	105.05	108.05	N	2	1		
	00.00								N	.		108.05	110.05					
	02.00								N	.		108.05	110.05					
	00.00								N	.		110.05	111.35					
	01.30								N	.		110.05	111.35					
	00.00								N	.		111.35	114.20					
	02.85								N	.		111.35	114.20					
	00.00								N	.		114.20	115.60					
	01.40								N	.		114.20	115.60					
	00.00								N	.		115.60	117.50					
	01.90								N	.		115.60	117.50					
	00.00								N	.		117.50	120.55					
	02.75								N	.		117.50	120.55					
	00.00								N	.		120.55	122.85					
	02.60	HFL							N	.		120.55	122.85					
	.									.		.	.					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT: Aranzazu
LOCATION:
HOLE NO.: GHP-GMX-06
INCLINATION:
NORTHING:
BEARING:
EASTING:

DATE: 6/10/17
ELEVATION:
BY: ZAO
DIA.: HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.00	HFL							N			122.85	125.95					
	02.60								N									
-048	02.72				SJ	B	226	42		00.0	LC			N	1	3		
-048	02.83	HFL			SJ	T	008	51		00.0	L	122.85	125.95	N	2	2		
	00.00	PPB							N			125.95	129.05					
	03.10	PPB							N			125.95	129.05					
-336	00.66				SJ	B	276	61		00.5	S	129.05	132.10	N	2	2		
	00.80				VN	B	142	20		00.2	SL			N	1	4		
	00.96				VN	T	006	47		01.0	S			N	1	3		
	01.22				VN	B	136	33		00.5	S			N	1	3		
-336	02.34	PPB			SJ	T	056	33		00.0	LS	129.05	132.10	N	2	2		
	00.00								N			132.10	135.15					
	00.80								N									
-254	01.05				SJ	T	054	58		00.0	SL			N	2	3		
	01.35				SJ	B	168	62		00.0	SL			N	1	4		
	01.44				SJ	B	152	56		00.0	N			N	1	3		
	01.46				SJ	T	050	58		00.0	S			N	1	2		
	01.49				SJ	B	134	58		00.0	N			N	1	3		
	01.50								N									
	01.58								N									
	01.59				SJ	T	040	33		00.0	~~O~~LS			Y	1	2		
	02.21				SJ	T	092	48		00.0	SL			N	1	3		
	02.65				VN	B	088	44		00.5	LS			N	1	3		
-254	02.85	PPB			SJ	B	162	63		00.0	SL	132.10	135.15	N	1	3		

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ARAN7A7U

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-06

INCLINATION
NORTHING

BEARING
EASTING

DATE 6/10/17
ELEVATION

BY ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.00	PPB							N	.		135.15	135.65					
	00.50								N	.		135.15	135.65					
	00.00								W	.		135.65	136.45					
	00.80								W	.		135.65	136.45					
	00.00								N	.		136.45	138.80					
	02.35								N	.		136.45	138.80					
	00.00								N	.		138.80	139.85					
	01.05								N	.		138.80	139.85					
	00.00								N	.		139.85	142.85					
	03.00								N	.		139.85	142.85					
	00.00								N	.		142.85	145.85					
	03.00								N	.		142.85	145.85					
	00.00								N	.		145.85	148.90					
	03.10								N	.		145.85	148.90					
	00.00								N	.		148.90	150.40					
	01.50	PPB							N	.		148.90	150.40					
	.									.		.	.					
	.									.		.	.					
	.									.		.	.					
	.									.		.	.					
	.									.		.	.					
	.									.		.	.					
	.									.		.	.					
	.									.		.	.					
	.									.		.	.					

DRAFT

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEETS

DRILL HOLE GHP_GMX07

CALL & NICHOLAS, INC.

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-07

INCLINATION
NORTHING

BEARING
EASTING

DATE 6/12/17
ELEVATION

PAGE 1 OF 14
BY ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.00	LMS							N	.		000.00	008.75					
	08.75								N	.		000.00	008.75					
-000	00.16				VN	B	322	28		00.5	TLS	008.75	011.75	N	2	2		
	00.58				SJ	T	142	51		00.0	LS	.	.	N	2	1		
	01.11				SJ	B	178	45		00.0	LS	.	.	N	1	3		
	01.21				VN	T	200	31		01.0	LST	.	.	N	1	4		
	01.39				SJ	B	266	80		00.0	N	.	.	N	2	2		
	02.09				VN	T	246	20		02.0	LT	.	.	N	1	4		
	02.34				SJ	T	358	57		00.0	N	.	.	N	1	3		
-000	02.49				VN	T	198	30		00.0	LS	008.75	011.75	N	1	3		
	00.00								N	.		011.75	015.80					
	04.05	LMS							N	.		011.75	015.80					
	00.00								N	.		015.80	018.30					
	02.50								N	.		015.80	018.30					
-330	00.15				SJ	T	326	36		00.0	N	018.30	020.80	N	1	3		
-330	00.45	LMS			VN	T	347	28		01.5	T	018.30	020.80	N	1	3		
	.								N	.		020.80	021.80					
	.								N	.		020.80	021.80					
	00.00	LMS							N	.		021.80	023.45					
	00.45								N	.		.	.					
0000	00.58				SJ	B	280	65		00.0	N	.	.	N	1	3		
000	01.21				VN	B	092	48		00.2	T	021.80	023.45	N	1	3		
	00.00								N	.		023.45	025.55					
	02.10	LMS							N	.		023.45	025.55					
	.									.		.	.					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT: Aranzazu
LOCATION:
HOLE NO.: GHP-GMX-07
INCLINATION:
NORTHING:
BEARING:
EASTING:
DATE: 6/13/17
ELEVATION:

BY: ZAO
DIA.: HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.00	LMS							N			025.55	026.80					
	01.25	LMS	PPB						N			025.55	026.80					
	00.00								N			026.80	029.90					
	00.73								N									
000	01.30				VN	B	034	23		00.2	TL			N	1	3		
000	02.58	LMS	PPB		SJ	T	006	41		00.0	T	026.80	029.90	N	1	4		
	00.69	PPB	LMS		VN	T	178	61		01.0	LTS	029.90	032.90	N	2	2	99	
	01.12				VN	B	172	27		04.0	TLS			N	1	2		
	01.27				SJ	T	204	60		00.0	N			N	2	2		
	01.44				VN	B	132	21		02.2	CLT			Y	1	2		
	01.53				SJ	T	156	51		00.0	N			N	2	2		
	01.85				SJ	B	010	43		00.0	N			N	2	2		
000	02.13	PPB	LMS		SJ	T	178	43		00.0	S	229.90	032.90	N	2	1	99	
	00.00	LMS							N			032.90	035.60					
	01.75								N									
	01.88				SJ	T	138	45		00.0	N			N	2	3		
	02.13				SJ	B	032	63		00.0	N			N	2	2		
000	02.26	LMS			VN	T	022	28		01.0	LCS	032.90	035.60	N	1	3		
	00.00	MBL							N			035.60	036.60					
	01.00	MBL							N			035.60	036.60					
	00.00	MBL							N			036.60	039.40					
	02.80	MBL							N			036.60	039.40					
	00.00	MBL							N			039.40	042.20					
	02.80	MBL							N			039.40	042.20					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES — YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE — 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS	

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

CALL & NICHOLAS. INC. file: ocore_form_toro11-m.dwa ARAN7A7U

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-07
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/14/17
ELEVATION
BY ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	0.00	MBL							N			042.20	044.05					SD
	1.85	MBL							N			042.20	044.05					
+154	0.54	MBL			SJ	T	156	68		.0	ST	044.05	045.80	N	2	3		
	0.78				BD	T	018	26		00.0	L			N	1	3		
	1.03				SJ	T	146	59		00.0	SL	SC		N	2	3		
	1.10				SJ	T	262	32		00.0	C			Y	1	3		
+154	1.60	MBL			SJ	T	078	66		00.0	N	044.05	045.80	N	1	3		
+190	0.41	~~MBL~~			BD	B	340	24		.0	CL	045.80	047.45	Y	1	3		
	0.46				SJ	T	334	53		.0	N			N	2	3		
+190	0.78				SJ	B	108	42		.0	L			N	1	3		
+000	1.65								N			045.80	047.45					
	0.00				~~SJ~~	~~B~~	~~130~~	~~64~~	N			047.45	048.90					
	1.45				~~SJ~~	~~T~~	~~044~~	~~72~~	N			047.45	048.90					
	0.00								N			048.90	050.30					
+000	0.13				SJ	B	130	64		.0	T			N	1	3		
	0.23				SJ	B	094	72		.0	TL			N	2	3		
	0.37				SJ	B	050	68		.0	TL			N	1	3		
	0.84				BD	B	238	20		.0	AL			N	1	3		
	0.97				BD	B	290	30		.0	A			N	1	3		
+000	1.10				SJ	B	296	80		.0	N	048.90	050.30	N	3	3		
	0.54				SJ	T	294	64		.0	N	050.30	051.45	N	1	3		
	0.71				SJ	B	030	79		.0	N	050.30	051.45	N	2	3		
	0.94				SJ	B	006	66		.0	N	050.30	051.45	N	2	3		
	1.03				SJ	B	260	76		.0	T	050.30	051.45	N	2	3		
	00.00								W			051.45	051.65					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N—NON ORIENTABLE W—WHOLE CORE
SLIC	SLICKENSIDES — YES OR NO
FRAC	1—Natural 2—Maybe (Natural or Mech.) 3—Mechanical
CONF	CONFIDENCE — 1—Poor . . . 4—Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT: Aranzazu
LOCATION:
HOLE NO.: GHP-GMX-07
INCLINATION:
NORTHING:
BEARING:
EASTING:

DATE: 6/14/17
ELEVATION:
BY: ZAO SMD
DIA.: HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.20								W	.		051.45	051.65					
-228	00.10	MBL			VN	T	142	74		00.2	T	051.65	054.70	N	1	3		
	00.47				SJ	T	016	41		00.0	N	.	.	N	1	4		
	00.56				VN	B	184	36		00.2	TL	.	.	N	2	3		
	01.94				VN	B	180	35		01.0	TL	.	.	N	1	4		
-228	02.80	MBL			SJ	B	102	75		00.0	N	051.65	054.70	N	2	3		
	00.00								W	.		054.70	055.30					
	60.60								W	.		054.70	055.30					
-110	00.96				SJ	T	320	24		00.0	T	055.30	057.80	N	1	3		
	00.95				BD	B	120	27		.0	T	.	.	N	1	3		
	01.35				BD	B	138	35		.0	W	.	.	N	1	3		
	01.41				BD	B	128	34		.0	AC	.	.	N	1	3		
	01.44				BD	B	168	42		.0	N	.	.	N	1	2		
	01.53				BD	T	088	33		.0	N	.	.	N	2	3		
	01.95	MBL			SJ	B	340	65		.0	N	.	.	N	3	3		
-110	02.03	MBL			BD	T	098	33		.0	AC	055.30	057.80	N	1	3		
	00.06	HFL							N	.		057.80	060.80					
	03.00								N	.		057.80	060.80					
	00.00								N	.		060.80	063.10					
	02.30	HFL							N	.		060.80	063.10					
	00.00	HFL							N	.		063.10	064.75					
	00.30								N	.		.	.					
	00.40				SJ	B	164	59		00.0	N	.	.	N	2	3		
	00.41								N	.		.	.					
	00.55								N	.		063.10	064.75					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ARAN7A7U

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-07

INCLINATION
NORTHING

BEARING
EASTING

PAGE 5 OF 14
DATE 6/14/17
ELEVATION

BY ZAO SMO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-088	00.56	HFL			VN	B	168	30		00.0	L	063.10	064.75	N	1	3		SD
	00.85				VN	B	272	25		01.0	L			N	1	3		
	00.91				SJ	T	204	36		00.0	L			N	1	3		
	01.01				SJ	B	304	36		00.0	LC			N	1	3		
-088	01.11	HFL			BD	T	274	24		00.0	L	063.10	064.75	N	1	3		
	00.00								N			064.75	066.55					
	01.80								N			064.75	066.55					
	00.00								N			066.55	068.40					
	01.85								N			066.55	068.40					
	00.34	HFL			VN	B	062	08		00.0	T	068.40	070.00	N	1	3		
	00.52				SJ	T	154	58		00.0	T	068.40	070.00	N	1	3		
	00.77				SJ	B	040	48		00.0	L			N	1	3		
	00.87				SJ	B	078	26		00.0	N			N	1	3		
	00.92				SJ	T	152	74		00.0	N			N	2	3		
	01.22				SJ	B	252	58		00.0	N			N	2	3		
	01.40				SJ	B	028	66		00.0	N			N	1	3		
	01.53	HFL			SJ	B	234	57		00.0	N	068.40	070.00	N	1	3		
	00.00								N			070.00	071.30					
	01.30								N			070.00	071.30					
	00.00								N			071.30	073.05					
	01.75								N			071.30	073.05					
	00.00								N			073.05	073.85					
	00.80								N			073.05	073.85					
	00.00								N			073.85	075.85					
	02.00								N			073.85	075.85					

DRAFT

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "-" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N-NON ORIENTABLE W-WHOLE CORE
SLIC	SLICKENSIDES - YES OR NO
FRAC	1-Natural 2-Maybe (Natural or Mech.) 3-Mechanical
CONF	CONFIDENCE - 1-Poor . . . 4-Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ARANZAZU

PROJECT	Aranzazu	INCLINATION		DATE	6/16/17
LOCATION		BEARING		BY	ZAO SMD
HOLE NO.	GHP-GMX-07	NORTHING		DIA.	HQ3
		EASTING		ELEVATION	

ORIENTED CORE DATA SHEET (MET.)

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.00	HFL	LMS						N			075.85	076.55					SD
	00.00								N			075.85	076.55					
	00.00								N			076.55	077.75					
	01.20								N			076.55	077.75					
	00.00								N			077.75	078.40					
	00.65								N			077.75	078.40					
	00.00								N			078.40	079.30					
	00.90	HFL	LMS						N			078.40	079.30					
	00.00								N			079.30	080.50					
	01.20								N			079.30	080.50					
	00.00								N			080.50	081.70					
	01.20								N			080.50	081.70					
	00.00											081.70	084.55					
	02.85											081.70	084.55					
	00.00											084.55	085.95					
	01.40		LMS									084.55	085.95					
-23.0	00.43	HFL			SJ	B	281	50		00.0	N	085.95	088.65	N	1	3		
-23.0	00.50				VN	T	004	30		01.0	E	085.95	088.65	N	1	3		
	00.51																	
	02.70	HFL										085.95	088.65					
	00.00		LMS						N			088.65	091.70					
	01.67								N									
-27.5	2.00				SJ	T	098	81		00.0	N			N	2	1		
	2.15				SS	B	154	74		00.0	N			N	2	1		
-27.5	2.52				SJ	T	066	68		00.0	N	088.65	091.70	N	2	1		

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES — YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE — 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ARANZAZU

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GM-07
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/18/17
ELEVATION
BY ZAO SMD
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
+000.0	00.10	HFL	LMS		SJ	T	290	68		00.0	N	092.75	094.40	N	2	3		SD
	00.47				SJ	B	264	33		00.0	L			N	1	3		
	00.54				SJ	T	067	52		00.0	N			N	1	3		
	00.63				SJ	B	258	71		00.0	N			N	2	3		
	00.82				SJ	B	070	50		00.0	N			N	1	3		
	00.91				SJ	T	272	43		00.0	N			N	1	3		
	01.15				SJ	B	270	24		00.0	L			N	1	3		
	01.20				SJ	B	358	47		00.1	L			N	1	3		
	01.28				SJ	T	274	42		00.0	N			N	1	3		
+000	01.37				SJ	T	154	78		00.0	N	092.75	094.40	N	3	3		
	00.24											094.40	096.70					
	00.73											094.40	096.70					
-094	00.24	ESK			SJ	B	186	54		00.0	N	096.70	098.50	N	1	1		
	00.73				VN	T	304	64		00.2	T			N	2	1		
	00.94				SJ	B	280	75		00.0	N			N	2	1		
	01.10				SJ	B	108	71		00.0	N			N	2	1		
	01.24				SJ	B	014	70		00.0	N	096.70	098.50	N	3	1		
	01.52				SJ	B	182	43		00.0	N			N	2	1		
-094	01.64				SJ	T	078	73		00.0	N	096.70	098.50	N	3	1		
-158	00.05				SJ	B	212	74		00.0	N	098.50	099.85	N	2	3		
	00.37				SJ	B	[illegible]40	86		00.0	N			N	3	3		
	00.72				SJ	B	210	68		00.0	N			N	2	3		
	00.79				SJ	T	098	64		00.0	N			N	3	3		
	00.84				SJ	T	024	64		00.0	N			N	2	3		
-158	01.06	ESK			SJ	B	230	75		00.0	N	098.50	099.85	N	2	3		

91.70
92.75
*

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N-NON ORIENTABLE W-WHOLE CORE
SLIC	SLICKENSIDES — YES OR NO
FRAC	1-Natural 2-Maybe (Natural or Mech.) 3-Mechanical
CONF	CONFIDENCE — 1-Poor . . . 4-Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

CALL & NICHOLAS. INC. file: ocore_form_toro11-m.dwa * 91.70 - 92.75 NON ORIENTED! ARAN7A7U

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-07
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/18/17
ELEVATION
BY ZAO SAD
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-158	01.25	ESK			SJ	B	142	70		00.0	N	098.50	099.85	N	2	3		SD
+000	00.00								N	.		099.85	099.95					
	00.10								N	.		099.85	099.95					
	00.00								N	.		099.95	100.15					
	00.20								N	.		099.95	100.15					
	00.10				SJ	T	208	71		00.0	N	100.15	102.00	N	1	3		
	00.96				VN	B	322	37		01.0	ST	.	.	N	1	3		
	00.97								N	.		.	.					
	01.21								N	.		.	.					
	01.22				VN	T	151	18		00.5	T	.	.	N	1	3		
	01.50				SJ	B	246	33		00.0	N	.	.	N	1	3		
+000	01.76				SJ	B	290	61		00.0	N	100.15	102.00	N	2	3		
+000	00.00	ESK							N	.		102.00	104.85					
	00.40	MBL							N	.		.	.					
	02.07				SJ	T	004	78		00.0	N	.	.	N	1	3		
+000	02.67				SJ	B	314	48		00.0	T	102.00	104.85	N	1	3		
	00.00								N	.		104.85	107.75					
	01.04								N	.		.	.					
-022	01.14	MBL			SJ	B	014	67		00.0	N	.	.	N	2	3		
	01.35				SJ	B	237	74		00.0	N	.	.	N	3	3		
	01.81		ESK		SJ	B	019	70		00.2	L	.	.	Y	1	3		
	02.11		ESK		SJ	T	086	77		00.0	L	.	.	N	1	3		
	02.47				FT	B	123	35		01.0	C	.	.	Y	1	3		
	02.48								N	.		.	.					
-022	02.66	MBL							N	.		104.85	107.75					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ARANZAZU

CALL & NICHOLAS. INC.

file: ocore_form_toro11-m.dwa

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION GHP-GMX-07
HOLE NO.
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/19/17
ELEVATION
BY ZAO SMD
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-022	02.67	MBL			SJ	T	121	78		00.1	L	104.85	107.75	N	1	3		SD
-022	02.84	MBL			SJ	B	018	34		00.0	N	104.85	107.75	N	2	3		
	00.00	MBL							N			107.75	108.90					
	01.15	MBL							N			107.75	108.90					
	00.00								N			108.90	110.10					
	01.70								N			108.90	110.10					
	00.00								N			110.10	112.10					
	02.00								N			110.10	112.10					
	00.00								N			112.10	115.00					
	02.90								N			112.10	115.00					
	00.00								N			115.00	116.20					
	01.20								N			115.00	116.20					
	00.00								N			116.20	119.25					
	03.05								N			116.20	119.25					
	00.00								N			119.25	121.55					
	02.30								N			119.25	121.55					
	00.00								W			121.55	123.85					
	01.07								W			121.55	123.85					
	01.08								N			↓	↓					
	02.30	MBL							N			121.55	123.85					
-202	01.09				SJ	T	036	50	~~N~~	00.0	N	123.85	125.50	N	1	3		
↓	01.19				SJ	B	206	46	~~N~~	00.2	T	↓	↓	N	1	3		
↓	01.35				VN	T	222	57		00.5	T			N	1	3		
-202	01.36				VN	B	058	22		01.0	T	123.85	125.50	N	1	3		
-262	00.14	MBL			SJ	B	318	55		00.0	N	125.50	128.55	N	1	3		

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "-" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N-NON ORIENTABLE W-WHOLE CORE
SLIC	SLICKENSIDES - YES OR NO
FRAC	1-Natural 2-Maybe (Natural or Mech.) 3-Mechanical
CONF	CONFIDENCE - 1-Poor . . . 4-Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-07
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/20/17
ELEVATION
BY SMD ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-2.62	00.24	MBL			VN	B	038	48		00.5	T	125.50	128.55	N	1	2		SD
	00.30				SJ	T	084	44		00.1	N	.	.	N	1	2		
	00.72				SJ	T	262	55		00.2	T	.	.	N	1	2		
	00.92				SJ	B	232	82		00.2	T	.	.	N	1	3		
	01.91				SJ	T	112	72		00.0	N	.	.	N	2	3		
-2.62	02.07	MBL			SJ	B	262	58		00.0	N	125.50	128.55	N	1	3		SD
	00.00				~~SJ~~	~~T~~	~~068~~	~~77~~	N	00.		128.55	129.45	~~N~~	~~2~~	~~3~~		
	00.90								N	.		128.55	129.45					
	00.00								N	.		129.45	131.85					
	02.40								N	.		129.45	131.85					
	00.00								N	.		131.85	134.65					
	01.92								N	.		131.85	134.65					
	02.16				SJ	T	066	77		00.0	N	.	.	N	2	3		
	02.37				SJ	B	110	8[illegible]		00.0	N	.	.	N	3	3		
	02.67				SJ	B	110	85		00.0	N	131.85	134.65	N	3	3		
	00.00								N	.		134.65	136.85					
	02.20	MBL							N	.		134.65	136.85					
	00.00								N	.		136.85	137.75					
	00.90								N	.		136.85	137.75					
	00.00								N	.		138.55	139.70					
	01.15								N	.		138.55	139.70					
	00.60								N	.		139.70	140.65					
	00.95								N	.		139.70	140.65					
	00.00								N	.		140.65	141.20					
	00.55								N	.		140.65	141.20					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "-" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N-NON ORIENTABLE W-WHOLE CORE
SLIC	SLICKENSIDES - YES OR NO
FRAC	1-Natural 2-Maybe (Natural or Mech.) 3-Mechanical
CONF	CONFIDENCE - 1-Poor . . . 4-Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

CALL & NICHOLAS, INC. file: ocore_form_toro11-m.dwa

137.75 → 138.55 N 0.00 → 0.80

ARANZAZU

ORIENTED CORE DATA SHEET (MET.)

PROJECT: Aranzazu
LOCATION:
HOLE NO.: GHP-GMX-07
INCLINATION:
NORTHING:
BEARING:
EASTING:
PAGE 11 OF 14
DATE: 6/21/17
ELEVATION:
BY: SMD ZAO
DIA.: HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.74	MBL							N	.		141.20	143.90					SD
	02.70								N	.		141.20	143.90					
	00.00								N	.		143.90	146.95					
	03.05								N	.		143.90	146.95					
	00.00								N	.		146.95	148.70					
	01.75								N	.		146.95	148.70					
	00.00								N	.		148.70	150.05					
	01.35	MBL							N	.		148.70	150.05					
	00.00								N	.		150.05	153.10					
	01.95								N	.		.	.					
-1.67	01.96	MBL			VN	T	202	50		00.5	T	.	.	N	1	3		
+1.67	02.16	MBL			SJ	B	184	60		00.1	T	150.65	153.05	N	1	3		
	00.00								N	.		153.05	156.15					
	03.05								N	.		153.05	156.15					
+3.53	00.12	MBL			SJ	B	026	26		00.1	T	141.20	143.90	N	1	3		SD
	00.24				VN	T	144	30		00.5	T	.	.	N	1	3		
	00.35				FT	B	206	44		00.4	CLS	.	.	N	1	3		
	00.47				SJ	B	233	80		00.1	T	.	.	N	1	3		
+3.53	00.73	MBL			SJ	B	064	70		00.0	N	141.20	143.90	N	1	3		
	00.00								N	.		156.15	159.20					
	03.05								N	.		156.15	159.20					
	00.00								N	.		159.20	162.25					
	03.05								N	.		159.20	162.25					
	00.00	MBL							N	.		162.25	165.30					
	03.05	PPB							N	.		162.25	165.30					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N—NON ORIENTABLE W—WHOLE CORE
SLIC	SLICKENSIDES — YES OR NO
FRAC	1—Natural 2—Maybe (Natural or Mech.) 3—Mechanical
CONF	CONFIDENCE — 1—Poor . . . 4—Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

CALL & NICHOLAS. INC. file: ocore_form_toro11-m.dwa ARANZAZU

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-07

INCLINATION
NORTHING

BEARING
EASTING

DATE 6/25/17
ELEVATION

BY SMD ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.00	PPB							N	.		165.30	168.35					SD
	00.37								N	.		.	.					
+000.0	00.90				SJ	B	025	56		00.2	N	.	.	N	2	3		
	01.11				SJ	B	168	38		00.2	N	.	.	N	2	3		
	01.83				SJ	T	044	69		00.0	N	.	.	N	2	3		
+000.0	02.30	PPB			SJ	T	327	59		00.0	N	165.30	168.35	N	2	3		
	00.00								N	.		168.35	171.40					
	03.05								N	.		168.35	171.40					
-345	00.00								N	.		171.40	174.45					
	00.60								N	.		.	.					
	01.01				SJ	T	224	47		00.5	S	.	.	N	1	2		
	01.33				SJ	B	277	41		00.0	N	.	.	N	2	2		
	01.96				SJ	B	050	57		00.0	N	.	.	N	2	2		
-345	02.76	PPB			FT	B	316	35		00.4	C	171.40	174.45	Y	1	2		
-011	00.32	PPB			FT	B	025	24		00.2	CL	174.45	177.10	Y	1	2		
	00.63				FT	B	114	23		00.5	CL	.	.	Y	1	2		
	01.62				SJ	T	037	30		00.0	N	.	.	N	1	2		
	01.66				SJ	T	110	64		00.1	T	.	.	N	1	2		
	01.74				SJ	B	206	81		00.0	N	.	.	N	1	2		
	01.90				SJ	B	178	84		00.1	T	.	.	N	1	2		
	02.03				SJ	B	078	50		00.1	TL	.	.	N	1	3		
	02.40				SJ	B	118	78		00.0	N	.	.	N	2	3		
-011	02.47	PPB			SJ	T	124	64		00.0	N	174.45	177.10	N	1	3		
	00.00	PPB							N	.		177.10	179.85					
	02.75	PPB							N	.		177.10	179.85					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "−" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-07
INCLINATION
NORTHING
BEARING
EASTING
DATE 6/25/17
ELEVATION
BY SMD ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
	00.00	PPB							N			179.85	181.70					SD
	01.85	PPB							N			179.85	181.70					
-036	00.12	PPB			SJ	B	289	65		00.0	N	181.70	184.60	N	2	2		
	00.23				FT	B	154	36		00.2	L			Y	1	2		
	00.33				FT	T	016	32		00.4	CL			Y	1	2		
	00.59				SJ	B	037	49		00.0	N			N	1	2		
	00.69				SJ	T	012	44		00.0	N			N	1	3		
	01.50				SJ	B	138	42		00.2	TL			N	1	3		
	02.63				SJ	T	058	44		00.1	L			N	1	3		
	02.69				SJ	T	032	47		00.0	L			N	1	3		
	02.75				SJ	B	148	46		00.0	L			N	1	3		
-036	02.83	PPB			SJ	B	320	53		00.2	LT	181.70	184.60	N	1	3		
+202	00.33				SJ	B	134	44		00.1	L	184.60	187.65	N	1	3		
	00.42				SJ	B	104	38		00.2	L			N	1	3		
	00.49				SJ	T	089	22		00.2	L			N	1	3		
	00.87				SJ	B	142	42		00.1	L			N	1	3		
+202	01.68	PPB			SJ	B	043	71		00.0	N	184.60	187.65	N	1	3		SD
	00.06								N			187.65	190.65					
	00.58								N									
	00.59								W									
	02.33								W									
	02.34								N									
	03.00	PPB							N			187.65	190.65					
-146	00.11				SJ	B	000	90		00.0	N	190.65	193.75	N	3	3		
-146	00.92	PPB			SJ	B	136	45		00.0	N	190.65	193.75	N	1	3		

MISCELLANEOUS

REF. ANGLE	"+" FOR TOP END OF CORE, "-" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N-NON ORIENTABLE W-WHOLE CORE
SLIC	SLICKENSIDES - YES OR NO
FRAC	1-Natural 2-Maybe (Natural or Mech.) 3-Mechanical
CONF	CONFIDENCE - 1-Poor . . . 4-Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS

SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS

N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

CALL & NICHOLAS. INC. file: ocore_form_toro11-m.dwa ARAN7A7U

ORIENTED CORE DATA SHEET (MET.)

PROJECT Aranzazu
LOCATION
HOLE NO. GHP-GMX-07

INCLINATION
NORTHING

BEARING
EASTING

PAGE 14 OF 14
DATE 6/26/17
ELEVATION

BY ~~SMD~~ ZAO
DIA. HQ3

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	ROCK TYPE 1	ROCK TYPE 2	ROCK TYPE 3	STRUCTURE TYPE	T/B	CIRC. ANG.	DIP	N/W	FILLING THICKNESS (cm)	FILLING TYPE	DRILL RUN DEPTHS FROM COLLAR (M) FROM	TO	SLIC	FRAC	CONF	DIFF. ANGLE	INITLS
-146	01.13	PPB			SJ	T	051	57		00.0	N	190.65	193.75	N	2	3		SD
-302	00.05				SJ	T	104	30		00.1	L	193.75	195.60	N	1	3		
-302	00.09				SJ	T	187	51		00.1	T			N	1	3		
	00.14				VN	T	181	47		00.2	TL			N	1	3		
	00.47				SJ	B	108	38		00.1	T			N	1	3		
-302	00.74	PPB			SJ	T	172	82		00.0	N	193.75	195.60	N	3	3		SD
-248	01.11				SJ	T	317	44		00.0	N	195.60	198.55	N	1	3		
-248	01.46	PPB			SJ	B	307	39		00.0	L	195.60	198.55	N	1	3		
	00.00								W			198.55	200.10					
	01.55	PPB							W			198.55	200.10					
TD													TD					

MISCELLANEOUS	
REF. ANGLE	"+" FOR TOP END OF CORE, "–" FOR BOTTOM
T/B	TOP OR BOTTOM END OF FRACTURE
N/W	N–NON ORIENTABLE W–WHOLE CORE
SLIC	SLICKENSIDES – YES OR NO
FRAC	1–Natural 2–Maybe (Natural or Mech.) 3–Mechanical
CONF	CONFIDENCE – 1–Poor . . . 4–Excellent
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES

ROCK TYPE ABBREVIATIONS

STRUCTURE TYPE ABBREVIATIONS			
SJ	SINGLE JOINT	FO	FOLIATION
VN	VEIN		
BD	BEDDING		
CT	CONTACT		
FT	FAULT		
FC	FAULT CONTACT		
SZ	SHEAR ZONE		

FILLING ABBREVIATIONS			
N	NONE	P	SERPENTINE
X	OXIDE	T	CALCITE
S	SULPHIDE		
L	CHLORITE		
Q	QUARTZ		
C	CLAY		
A	ANHYDRITE		

APPENDIX C

LABORATORY TESTING

1. Fracture Direct-Shear Test

Fracture direct-shear tests are performed to test the shear strength of natural fracture samples. Laboratory testing procedures are done according to ASTM testing standard D3080. Small-scale direct-shear machines can test fractures up to 3 inches in diameter (typically drill core samples), whereas large-scale direct shear machines can test fractures up to 12 inches in diameter (bulk fracture samples).

Sample Preparation

Natural fracture samples are cut, as required, to fit the shear box and are fitted into a mold using spacers to center the specimen to ensure that the mean plane of the shear is as close as possible to the horizontal plane. Since it is difficult to cast a sample perfectly level, the roughness and attitude of the shearing surface is measured. On one half of the sample, a grid is established from a predetermined coordinate axis. Surface elevations are taken at intersection points, and the resultant data is tabulated for input to a trend surface analysis. A mean plane is traced through the data points, and the angle of the apparent dip of the plane in the direction of shear is added or subtracted to the resulting friction angle to correct for the shearing of the sample, whether uphill or downhill. An outline of both surfaces is traced for later use in contact area corrections.

Direct-Shear Test

Samples are then mounted in the testing machine so that a normal load is applied across the fracture surface. While maintaining the normal load, a shear load is applied to displace the sample along the fracture surface. The shear load for a given normal load is recorded on a shear-load-versus-displacement graph.

The residual shear strength of the discontinuity is attained when an increase in the shear displacement is not accompanied by an increase in the shear load (Figure B-1). Each sample is tested at four normal loads, resulting in four pairs of residual shear loads and normal loads. The displacement at each residual point is used to calculate the corresponding contact area, or the area in shear. This area is divided into the appropriate normal and shear loads to obtain normal and shear stresses for each residual point.

Data Reduction

By plotting the shear stress versus the normal stress and statistically analyzing their relationship, shear-strength parameters can be determined. Two different mathematical regression fits are applied to the data: the linear fit and power fit (Figure B-2). Relationships defined by these regressions describe the shear strength of the fracture for given normal stresses.

2. Remolded Direct-Shear Test

The remolded direct shear test consists of shearing granular material in a small-scale (3 inch) or large-scale (12 inch) shear apparatus. The tested material is sieved such that the maximum grain size is no larger than 10 percent of the diameter of the shear apparatus as recommended by ASTM. Prior to shearing, the material is consolidated under the tested normal load. After consolidation, the sample is sheared at a rate of 0.012 inches per minute until residual strength conditions are obtained. This procedure is repeated after each trace (typically four traces total) with the normal load increasing for each subsequent trace. After each trace, the material is remixed and consolidated in order to disrupt the shear plane from the previous trace.

A shear strength function defining the shear strength-normal stress behavior of the sample is then calculated by performing a regression on shear stress values as a function of normal stress (as described in Section 1). In the case of the large-scale test on granular material, the peak and residual shear strengths are often equal.

3. Uniaxial Compression Test

In a uniaxial compression test, a cylinder of drill core is cut with a length-diameter ratio of approximately 2:1 (Figure B-3). The ends of the sample are ground flat and perpendicular to the core axis. A length-to-diameter ratio of 2:1 is considered optimum. Length-to-diameter ratios other than 2:1 are corrected, as required, using standard empirical relationships. The sample is then loaded axially, without lateral confining load, until the sample fails. The maximum load at failure is recorded and the maximum compressive strength is determined by dividing the maximum load by the cross sectional area of the sample.

During this test, samples can be instrumented with strain gauges which are designed to measure axial and lateral strain of the sample that occurs in response to loading. Data from strain gauge measurements can be used to calculate Young's Modulus (E) and Poisson's Ratio (ν). These parameters are calculated in the following manner:

Young's Modulus (E) = Axial Stress / Axial Strain

Poisson's Ratio (ν) = Lateral Strain / Axial Strain

In the absence of strain gauges, Young's Modulus (E) can be calculated by using platen displacement to calculate axial strain. Measurements of platen displacement were used in computing axial strain for calculating Young's Modulus. Uniaxial compression test procedures are done according to ASTM D2166.

4. <u>Triaxial Compression Test</u>

The triaxial compression test is similar to the unconfined uniaxial compression test; however, in the triaxial test, the drill core sample is subjected to a confining stress with the use of a hydraulic pressure cell referred to as a Hoek triaxial cell. Testing procedures are done according to ASTM standard D2850. In a triaxial compression test of rock cores, samples are presumed to be relatively dry, and the buildup of pore pressure during the test is assumed to be negligible.

The sample, sheathed in an impermeable membrane, is placed in the cell and the cell pressure is raised to a specified confining pressure. A vertical load is applied by a piston and is increased until the sample fails at the sample's peak intact shear-strength limit. The vertical load at failure is divided by the sample cross sectional area to calculate the vertical stress at failure (σ_1). Each triaxial compression test provides data for two stresses: vertical stress at failure (σ_1) and confining stress (σ_3).

The triaxial test can be "staged" whereby the confining stress is adjusted (typically upwards) and the sample is failed again. This process is repeated typically up to four times. The successive failure stresses are referred to as a "post-peak" or "residual intact strength" values. A regression of the failure stress versus confinement stress for multiple post-peak stress pairs can be conducted to determine the friction angle and cohesion of the sample as shown in Figure B-4.

5. Brazilian Disk Tension Test

The Brazilian Disk Tension test consists of diametrically loading a disk of drill core until the disk splits (Figure B-5). The diametrical load induces a tensile stress (σ_3) perpendicular to the direction of loading. A specimen thickness-to-diameter ratio of 0.5:1 is considered optimum.

The vertical load at failure (P_f) is noted when the core disk shows visible vertical cracking. The sample tensile strength is calculated using the formula:

$$T_s = \frac{2 * P}{D * L}$$

where:

Ts = Tensile Strength
P = Applied Load
D = Diameter
L = Length

The Brazilian Disk Tension test is done according to ASTM standard D3967.

6. Lab Characterization (Gradation (wet-sieve), Hydrometer, and Atterberg Limits Tests)

Sieve with hydrometers and Atterberg Limit testing are performed to characterize granular materials in terms of the Unified Soil Classification System (USCS).

Material is initially air dried, gently pulverized, and homogenized. This material is then reduced to a representative sample to be classified. In order to break down samples for sieve analysis, samples are typically subjected to a repeated wetting and drying cycles. This slaking process allows the softening of hard weakly-lithified materials into a loose slurry compound.

As per ASTM D422, this material is screened on a 2mm (#10) sieve. Material passing the #10 sieve is collected for hydrometer analysis. Any material retained on the #10 sieve is oven dried and weighed. The post hydrometer material is then washed through a series of nested sieves. A sieve analysis and graph are prepared using the calculations described in ASTM D422.

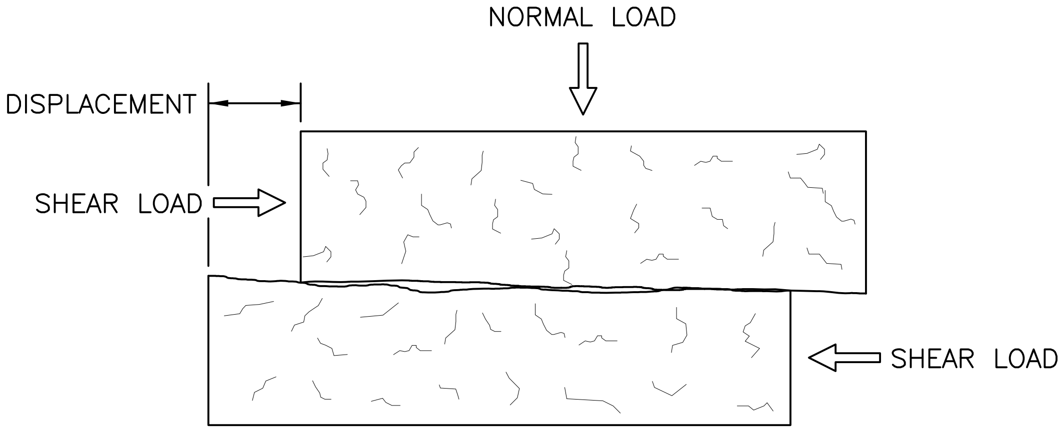
Atterberg Limits

Atterberg Limits are based on the concept that a soil can exist, depending on water content, in any of the four states: solid, semisolid, plastic, and liquid. The water content boundaries for each state are termed *shrinkage limit*, *plastic limit*, and *liquid limit.* Atterberg Limit tests are conducted on material passing a #40 sieve as per ASTM D4318. Sufficient water is added to bring the material close to or above its liquid limit. The soil is allowed to sit for several days in order to fully hydrate and thoroughly mixed. The liquid limit is determined by conducting multiple tests with the Casa Grande apparatus at different moisture levels. The data is plotted and the liquid limit is the moisture level at which a standard groove formed in a pat of soil undergoes a groove closure of 12.7 mm when dropped 25 times from a height of 1 cm. The plastic limit is determined by rolling a thread of soil to a diameter of 3mm, reforming into a ball, and repeating the rolling process. The plastic limit is defined as the moisture level at which the sample crumbles and cannot be rolled further. The Plasticity Index is calculated as the difference between the Liquid and Plastic limits. These Atterberg Limits are then used in conjunction with the sieve analysis to determine a Unified Soil Classification System (USCS) engineering code for the soil.

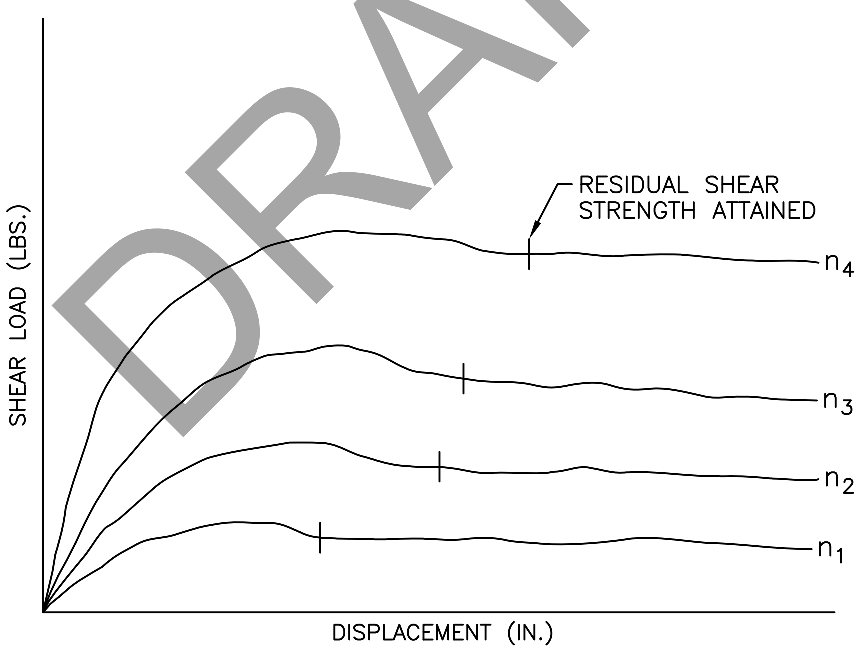
7. <u>Moisture Content and Density</u>

The moisture content of a soil is the ratio of the weight of water to the weight of solids. The moisture content is determined by placing about 100 grams of a sample in a tin with a known weight and then drying the sample in an oven at a temperature between 110 and 115 degrees Celsius (ASTM 2216). After the material has dried sufficiently, a final dry weight is recorded. The moisture content is the wet weight minus the dry weight, divided by the dry weight.

The moist density for each sample is determined by using the sample mass divided by its volume. The diameter is measured six times while the height is measured four times. The volume is then calculated using the average diameter and the average height values.



A. Loading Diagram



B. Shear Load vs. Displacement
for Four Normal Loads (n_1)

Figure B-1
Direct Shear Loading Diagram and
Laboratory Test Curve.

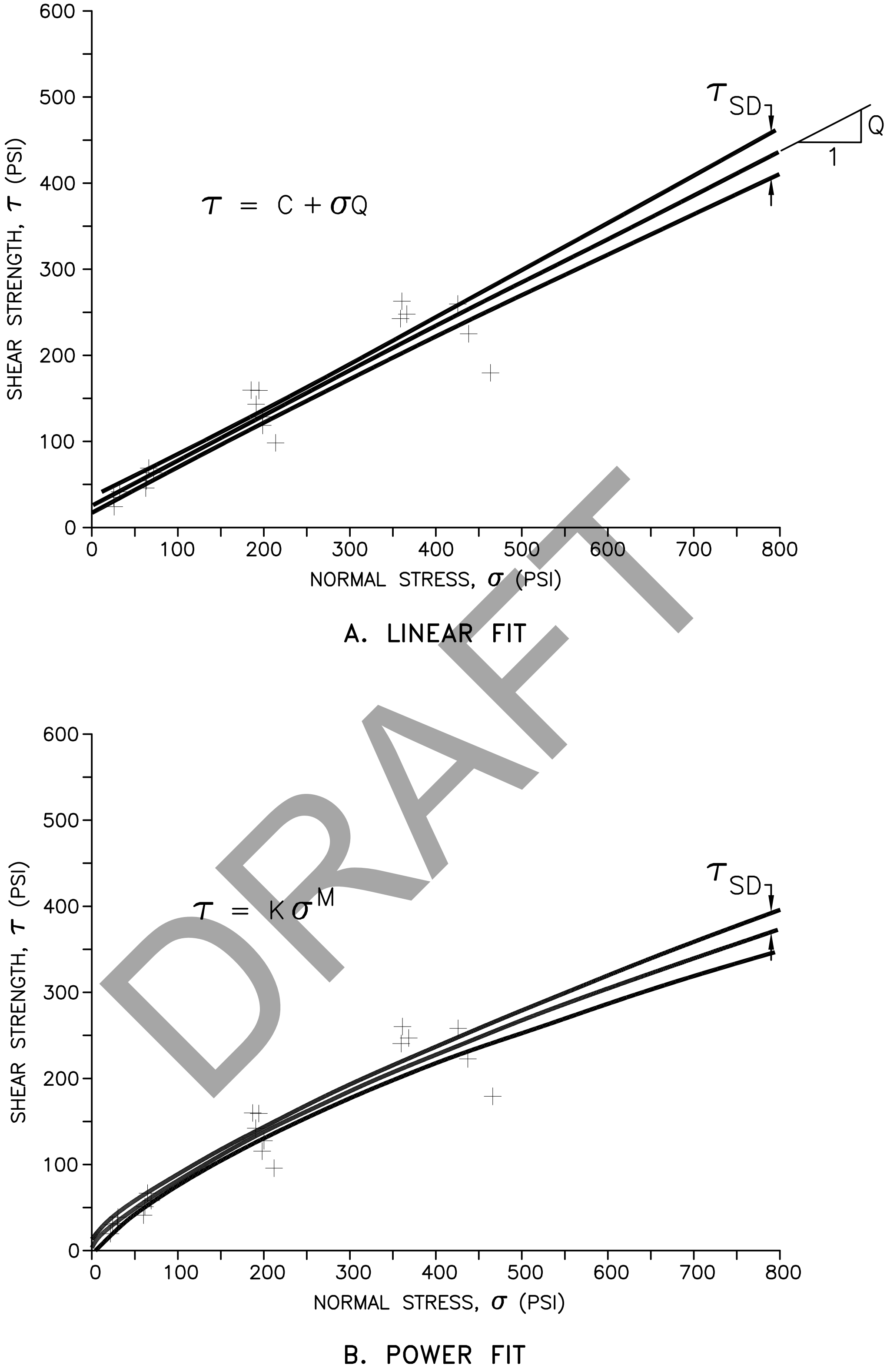


Figure B-2
Direct Shear Relationships Describing Shear Strength as a Function of Normal Stress

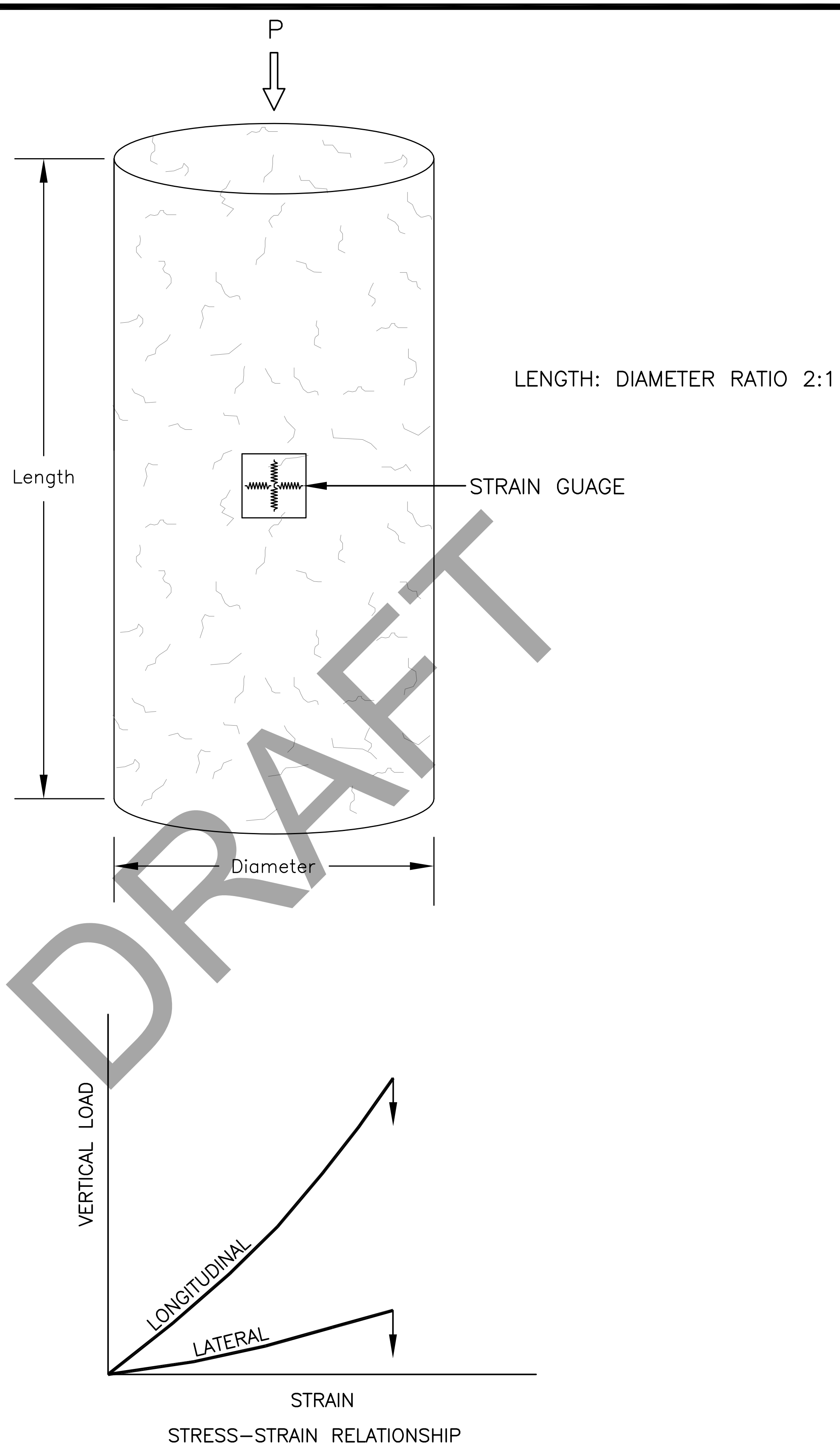
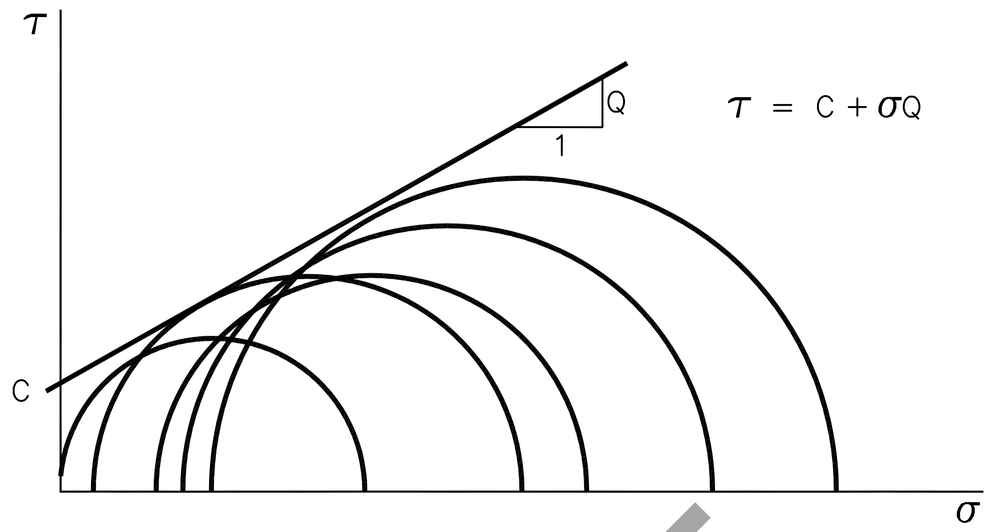
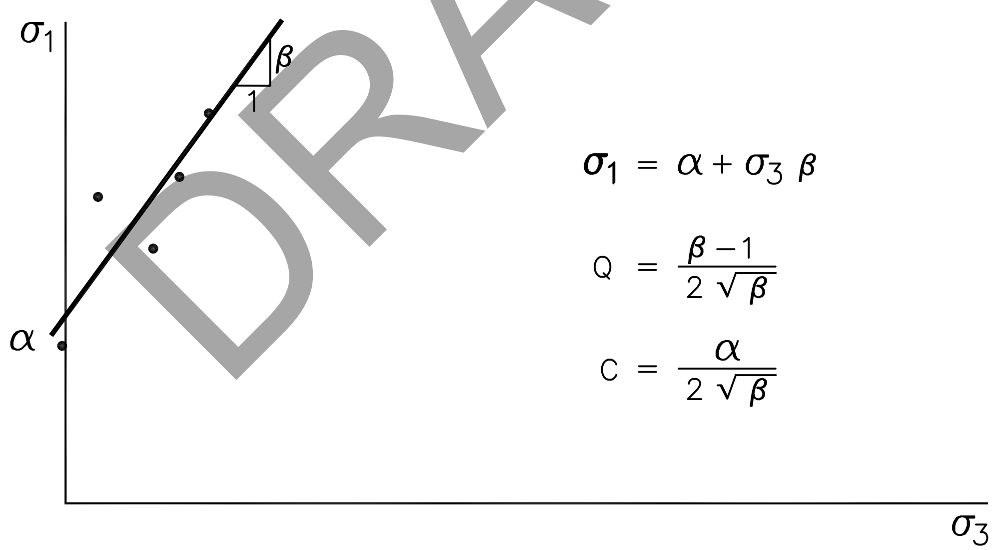


Figure B–3
Loading Diagram for the Uniaxial Compression Test.



A. CONVENTIONAL MOHR ANALYSIS

(FIT LARGELY EMPIRICAL)



$$\sigma_1 = \alpha + \sigma_3 \beta$$

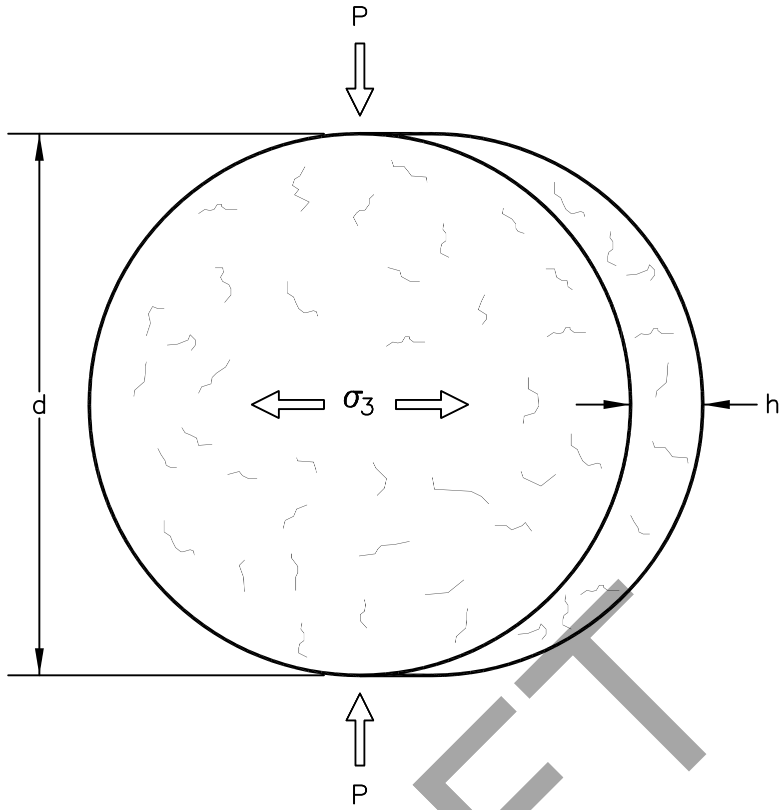
$$Q = \frac{\beta - 1}{2\sqrt{\beta}}$$

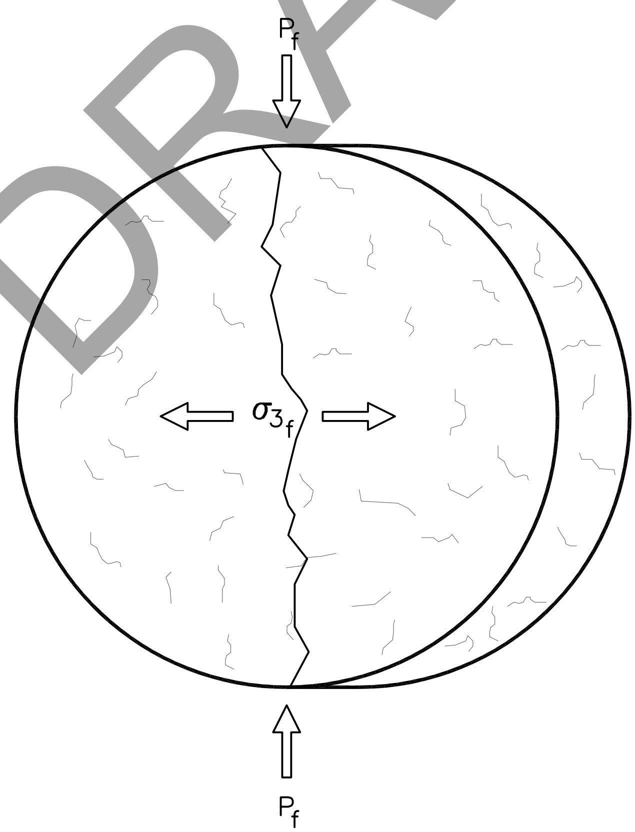
$$C = \frac{\alpha}{2\sqrt{\beta}}$$

B. CONFINING STRESS VS. FAILURE STRESS

(REGRESSION FIT)

Figure B-4
Reduction Methods for Triaxial Compression Data.





TENSILE STRENGTH
$T = \sigma_{3_f}$

Figure B-5
Loading Diagram for the Brazilian Disk Tension Test.

UNIAXIAL COMPRESSION TEST RESULTS

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Uniaxial Compression Test Results

Project #	17508
Date	7/31/2017
Technician	EK

Client	Aura Minerals
Location	Aranzazu, Zacatecas Mexico
Sample #	17508-GHP_GMX02-0159
Rock Type	Intrusive
Density :	158.1 (pcf)
	2,532.8 (kg/m^3)

Sample # **17508-GHP_GMX02-0159**

Fail Stress **10,753** psi

74.16 Mpa

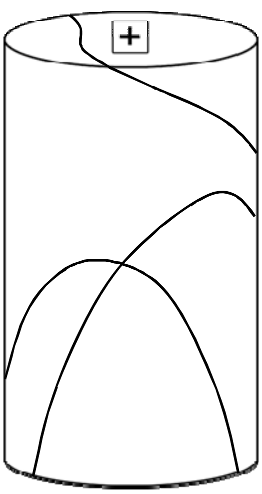
Sample Data :	
Sample # :	**17508-GHP_GMX02-0159**
Rock Type:	Intrusive
Hole # :	GHP_GMX02
Depth :	159.1 - 159.35
Alterations:	
Diameter :	2.391 (in)
Height :	5.025 (in)
Weight :	936.72 (gm)
Area :	4.491 (in^2)
Volume :	22.568 (in^3)

Fail Stress	10,753 (psi)
	74.2 Mpa

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Both
Test Duration :	(sec)
2:1 Correction :	1.015

Rock Code:	

Pre-Failure Sketch

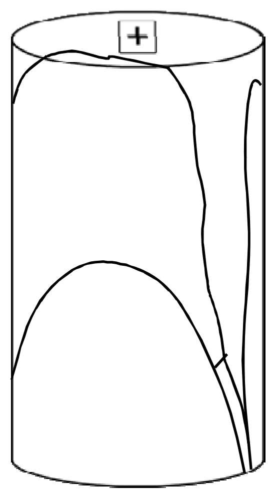


Worksheet

Mode of Failure :

Fracture	
Intact	
Both	XX

Post-Failure Sketch



NOTES:

Dia. 1	2.392	Ht. 1	5.025			
Dia. 2	2.390	Ht. 2	5.026	**Fail Load**	47,600	lbs
Dia. 3	2.391	Ht. 3	5.025			
Dia. 4	2.391	Ht. 4	5.024			
Dia. 5	2.393	Weight (gm)	936.72			
Dia. 6	2.391	Sample #	**17508-GHP_GMX02-0159**			

17508-GHP_GMX02-0159 Pre Test

17508-GHP_GMX02-0159 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Uniaxial Compression Test Results	Client	Aura Minerals
Date	7/31/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX02-0196**
		Sample # **17508-GHP_GMX02-0196**	Rock Type	Skarn
			Density :	229.3 (pcf)
		Fail Stress **22,405** psi		3,672.4 (kg/m^3)
		154.52 Mpa		

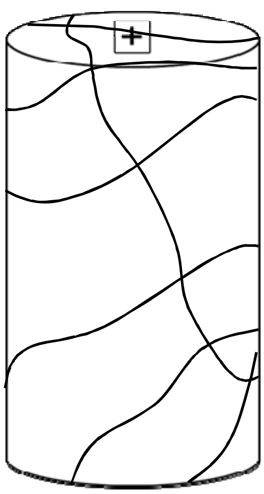
Sample Data :	
Sample # :	**17508-GHP_GMX02-0196**
Rock Type:	Skarn
Hole # :	GHP_GMX02
Depth :	196.9 - 197.1
Alterations:	
Diameter :	2.389 (in)
Height :	5.042 (in)
Weight :	1359.92 (gm)
Area :	4.482 (in^2)
Volume :	22.597 (in^3)

Fail Stress	22,405 (psi)
	154.5 Mpa

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Both
Test Duration :	(sec)
2:1 Correction :	1.015

Rock Code:	

Pre-Failure Sketch



Worksheet

Mode of Failure :

Fracture	
Intact	
Both	XX

Post-Failure Sketch

NOTES: Heavy sulfides.

Dia. 1	2.388	Ht. 1	5.044			
Dia. 2	2.389	Ht. 2	5.043	**Fail Load**	98,920	lbs
Dia. 3	2.391	Ht. 3	5.042			
Dia. 4	2.388	Ht. 4	5.042			
Dia. 5	2.387	Weight (gm)	1359.92			
Dia. 6	2.389	Sample #	**17508-GHP_GMX02-0196**			

17508-GHP_GMX02-0196 Pre Test

17508-GHP_GMX02-0196 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Uniaxial Compression Test Results

Project #	17508
Date	7/31/2017
Technician	EK

Client	Aura Minerals
Location	Aranzazu, Zacatecas Mexico
Sample #	**17508-GHP_GMX02-0224**
Rock Type	Skarn
Density :	243.7 (pcf)
	3,903.8 (kg/m^3)

Sample # **17508-GHP_GMX02-0224**

Fail Stress **12,833** psi

88.51 Mpa

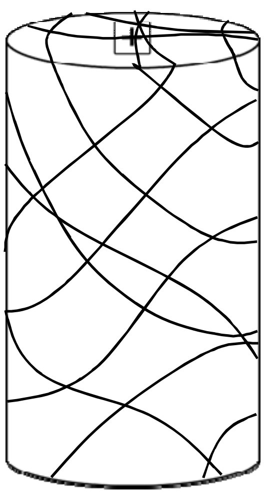
Sample Data :	
Sample # :	**17508-GHP_GMX02-0224**
Rock Type:	Skarn
Hole # :	GHP_GMX02
Depth :	224.0 - 224.25
Alterations:	
Diameter :	2.401 (in)
Height :	5.000 (in)
Weight :	1448.32 (gm)
Area :	4.528 (in^2)
Volume :	22.639 (in^3)

Fail Stress	12,833 (psi)
	88.5 Mpa

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Intact
Test Duration :	(sec)
2:1 Correction :	1.014

Rock Code:	

Pre-Failure Sketch

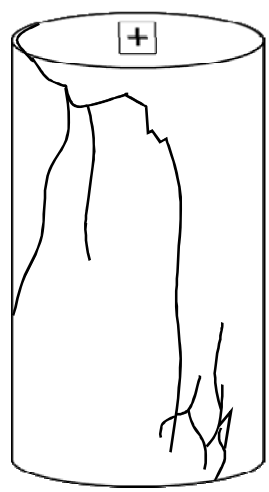


Worksheet

Mode of Failure :

Fracture	
Intact	XX
Both	

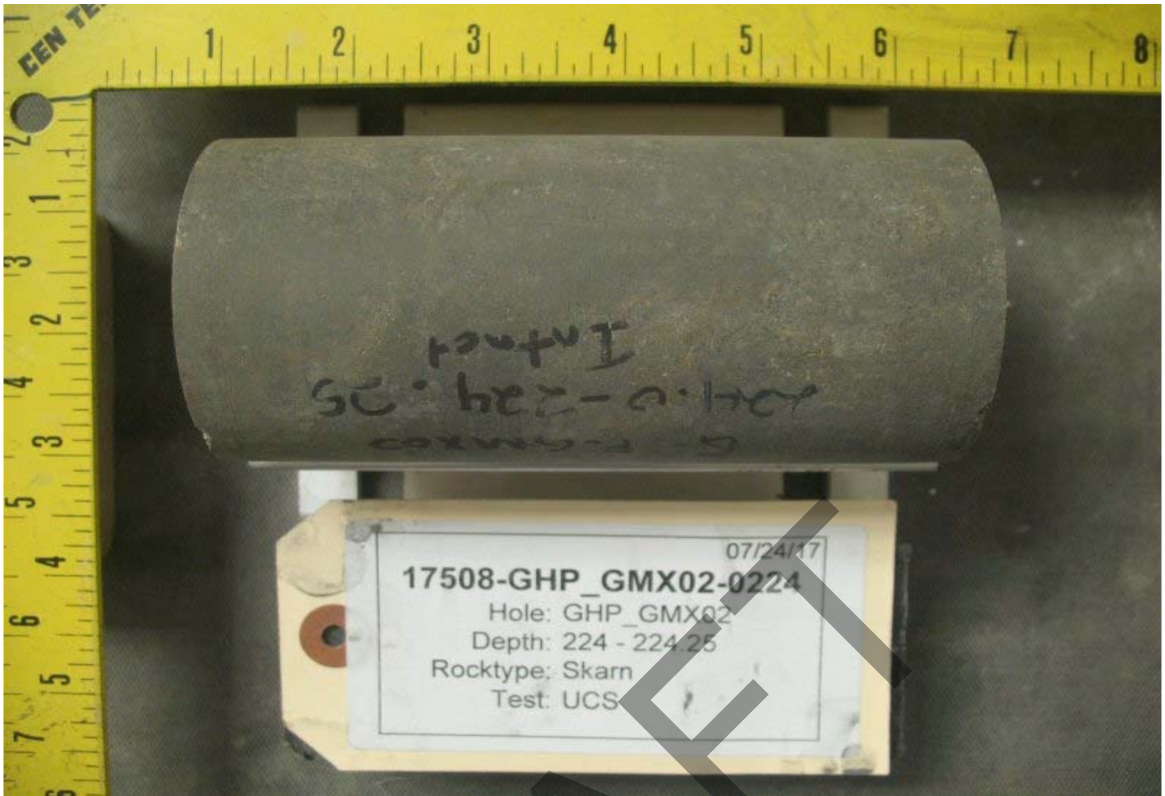
Post-Failure Sketch



NOTES: Heavy sulfides. Sample does not meet end tolerances for flatness.

Dia. 1	2.402	Ht. 1	4.999
Dia. 2	2.400	Ht. 2	5.006
Dia. 3	2.399	Ht. 3	5.000
Dia. 4	2.401	Ht. 4	4.995
Dia. 5	2.402	Weight (gm)	1448.32
Dia. 6	2.402	Sample #	**17508-GHP_GMX02-0224**

Fail Load 57,330 lbs



17508-GHP_GMX02-0224 Pre Test

17508-GHP_GMX02-0224 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Uniaxial Compression Test Results

Project #	17508
Date	7/31/2017
Technician	EK

Client	Aura Minerals
Location	Aranzazu, Zacatecas Mexico
Sample #	17508-GHP_GMX04-0017
Rock Type	Marble
Density :	174.3 (pcf)
	2,792.0 (kg/m^3)

Sample # **17508-GHP_GMX04-0017**

Fail Stress **5,786** psi

39.91 Mpa

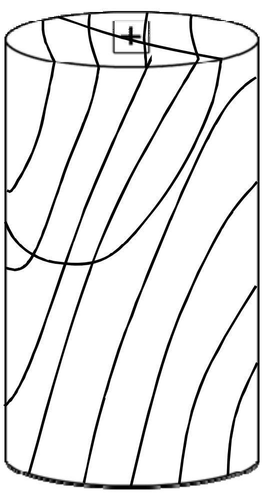
Sample Data :	
Sample # :	**17508-GHP_GMX04-0017**
Rock Type:	Marble
Hole # :	GHP_GMX04
Depth :	17.6 - 17.9
Alterations:	
Diameter :	2.402 (in)
Height :	5.112 (in)
Weight :	1060.39 (gm)
Area :	4.533 (in^2)
Volume :	23.176 (in^3)

Fail Stress	5,786 (psi)
	39.9 Mpa

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)
2:1 Correction :	1.016

Rock Code:	

Pre-Failure Sketch

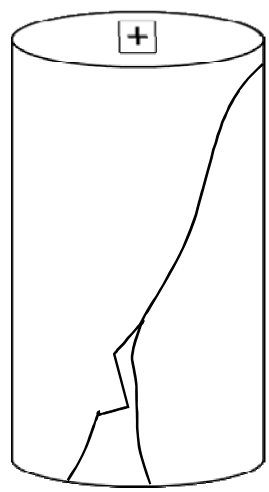


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch



NOTES: Strata

Dia. 1	2.399	Ht. 1	5.117
Dia. 2	2.405	Ht. 2	5.109
Dia. 3	2.403	Ht. 3	5.109
Dia. 4	2.403	Ht. 4	5.115
Dia. 5	2.402	Weight (gm)	1060.39
Dia. 6	2.403	Sample #	**17508-GHP_GMX04-0017**

Fail Load 25,820 lbs

17508-GHP_GMX04-0017 Pre Test

17508-GHP_GMX04-0017 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Uniaxial Compression Test Results

Project #	17508	Client	Aura Minerals
Date	7/31/2017	Location	Aranzazu, Zacatecas Mexico
Technician	EK	Sample #	**17508-GHP_GMX04-0040**
		Rock Type	Marble
		Density :	181.8 (pcf)
			2,911.5 (kg/m^3)

Sample # **17508-GHP_GMX04-0040**

Fail Stress **16,227** psi

111.91 Mpa

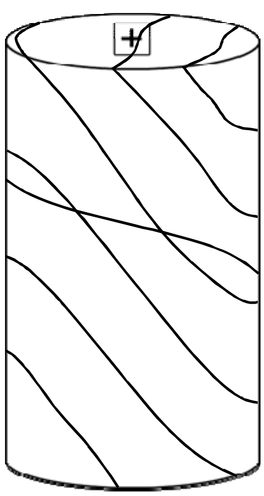
Sample Data :	
Sample # :	**17508-GHP_GMX04-0040**
Rock Type:	Marble
Hole # :	GHP_GMX04
Depth :	40.45 - 40.65
Alterations:	
Diameter :	2.402 (in)
Height :	5.009 (in)
Weight :	1082.79 (gm)
Area :	4.530 (in^2)
Volume :	22.694 (in^3)

Fail Stress	16,227 (psi)
	111.9 Mpa

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Both
Test Duration :	(sec)
2:1 Correction :	1.014

Rock Code:	

Pre-Failure Sketch

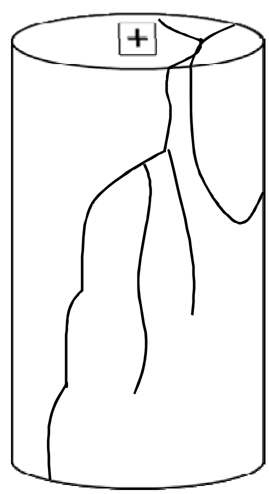


Worksheet

Mode of Failure :

Fracture	
Intact	
Both	XX

Post-Failure Sketch



NOTES: Strata

Dia. 1	2.402	Ht. 1	5.007	
Dia. 2	2.398	Ht. 2	5.009	**Fail Load** 72,520 lbs
Dia. 3	2.401	Ht. 3	5.012	
Dia. 4	2.403	Ht. 4	5.010	
Dia. 5	2.404	Weight (gm)	1082.79	
Dia. 6	2.403	Sample #	**17508-GHP_GMX04-0040**	

17508-GHP_GMX04-0040 Pre Test

17508-GHP_GMX04-0040 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Uniaxial Compression Test Results

Project #	17508	Client	Aura Minerals
Date	7/31/2017	Location	Aranzazu, Zacatecas Mexico
Technician	EK	Sample #	**17508-GHP_GMX04-0112**
		Rock Type	Intrusive
		Density :	154.6 (pcf)
			2,475.6 (kg/m^3)

Sample # **17508-GHP_GMX04-0112**

Fail Stress **6,634** psi

45.75 Mpa

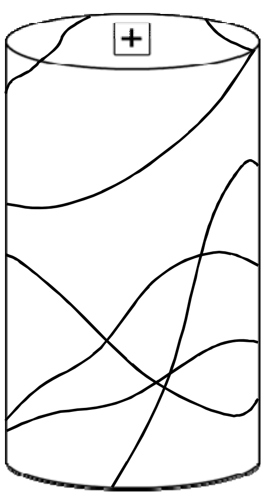
Sample Data :	
Sample # :	**17508-GHP_GMX04-0112**
Rock Type:	Intrusive
Hole # :	GHP_GMX04
Depth :	112.75 - 112.95
Alterations:	
Diameter :	2.403 (in)
Height :	4.977 (in)
Weight :	916.00 (gm)
Area :	4.537 (in^2)
Volume :	22.579 (in^3)

Fail Stress	6,634 (psi)
	45.7 Mpa

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)
2:1 Correction :	1.013

Rock Code:	

Pre-Failure Sketch

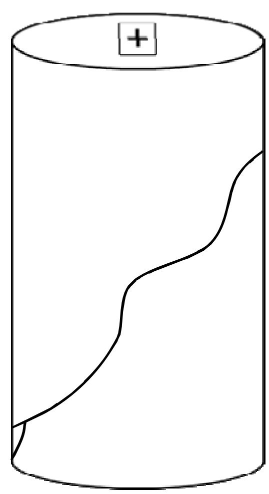


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch



NOTES:

Dia. 1	2.403	Ht. 1	4.980	
Dia. 2	2.402	Ht. 2	4.980	**Fail Load** 29,710 lbs
Dia. 3	2.403	Ht. 3	4.975	
Dia. 4	2.402	Ht. 4	4.974	
Dia. 5	2.405	Weight (gm)	916.00	
Dia. 6	2.405	Sample #	**17508-GHP_GMX04-0112**	

17508-GHP_GMX04-0112 Pre Test

17508-GHP_GMX04-0112 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Uniaxial Compression Test Results

Project #	17508
Date	8/19/2017
Technician	EK

Client	Aura Minerals
Location	Aranzazu, Zacatecas Mexico
Sample #	17508-GHP_GMX04-0222
Rock Type	Skarn
Density :	194.0 (pcf)
	3,106.8 (kg/m^3)

Sample # **17508-GHP_GMX04-0222**

Fail Stress **8,796** psi

60.66 Mpa

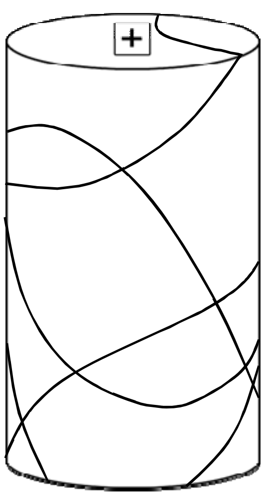
Fail Stress	8,796 (psi)
	60.7 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX04-0222**
Rock Type:	Skarn
Hole # :	GHP_GMX04
Depth :	222.0 - 222.25
Alterations:	
Diameter :	2.402 (in)
Height :	4.868 (in)
Weight :	1122.87 (gm)
Area :	4.530 (in^2)
Volume :	22.055 (in^3)

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)
2:1 Correction :	1.011

Rock Code:	

Pre-Failure Sketch

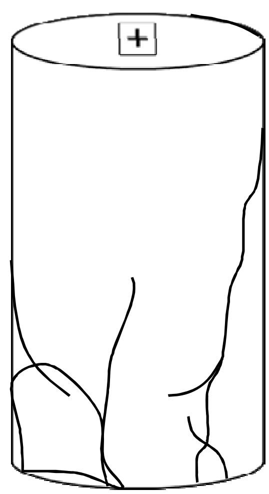


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

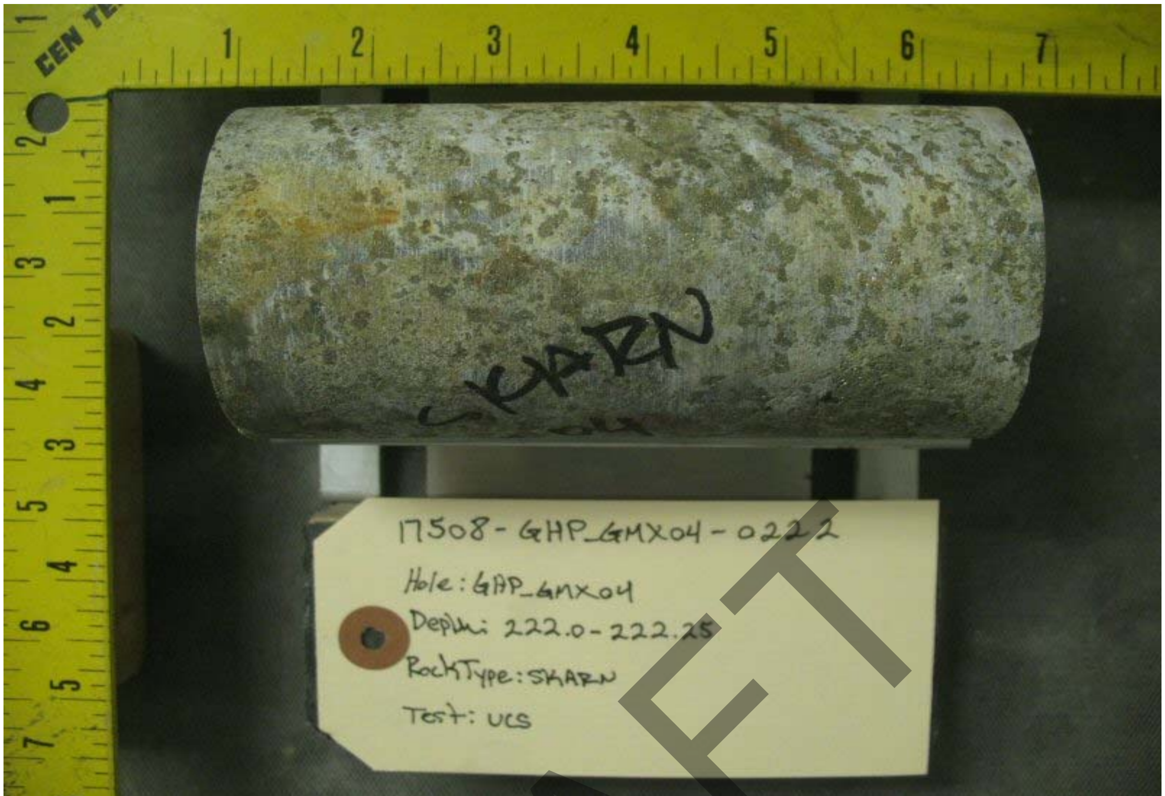
Post-Failure Sketch



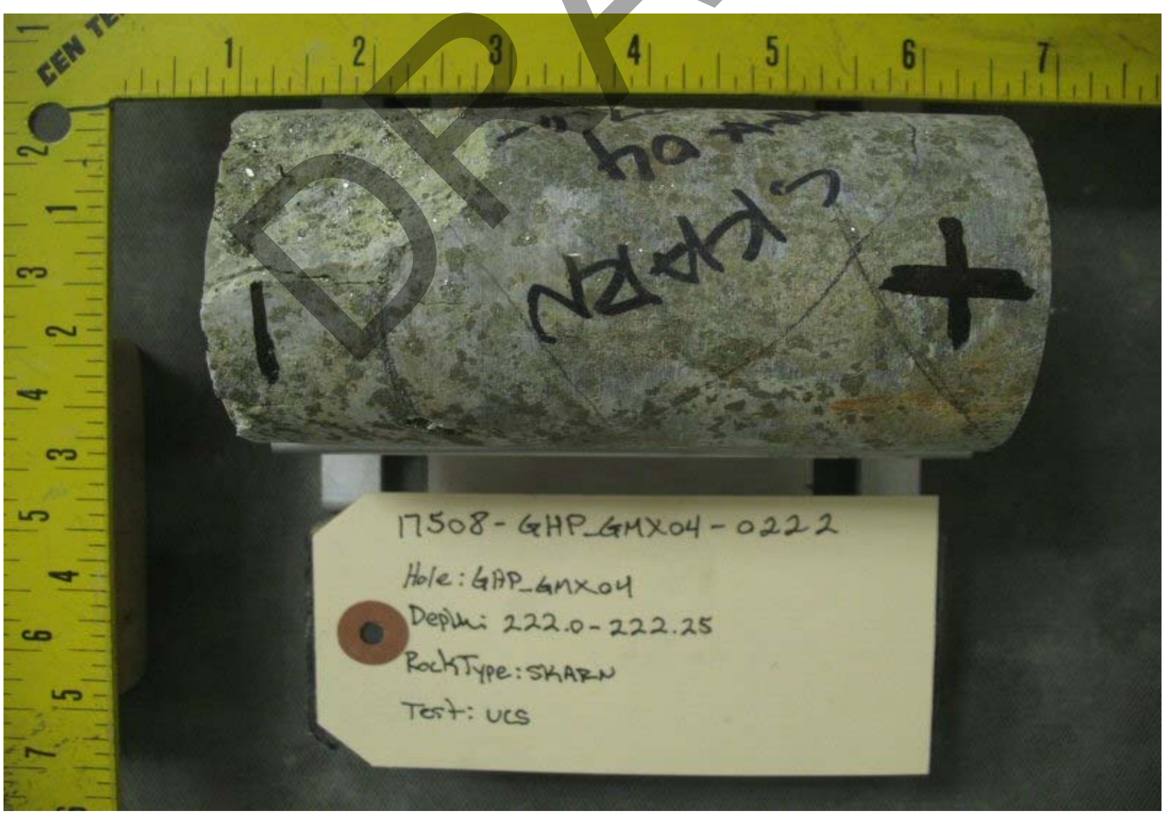
NOTES: Heavy sulfides.

Dia. 1	2.402	Ht. 1	4.867
Dia. 2	2.402	Ht. 2	4.869
Dia. 3	2.401	Ht. 3	4.870
Dia. 4	2.400	Ht. 4	4.868
Dia. 5	2.400	Weight (gm)	1122.87
Dia. 6	2.405	Sample #	**17508-GHP_GMX04-0222**

Fail Load 39,430 lbs



17508-GHP_GMX04-0222 Pre Test



17508-GHP_GMX04-0222 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Uniaxial Compression Test Results

Project #	17508
Date	7/31/2017
Technician	EK

Client	Aura Minerals
Location	Aranzazu, Zacatecas Mexico
Sample #	17508-GHP_GMX04-0224
Rock Type	Skarn
Density :	208.9 (pcf)
	3,346.9 (kg/m^3)

Sample # **17508-GHP_GMX04-0224**

Fail Stress **18,215** psi

125.62 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX04-0224**
Rock Type:	Skarn
Hole # :	GHP_GMX04
Depth :	224.25 - 224.50
Alterations:	
Diameter :	2.388 (in)
Height :	4.899 (in)
Weight :	1203.12 (gm)
Area :	4.478 (in^2)
Volume :	21.936 (in^3)

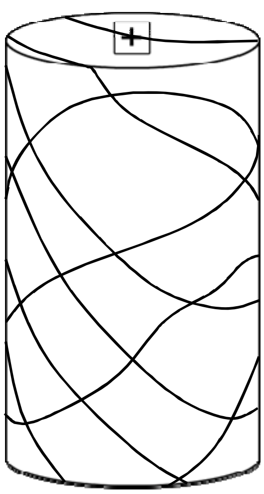
Fail Stress	18,215 (psi)
	125.6 Mpa

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Intact
Test Duration :	(sec)
2:1 Correction :	1.012

Rock Code:	

DRAFT

Pre-Failure Sketch

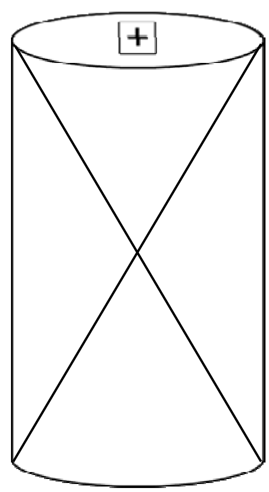


Worksheet

Mode of Failure :

Fracture	
Intact	XX
Both	

Post-Failure Sketch



NOTES: Heavy sulfides. Conical failure

Dia. 1	2.386	Ht. 1	4.897
Dia. 2	2.389	Ht. 2	4.899
Dia. 3	2.387	Ht. 3	4.899
Dia. 4	2.388	Ht. 4	4.901
Dia. 5	2.389	Weight (gm)	1203.12
Dia. 6	2.388	Sample #	**17508-GHP_GMX04-0224**

Fail Load 80,600 lbs

17508-GHP_GMX04-0224 Pre Test

17508-GHP_GMX04-0224 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Uniaxial Compression Test Results	Client	Aura Minerals
Date	7/31/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX04-0253**
			Rock Type	Intrusive
			Density :	171.0 (pcf)
				2,738.6 (kg/m^3)

Sample # **17508-GHP_GMX04-0253**

Fail Stress **30,540** psi

210.62 Mpa

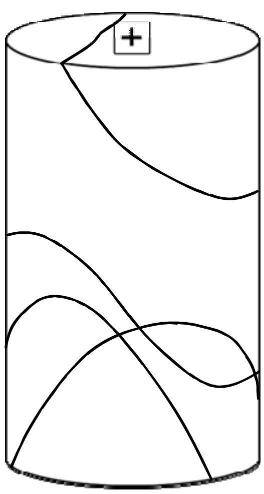
Sample Data :	
Sample # :	**17508-GHP_GMX04-0253**
Rock Type:	Intrusive
Hole # :	GHP_GMX04
Depth :	253.3 - 253.5
Alterations:	
Diameter :	2.399 (in)
Height :	5.094 (in)
Weight :	1033.22 (gm)
Area :	4.519 (in^2)
Volume :	23.023 (in^3)

Fail Stress	30,540 (psi)
	210.6 Mpa

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Intact
Test Duration :	(sec)
2:1 Correction :	1.016

Rock Code:	

Pre-Failure Sketch

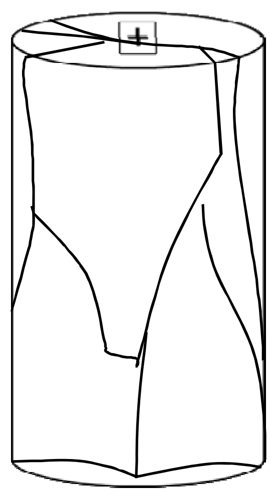


Worksheet

Mode of Failure :

Fracture	
Intact	XX
Both	

Post-Failure Sketch



NOTES:

Dia. 1	2.397	Ht. 1	5.093		
Dia. 2	2.399	Ht. 2	5.097	**Fail Load**	135,890 lbs
Dia. 3	2.401	Ht. 3	5.095		
Dia. 4	2.400	Ht. 4	5.092		
Dia. 5	2.397	Weight (gm)	1033.22		
Dia. 6	2.400	Sample #	**17508-GHP_GMX04-0253**		

17508-GHP_GMX04-0253 Pre Test

17508-GHP_GMX04-0253 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Uniaxial Compression Test Results

Project #	17508
Date	7/31/2017
Technician	EK

Client	Aura Minerals
Location	Aranzazu, Zacatecas Mexico
Sample #	**17508-GHP_GMX04-0257**
Rock Type	Intrusive
Density :	170.5 (pcf)
	2,730.4 (kg/m^3)

Sample # **17508-GHP_GMX04-0257**

Fail Stress **40,304** psi

277.96 Mpa

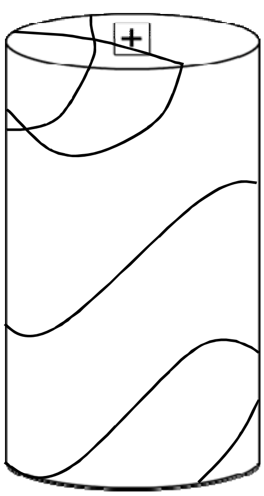
Sample Data :	
Sample # :	**17508-GHP_GMX04-0257**
Rock Type:	Intrusive
Hole # :	GHP_GMX04
Depth :	257.35 - 257.60
Alterations:	
Diameter :	2.402 (in)
Height :	5.073 (in)
Weight :	1028.44 (gm)
Area :	4.531 (in^2)
Volume :	22.985 (in^3)

Fail Stress	40,304 (psi)
	278.0 Mpa

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Intact
Test Duration :	(sec)
2:1 Correction :	1.015

Rock Code:	

Pre-Failure Sketch

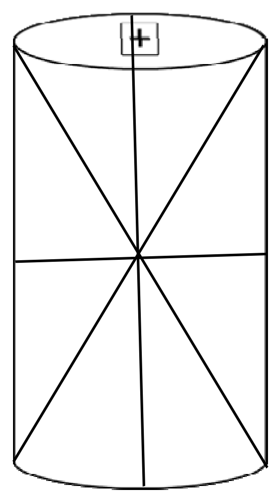


Worksheet

Mode of Failure :

Fracture	
Intact	XX
Both	

Post-Failure Sketch



NOTES:

Dia. 1	2.402	Ht. 1	5.071
Dia. 2	2.402	Ht. 2	5.072
Dia. 3	2.402	Ht. 3	5.075
Dia. 4	2.402	Ht. 4	5.074
Dia. 5	2.402	Weight (gm)	1028.44
Dia. 6	2.403	Sample #	**17508-GHP_GMX04-0257**

Fail Load 179,900 lbs

17508-GHP_GMX04-0257 Pre Test

17508-GHP_GMX04-0257 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Uniaxial Compression Test Results

Project #	17508	Client	Aura Minerals
Date	7/31/2017	Location	Aranzazu, Zacatecas Mexico
Technician	EK	Sample #	**17508-GHP_GMX05-0086**
		Rock Type	Hornfels
		Density :	149.7 (pcf)
			2,397.5 (kg/m³)

Sample # **17508-GHP_GMX05-0086**

Fail Stress **3,763** psi

25.95 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX05-0086**
Rock Type:	Hornfels
Hole # :	GHP_GMX05
Depth :	86.65 - 86.90
Alterations:	
Diameter :	2.397 (in)
Height :	4.694 (in)
Weight :	832.19 (gm)
Area :	4.513 (in^2)
Volume :	21.181 (in^3)

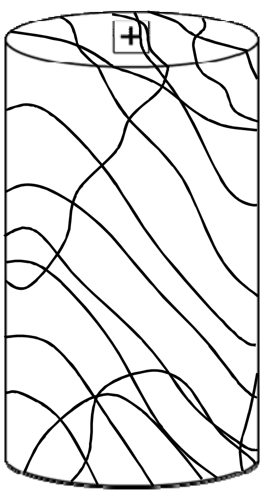
Fail Stress	3,763 (psi)
	26.0 Mpa

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)
2:1 Correction :	1.007

Rock Code:	

DRAFT

Pre-Failure Sketch

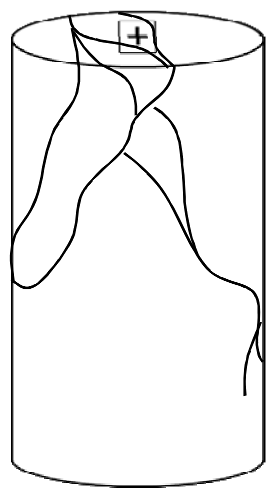


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch



NOTES: Strata

Dia. 1	2.399	Ht. 1	4.695	
Dia. 2	2.397	Ht. 2	4.697	**Fail Load** 16,870 lbs
Dia. 3	2.396	Ht. 3	4.693	
Dia. 4	2.397	Ht. 4	4.691	
Dia. 5	2.398	Weight (gm)	832.19	
Dia. 6	2.396	Sample #	**17508-GHP_GMX05-0086**	

17508-GHP_GMX05-0086 Pre Test

17508-GHP_GMX05-0086 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Uniaxial Compression Test Results

Project #	17508
Date	7/31/2017
Technician	EK

Client	Aura Minerals
Location	Aranzazu, Zacatecas Mexico
Sample #	17508-GHP_GMX05-0148
Rock Type	Intrusive
Density :	154.7 (pcf)
	2,478.2 (kg/m^3)

Sample # **17508-GHP_GMX05-0148**

Fail Stress **12,298** psi

84.81 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX05-0148**
Rock Type:	Intrusive
Hole # :	GHP_GMX05
Depth :	148.15 - 148.35
Alterations:	
Diameter :	2.402 (in)
Height :	5.070 (in)
Weight :	932.93 (gm)
Area :	4.531 (in^2)
Volume :	22.972 (in^3)

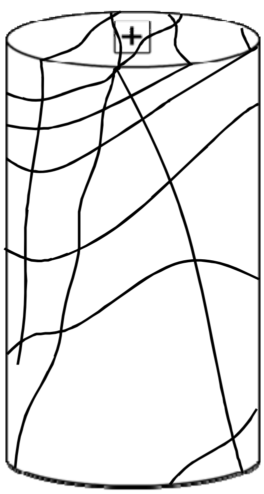
Fail Stress	12,298 (psi)
	84.8 Mpa

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)
2:1 Correction :	1.015

Rock Code:	

DRAFT

Pre-Failure Sketch



Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

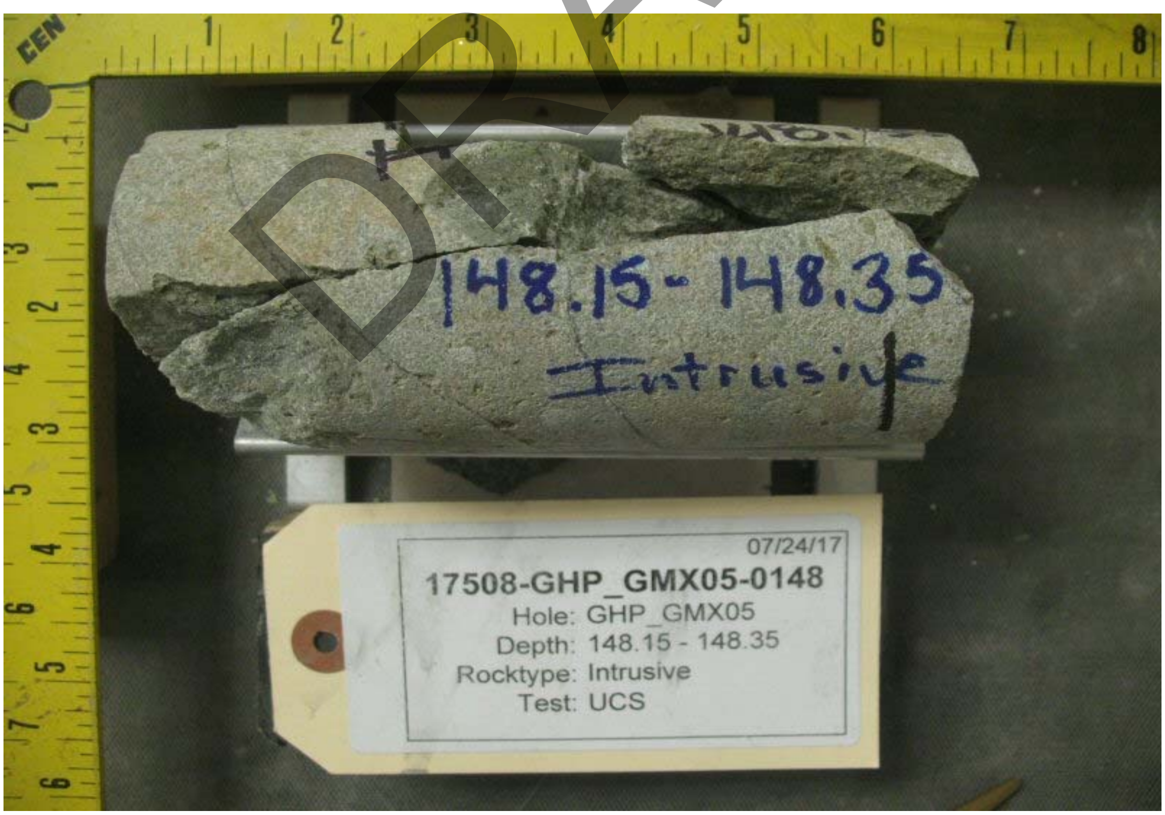
Post-Failure Sketch

NOTES:

Dia. 1	2.402	Ht. 1	5.069
Dia. 2	2.403	Ht. 2	5.069
Dia. 3	2.402	Ht. 3	5.070
Dia. 4	2.402	Ht. 4	5.071
Dia. 5	2.402	Weight (gm)	932.93
Dia. 6	2.403	Sample #	**17508-GHP_GMX05-0148**

Fail Load 54,900 lbs

17508-GHP_GMX05-0148 Pre Test



17508-GHP_GMX05-0148 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Uniaxial Compression Test Results

Project #	17508
Date	7/31/2017
Technician	EK

Client	Aura Minerals
Location	Aranzazu, Zacatecas Mexico
Sample #	**17508-GHP_GMX05-0195**
Rock Type	Skarn
Density :	164.0 (pcf)
	2,626.8 (kg/m^3)

Sample # **17508-GHP_GMX05-0195**

Fail Stress **2,128** psi

14.68 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX05-0195**
Rock Type:	Skarn
Hole # :	GHP_GMX05
Depth :	195.45 - 195.65
Alterations:	
Diameter :	2.412 (in)
Height :	4.912 (in)
Weight :	966.60 (gm)
Area :	4.571 (in^2)
Volume :	22.455 (in^3)

Fail Stress	2,128 (psi)
	14.7 Mpa

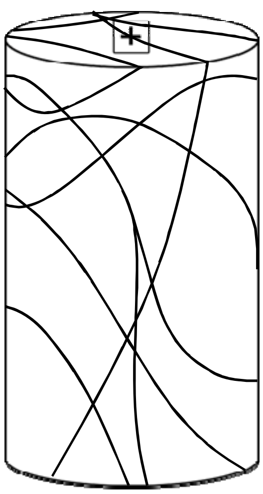
Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)
2:1 Correction :	1.011

Rock Code:	

DRAFT

Pre-Failure Sketch

Weak spot>



Worksheet

Mode of Failure :

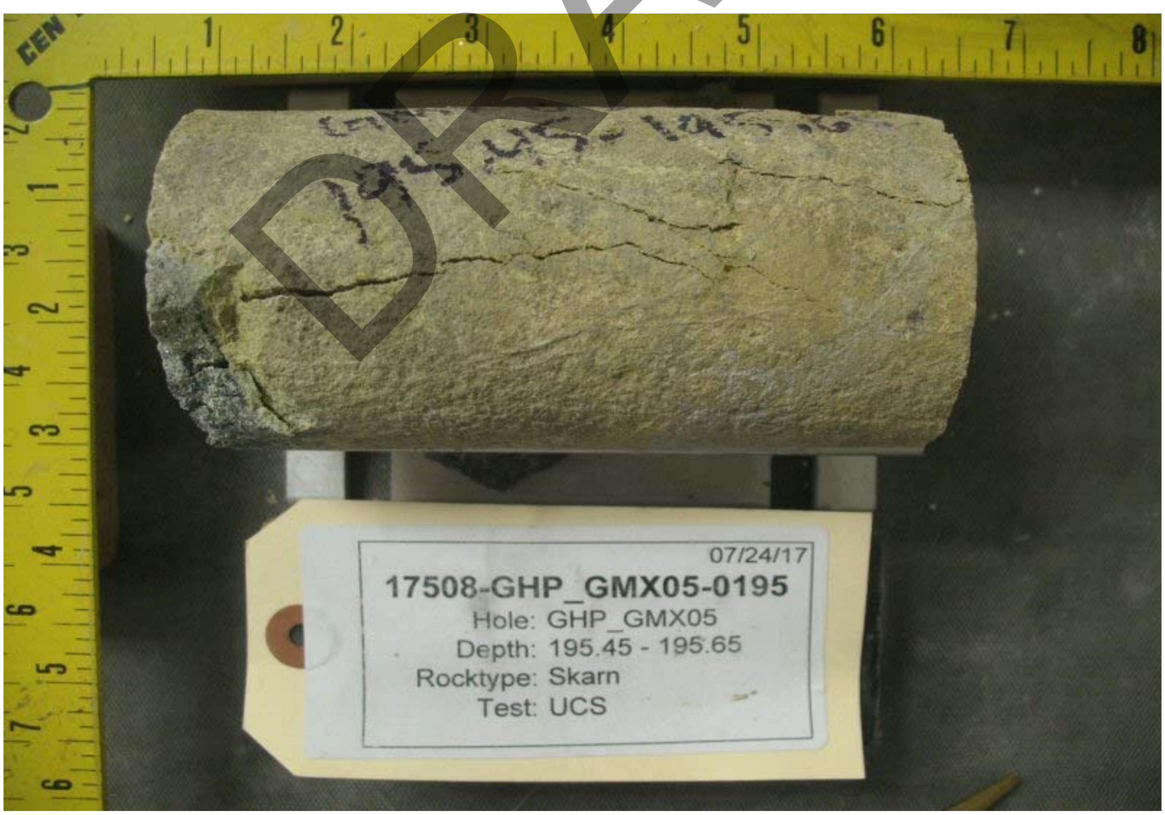
Fracture	XX
Intact	
Both	

Post-Failure Sketch

NOTES: Sulfides

Dia. 1	2.407	Ht. 1	4.915			
Dia. 2	2.419	Ht. 2	4.909	**Fail Load**	9,620	lbs
Dia. 3	2.413	Ht. 3	4.912			
Dia. 4	2.410	Ht. 4	4.914			
Dia. 5	2.411	Weight (gm)	966.60			
Dia. 6	2.415	Sample #	**17508-GHP_GMX05-0195**			

17508-GHP_GMX05-0195 Pre Test



17508-GHP_GMX05-0195 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Uniaxial Compression Test Results	Client	Aura Minerals
Date	7/31/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX05-0203-A**
		Sample # **17508-GHP_GMX05-0203-A**	Rock Type	Fault
			Density :	157.0 (pcf)
		Fail Stress **1,061** psi		2,514.3 (kg/m^3)
		7.32 Mpa		

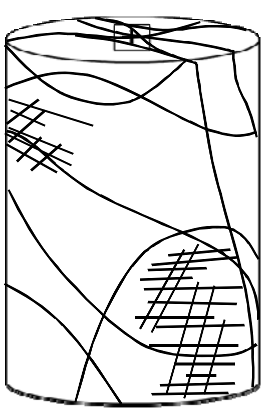
Sample Data :	
Sample # :	**17508-GHP_GMX05-0203-A**
Rock Type:	Fault
Hole # :	GHP_GMX05
Depth :	203.25 - 203.50
Alterations:	
Diameter :	2.418 (in)
Height :	3.909 (in)
Weight :	739.81 (gm)
Area :	4.593 (in^2)
Volume :	17.955 (in^3)

Fail Stress	1,061 (psi)
	7.3 Mpa

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Both
Test Duration :	(sec)
2:1 Correction :	0.983

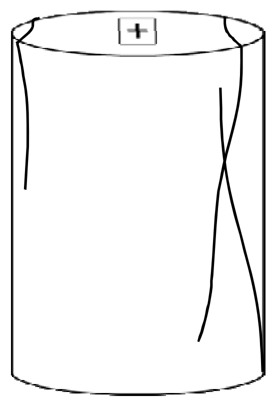
Rock Code:	

Pre-Failure Sketch | Worksheet | Post-Failure Sketch



Mode of Failure :

Fracture	
Intact	
Both	XX



NOTES: Sandstone. Heavy sulfides. Voids and gouges.

Dia. 1	2.427	Ht. 1	3.909
Dia. 2	2.424	Ht. 2	3.908
Dia. 3	2.417	Ht. 3	3.906
Dia. 4	2.411	Ht. 4	3.913
Dia. 5	2.416	Weight (gm)	739.81
Dia. 6	2.415	Sample #	**17508-GHP_GMX05-0203-A**

Fail Load	4,960	lbs

17508-GHP_GMX05-0203-A Pre Test

17508-GHP_GMX05-0203-A Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Uniaxial Compression Test Results

Project #	17508
Date	7/31/2017
Technician	EK

Client	Aura Minerals
Location	Aranzazu, Zacatecas Mexico
Sample #	**17508-GHP_GMX06-0025**
Rock Type	Hornfels
Density :	183.0 (pcf)
	2,931.2 (kg/m^3)

Sample # **17508-GHP_GMX06-0025**

Fail Stress **42,371** psi

292.21 Mpa

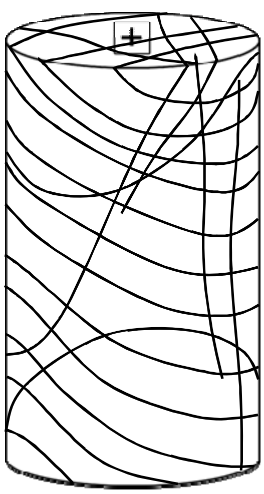
Sample Data :	
Sample # :	**17508-GHP_GMX06-0025**
Rock Type:	Hornfels
Hole # :	GHP_GMX06
Depth :	25.45 - 25.75
Alterations:	
Diameter :	2.405 (in)
Height :	4.994 (in)
Weight :	1090.01 (gm)
Area :	4.544 (in^2)
Volume :	22.692 (in^3)

Fail Stress	42,371 (psi)
	292.2 Mpa

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Both
Test Duration :	(sec)
2:1 Correction :	1.013

Rock Code:	

Pre-Failure Sketch

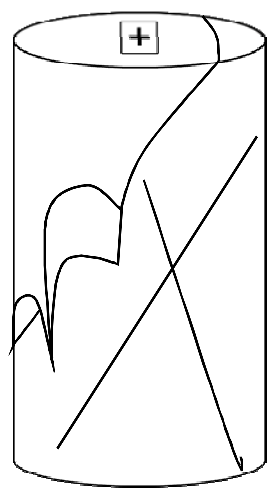


Worksheet

Mode of Failure :

Fracture	
Intact	
Both	XX

Post-Failure Sketch



NOTES: Strata

Dia. 1	2.405	Ht. 1	4.992
Dia. 2	2.406	Ht. 2	4.992
Dia. 3	2.405	Ht. 3	4.996
Dia. 4	2.405	Ht. 4	4.995
Dia. 5	2.406	Weight (gm)	1090.01
Dia. 6	2.406	Sample #	**17508-GHP_GMX06-0025**

Fail Load 190,029 lbs

17508-GHP_GMX06-0025 Pre Test

17508-GHP_GMX06-0025 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Uniaxial Compression Test Results	Client	Aura Minerals
Date	7/31/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX07-0044**
		Sample # **17508-GHP_GMX07-0044**	Rock Type	Hornfels
			Density :	163.7 (pcf)
		Fail Stress **7,047** psi		2,622.9 (kg/m^3)
		48.60 Mpa		

Sample Data :	
Sample # :	**17508-GHP_GMX07-0044**
Rock Type:	Hornfels
Hole # :	GHP_GMX07
Depth :	44.6 - 45.0
Alterations:	
Diameter :	2.396 (in)
Height :	5.029 (in)
Weight :	974.77 (gm)
Area :	4.510 (in^2)
Volume :	22.678 (in^3)

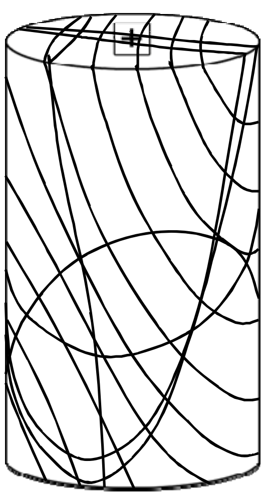
Fail Stress	7,047 (psi)
	48.6 Mpa

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)
2:1 Correction :	1.014

Rock Code:	

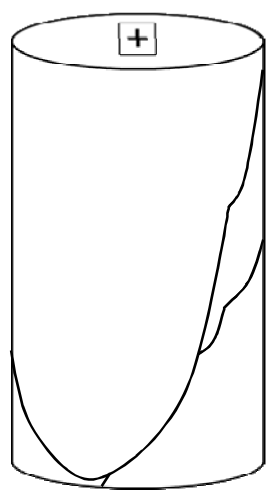
DRAFT

Pre-Failure Sketch | Worksheet | Post-Failure Sketch



Mode of Failure :

Fracture	XX
Intact	
Both	



NOTES: Strata

Dia. 1	2.397	Ht. 1	5.032			
Dia. 2	2.396	Ht. 2	5.029	**Fail Load**	31,330	lbs
Dia. 3	2.396	Ht. 3	5.030			
Dia. 4	2.397	Ht. 4	5.025			
Dia. 5	2.397	Weight (gm)	974.77			
Dia. 6	2.396	Sample #	**17508-GHP_GMX07-0044**			

17508-GHP_GMX07-0044 Pre Test

17508-GHP_GMX07-0044 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Uniaxial Compression Test Results

Project #	17508
Date	7/31/2017
Technician	EK

Client	Aura Minerals
Location	Aranzazu, Zacatecas Mexico
Sample #	**17508-GHP_GMX07-0128**
Rock Type	Marble
Density :	169.9 (pcf)
	2,721.6 (kg/m^3)

Sample # **17508-GHP_GMX07-0128**

Fail Stress **6,245** psi

43.07 Mpa

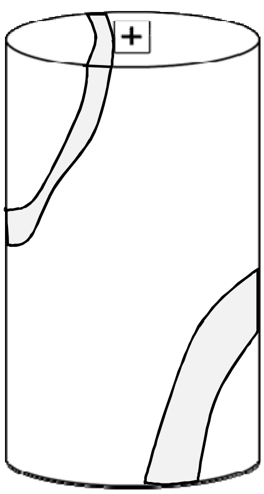
Sample Data :	
Sample # :	**17508-GHP_GMX07-0128**
Rock Type:	Marble
Hole # :	GHP_GMX07
Depth :	128.05 - 128.25
Alterations:	
Diameter :	2.399 (in)
Height :	5.016 (in)
Weight :	1011.29 (gm)
Area :	4.521 (in^2)
Volume :	22.675 (in^3)

Fail Stress	6,245 (psi)
	43.1 Mpa

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Both
Test Duration :	(sec)
2:1 Correction :	1.014

Rock Code:	

Pre-Failure Sketch

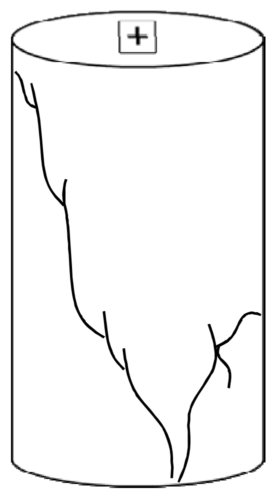


Worksheet

Mode of Failure :

Fracture	
Intact	
Both	XX

Post-Failure Sketch



NOTES: Quartz banding

Dia. 1	2.398	Ht. 1	5.015
Dia. 2	2.399	Ht. 2	5.014
Dia. 3	2.399	Ht. 3	5.017
Dia. 4	2.400	Ht. 4	5.019
Dia. 5	2.400	Weight (gm)	1011.29
Dia. 6	2.399	Sample #	**17508-GHP_GMX07-0128**

Fail Load 27,840 lbs

17508-GHP_GMX07-0128 Pre Test

17508-GHP_GMX07-0128 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Uniaxial Compression Test Results

Project #	17508
Date	7/31/2017
Technician	EK

Client	Aura Minerals
Location	Aranzazu, Zacatecas Mexico
Sample #	**17508-GHP_GMX07-0168-A**
Rock Type	Skarn
Density :	168.4 (pcf)
	2,697.5 (kg/m^3)

Sample # **17508-GHP_GMX07-0168-A**

Fail Stress **873** psi

6.02 Mpa

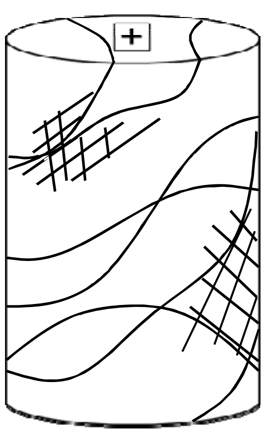
Sample Data :	
Sample # :	**17508-GHP_GMX07-0168-A**
Rock Type:	Skarn
Hole # :	GHP_GMX07
Depth :	168.75 - 169.05
Alterations:	
Diameter :	2.395 (in)
Height :	4.024 (in)
Weight :	801.21 (gm)
Area :	4.504 (in^2)
Volume :	18.125 (in^3)

Fail Stress	873 (psi)
	6.0 Mpa

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Both
Test Duration :	(sec)
2:1 Correction :	0.988

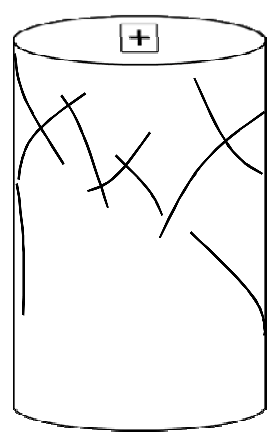
Rock Code:	

Pre-Failure Sketch | Worksheet | Post-Failure Sketch



Mode of Failure :

Fracture	
Intact	
Both	XX



NOTES: Sandstone. Heavy Sulfides. Small voids and gouges.

Dia. 1	2.389	Ht. 1	4.019				
Dia. 2	2.403	Ht. 2	4.026	**Fail Load**	3,980	lbs	
Dia. 3	2.399	Ht. 3	4.023				
Dia. 4	2.394	Ht. 4	4.028				
Dia. 5	2.397	Weight (gm)	801.21				
Dia. 6	2.389	Sample #	**17508-GHP_GMX07-0168-A**				

17508-GHP_GMX07-0168-A Pre Test

17508-GHP_GMX07-0168-A Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Uniaxial Compression Test Results

Project #	17508
Date	7/31/2017
Technician	EK

Client	Aura Minerals
Location	Aranzazu, Zacatecas Mexico
Sample #	**17508-GHP_GMX07-0172-A**
Rock Type	Skarn
Density :	172.4 (pcf)
	2,761.3 (kg/m^3)

Sample # **17508-GHP_GMX07-0172-A**

Fail Stress	**832**	psi
	5.73	Mpa

Fail Stress	832 (psi)
	5.7 Mpa

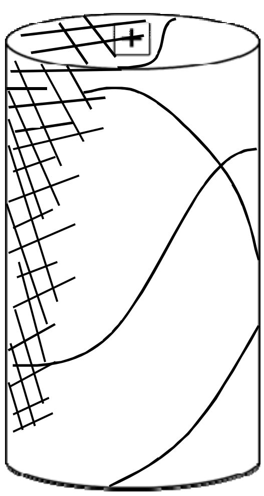
Sample Data :	
Sample # :	**17508-GHP_GMX07-0172-A**
Rock Type:	Skarn
Hole # :	GHP_GMX07
Depth :	172.5 - 172.8
Alterations:	
Diameter :	2.383 (in)
Height :	4.300 (in)
Weight :	867.91 (gm)
Area :	4.460 (in^2)
Volume :	19.180 (in^3)

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)
2:1 Correction :	0.997

Rock Code:	

Pre-Failure Sketch

Rough Sulfides>

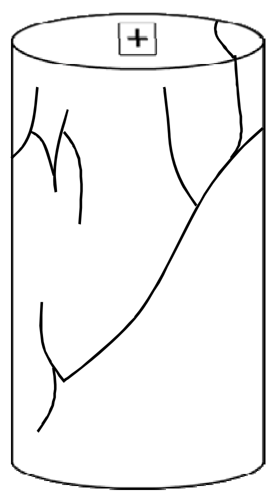


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch



NOTES: Sandstone. Heavy sulfides.

Dia. 1	2.377	Ht. 1	4.301
Dia. 2	2.397	Ht. 2	4.298
Dia. 3	2.375	Ht. 3	4.300
Dia. 4	2.372	Ht. 4	4.302
Dia. 5	2.391	Weight (gm)	867.91
Dia. 6	2.388	Sample #	**17508-GHP_GMX07-0172-A**

Fail Load	3,720	lbs

17508-GHP_GMX07-0172-A Pre Test

17508-GHP_GMX07-0172-A Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Uniaxial Compression Test Results

Project #	17508
Date	7/31/2017
Technician	EK

Client	Aura Minerals
Location	Aranzazu, Zacatecas Mexico
Sample #	**17508-GHP_GMX07-0189**
Rock Type	Intrusive
Density :	165.4 (pcf)
	2,649.1 (kg/m^3)

Sample # **17508-GHP_GMX07-0189**

Fail Stress **19,105** psi

131.76 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX07-0189**
Rock Type:	Intrusive
Hole # :	GHP_GMX07
Depth :	189.25 - 189.55
Alterations:	
Diameter :	2.403 (in)
Height :	5.175 (in)
Weight :	1018.85 (gm)
Area :	4.535 (in^2)
Volume :	23.470 (in^3)

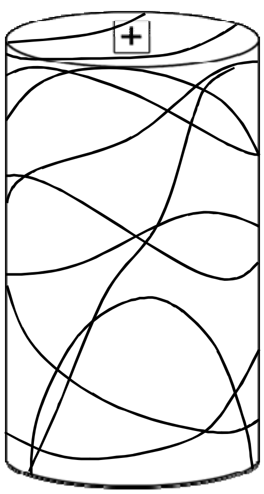
Fail Stress	19,105 (psi)
	131.8 Mpa

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)
2:1 Correction :	1.017

Rock Code:	

DRAFT

Pre-Failure Sketch

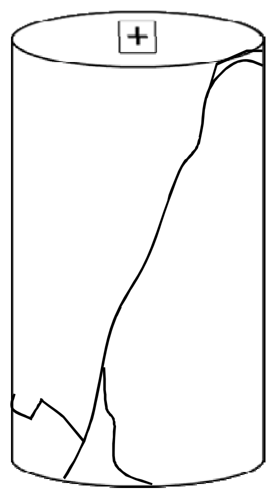


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch



NOTES:

Dia. 1	2.403	Ht. 1	5.173
Dia. 2	2.402	Ht. 2	5.177
Dia. 3	2.403	Ht. 3	5.177
Dia. 4	2.403	Ht. 4	5.174
Dia. 5	2.403	Weight (gm)	1018.85
Dia. 6	2.404	Sample #	**17508-GHP_GMX07-0189**

Fail Load 85,180 lbs

17508-GHP_GMX07-0189 Pre Test

17508-GHP_GMX07-0189 Post Test

TRIAXIAL COMPRESSION TEST RESULTS

CALL & NICHOLAS, INC.

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	8/7/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX01-0006**
		Sample # 17508-GHP_GMX01-0006	Rock Type	Marble
			Density :	169.5 (pcf)
				2,714.3 (kg/m^3)

Sample Data :	
Sample # :	17508-GHP_GMX01-0006
Rock Type:	Marble
Hole # :	GHP_GMX01
Depth :	6.8 - 7.1
Alterations:	
Diameter :	2.407 (in)
Height :	4.912 (in)
Weight :	994.41 (gm)
Area :	4.551 (in^2)
Volume :	22.356 (in^3)

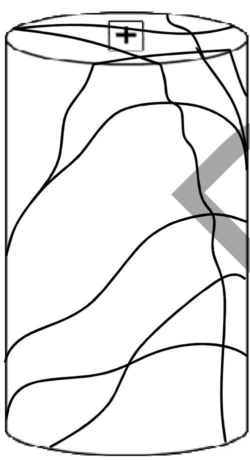
U.S. Standard		
Sigma 3 (psi)	**Sigma 1** (psi)	
750	14,422	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Both
Test Duration :	(sec)

Metric Standard		
Sigma 3 (MPa)	**Sigma 1** (MPa)	
5.17	99.5	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

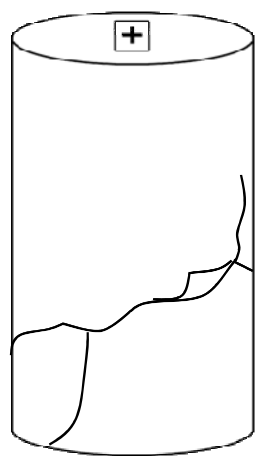


Worksheet

Mode of Failure :

Fracture	
Intact	
Both	XX

Post-Failure Sketch



NOTES:

Dia. 1	2.407	Ht. 1	4.915
Dia. 2	2.407	Ht. 2	4.908
Dia. 3	2.408	Ht. 3	4.909
Dia. 4	2.408	Ht. 4	4.918
Dia. 5	2.409	Weight (gm)	994.41
Dia. 6	2.405	Sample #	17508-GHP_GMX01-0006

Sigma 3 (psi)	**Fail Load** gage (lbs)
750	65,640

17508-GHP_GMX01-0006 Pre Test

17508-GHP_GMX01-0006 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX01-0018**
		Sample # 17508-GHP_GMX01-0018	Rock Type	Marble
			Density :	169.9 (pcf)
				2,721.0 (kg/m^3)

Sample Data :

Sample # :	17508-GHP_GMX01-0018
Rock Type:	Marble
Hole # :	GHP_GMX01
Depth :	18.6 - 19.0
Alterations:	
Diameter :	2.405 (in)
Height :	4.880 (in)
Weight :	988.49 (gm)
Area :	4.542 (in^2)
Volume :	22.168 (in^3)

Rock Code:	
Hardness:	

U.S. Standard

Sigma 3 (psi)	**Sigma 1** (psi)	
2,400	19,749	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

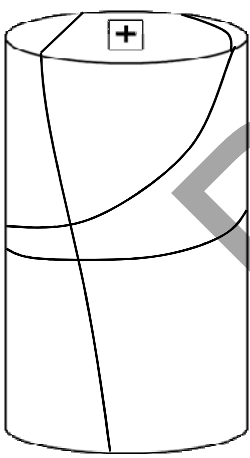
Metric Standard

Sigma 3 (MPa)	**Sigma 1** (MPa)	
16.55	136.2	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Test Data:

Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)

Pre-Failure Sketch

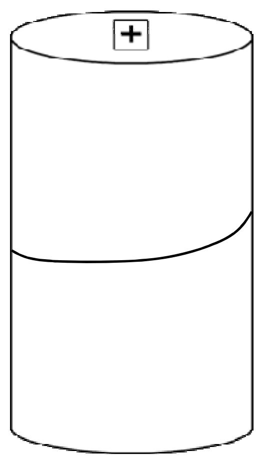


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

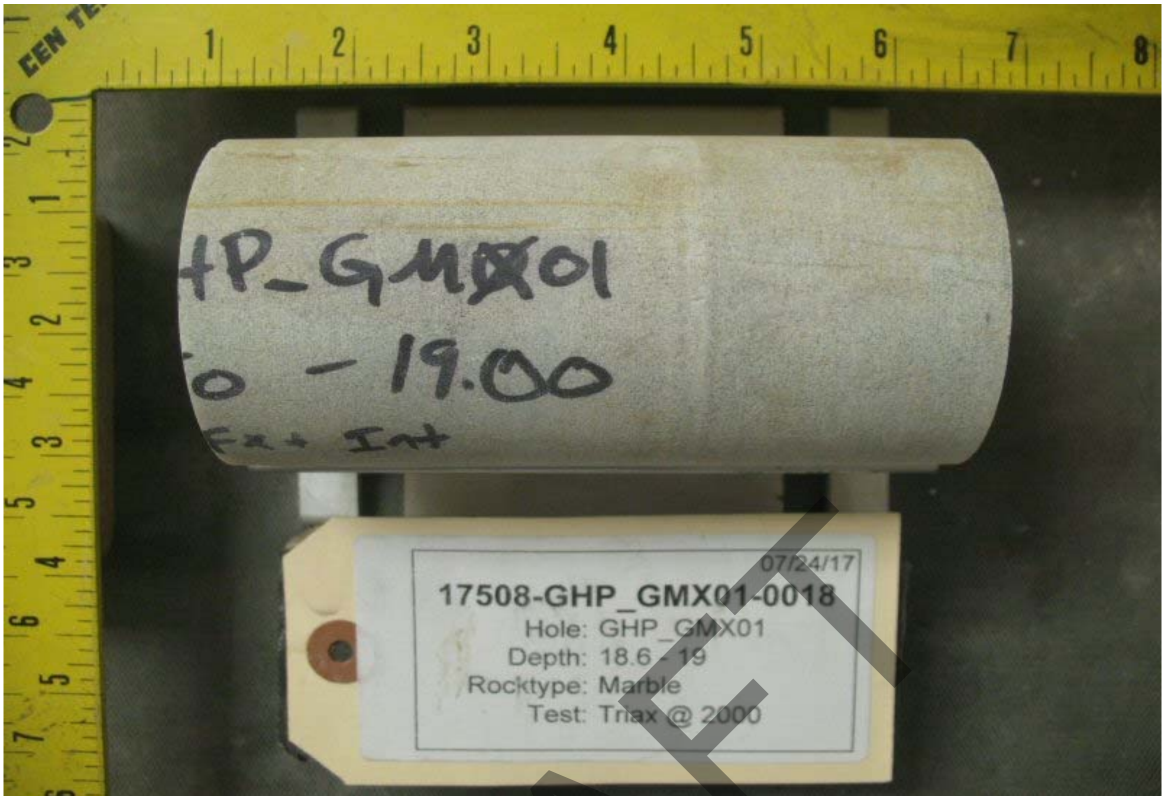
Post-Failure Sketch



NOTES:

Dia. 1	2.402	Ht. 1	4.881
Dia. 2	2.403	Ht. 2	4.881
Dia. 3	2.406	Ht. 3	4.880
Dia. 4	2.406	Ht. 4	4.880
Dia. 5	2.406	Weight (gm)	988.49
Dia. 6	2.407	Sample #	17508-GHP_GMX01-0018

Sigma 3 (psi)	**Fail Load** gage (lbs)
2,400	89,710



17508-GHP_GMX01-0018 Pre Test

17508-GHP_GMX01-0018 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX01-0035**
		Sample # 17508-GHP_GMX01-0035	Rock Type	Contact
			Density :	188.8 (pcf)
				3,024.0 (kg/m^3)

U.S. Standard

Sigma 3 (psi)	**Sigma 1** (psi)	
1,200	10,817	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Sample Data :	
Sample # :	17508-GHP_GMX01-0035
Rock Type:	Contact
Hole # :	GHP_GMX01
Depth :	35.9 - 36.1
Alterations:	
Diameter :	2.410 (in)
Height :	4.893 (in)
Weight :	1105.67 (gm)
Area :	4.560 (in^2)
Volume :	22.312 (in^3)

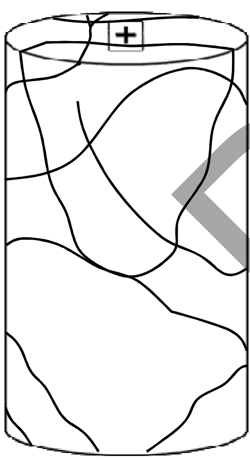
Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)

Metric Standard

Sigma 3 (MPa)	**Sigma 1** (MPa)	
8.28	74.6	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

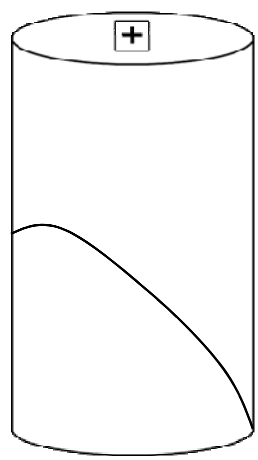


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch



NOTES:

Dia. 1	2.409	Ht. 1	4.890
Dia. 2	2.410	Ht. 2	4.893
Dia. 3	2.409	Ht. 3	4.896
Dia. 4	2.410	Ht. 4	4.892
Dia. 5	2.410	Weight (gm)	1105.67
Dia. 6	2.412	Sample #	17508-GHP_GMX01-0035

Sigma 3 (psi)	**Fail Load** gage (lbs)
1,200	49,330

17508-GHP_GMX01-0035 Pre Test

17508-GHP_GMX01-0035 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX02-0037**
		Sample # 17508-GHP_GMX02-0037	Rock Type	Hornfels
			Density :	163.7 (pcf)
				2,622.9 (kg/m^3)

U.S. Standard

Sigma 3 (psi)	**Sigma 1** (psi)	
1,200	16,765	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Sample Data :	
Sample # :	17508-GHP_GMX02-0037
Rock Type:	Hornfels
Hole # :	GHP_GMX02
Depth :	37.9 - 38.3
Alterations:	
Diameter :	2.390 (in)
Height :	4.852 (in)
Weight :	935.62 (gm)
Area :	4.486 (in^2)
Volume :	21.768 (in^3)

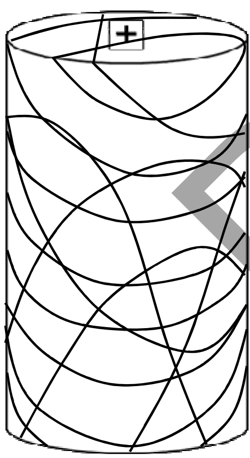
Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Both
Test Duration :	(sec)

Metric Standard

Sigma 3 (MPa)	**Sigma 1** (MPa)	
8.28	115.6	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

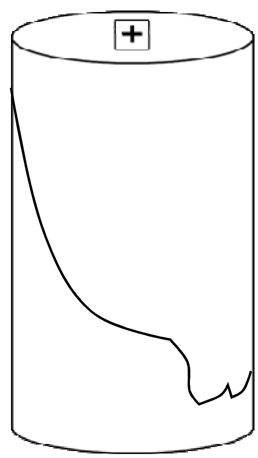


Worksheet

Mode of Failure :

Fracture	
Intact	
Both	XX

Post-Failure Sketch

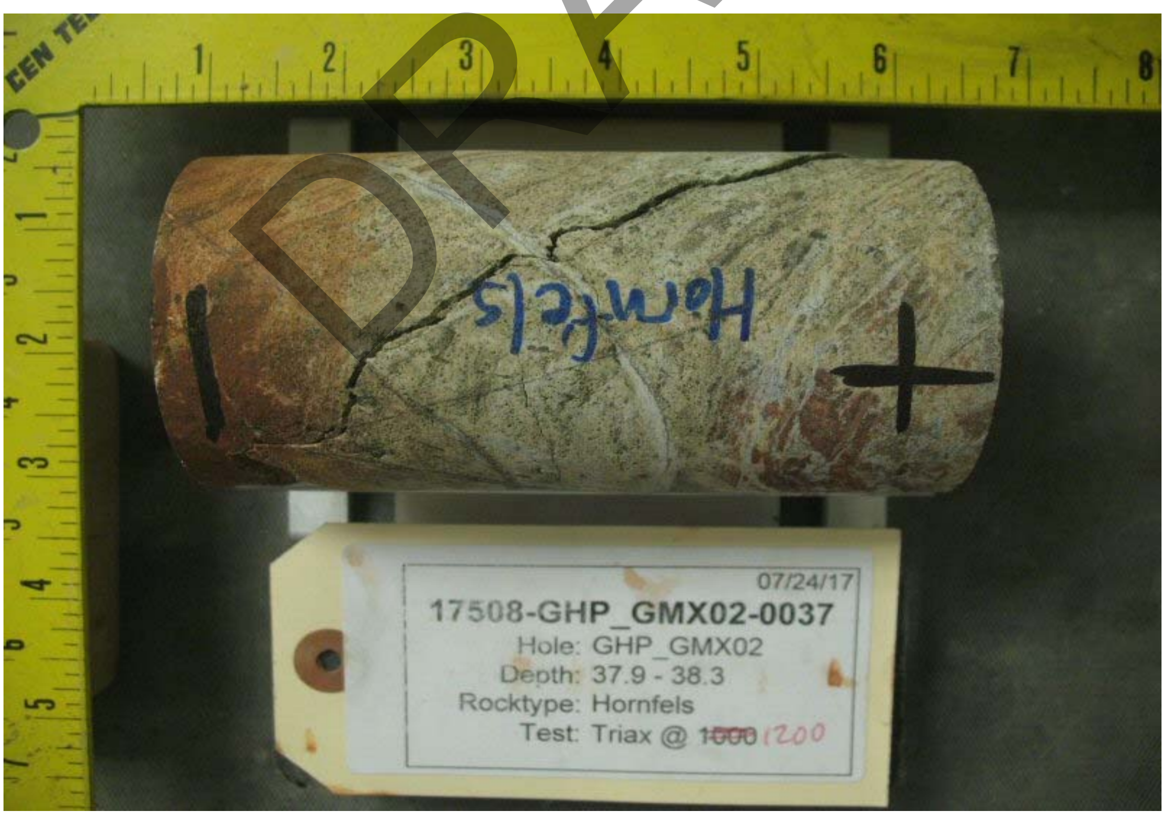


NOTES: Strata

Dia. 1	2.388	Ht. 1	4.858
Dia. 2	2.390	Ht. 2	4.851
Dia. 3	2.390	Ht. 3	4.849
Dia. 4	2.388	Ht. 4	4.851
Dia. 5	2.391	Weight (gm)	935.62
Dia. 6	2.394	Sample #	17508-GHP_GMX02-0037

Sigma 3 (psi)	**Fail Load** gage (lbs)
1,200	75,210

17508-GHP_GMX02-0037 Pre Test



17508-GHP_GMX02-0037 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX02-0056**
		Sample # 17508-GHP_GMX02-0056	Rock Type	Intrusive
			Density :	165.5 (pcf)
				2,650.7 (kg/m^3)

U.S. Standard

Sigma 3 (psi)	**Sigma 1** (psi)	
1,200	19,603	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Sample Data :	
Sample # :	17508-GHP_GMX02-0056
Rock Type:	Intrusive
Hole # :	GHP_GMX02
Depth :	56.1 - 56.4
Alterations:	
Diameter :	2.399 (in)
Height :	4.941 (in)
Weight :	969.97 (gm)
Area :	4.519 (in^2)
Volume :	22.330 (in^3)

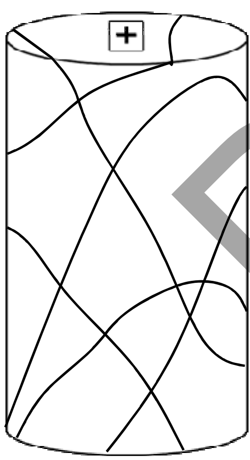
Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)

Metric Standard

Sigma 3 (MPa)	**Sigma 1** (MPa)	
8.28	135.2	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

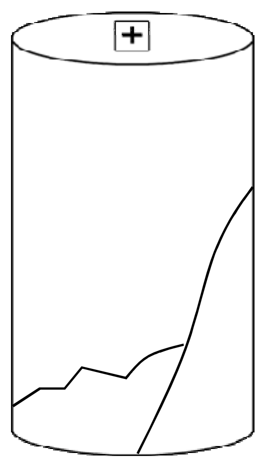


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch



NOTES:

Dia. 1	2.396	Ht. 1	4.941
Dia. 2	2.395	Ht. 2	4.939
Dia. 3	2.400	Ht. 3	4.940
Dia. 4	2.401	Ht. 4	4.946
Dia. 5	2.401	Weight (gm)	969.97
Dia. 6	2.400	Sample #	17508-GHP_GMX02-0056

Sigma 3 (psi)	**Fail Load** gage (lbs)
1,200	88,590

17508-GHP_GMX02-0056 Pre Test

17508-GHP_GMX02-0056 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX02-0083**
		Sample # 17508-GHP_GMX02-0083	Rock Type	Intrusive
			Density :	155.3 (pcf)
				2,487.0 (kg/m^3)

U.S. Standard

Sigma 3 (psi)	Sigma 1 (psi)	
2,400	22,875	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Sample Data :	
Sample # :	17508-GHP_GMX02-0083
Rock Type:	Intrusive
Hole # :	GHP_GMX02
Depth :	83.3 - 83.6
Alterations:	
Diameter :	2.408 (in)
Height :	4.081 (in)
Weight :	757.78 (gm)
Area :	4.556 (in^2)
Volume :	18.593 (in^3)

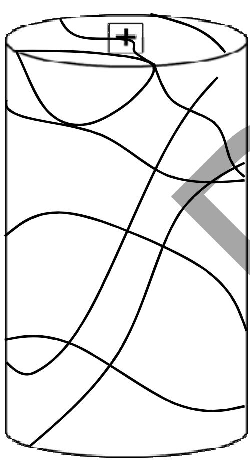
Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)

Metric Standard

Sigma 3 (MPa)	Sigma 1 (MPa)	
16.55	157.8	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

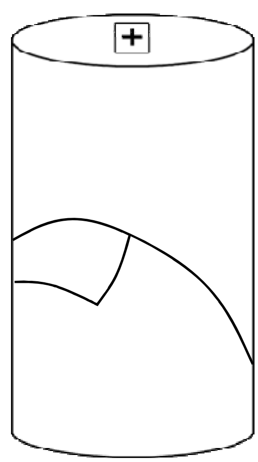


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch

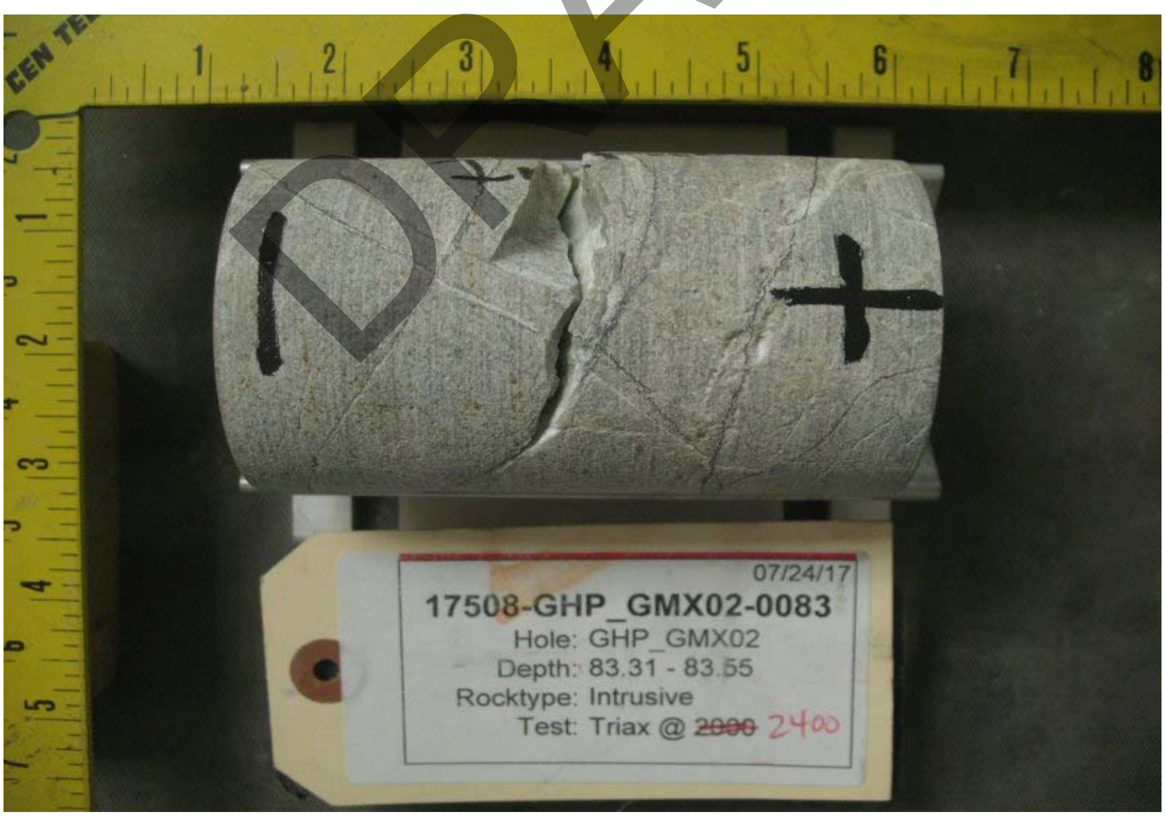


NOTES:

Dia. 1	2.408	Ht. 1	4.081
Dia. 2	2.408	Ht. 2	4.082
Dia. 3	2.408	Ht. 3	4.083
Dia. 4	2.409	Ht. 4	4.081
Dia. 5	2.410	Weight (gm)	757.78
Dia. 6	2.409	Sample #	17508-GHP_GMX02-0083

Sigma 3 (psi)	**Fail Load** gage (lbs)
2,400	104,210

17508-GHP_GMX02-0083 Pre Test



17508-GHP_GMX02-0083 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX02-0171**
		Sample # 17508-GHP_GMX02-0171	Rock Type	Intrusive
			Density :	157.3 (pcf)
				2,519.5 (kg/m^3)

U.S. Standard

Sigma 3 (psi)	**Sigma 1** (psi)	
750	15,735	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Sample Data :	
Sample # :	17508-GHP_GMX02-0171
Rock Type:	Intrusive
Hole # :	GHP_GMX02
Depth :	171.1 - 171.4
Alterations:	
Diameter :	2.394 (in)
Height :	5.074 (in)
Weight :	943.47 (gm)
Area :	4.503 (in^2)
Volume :	22.851 (in^3)

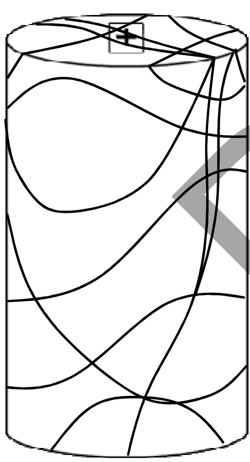
Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)

Metric Standard

Sigma 3 (MPa)	**Sigma 1** (MPa)	
5.17	108.5	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

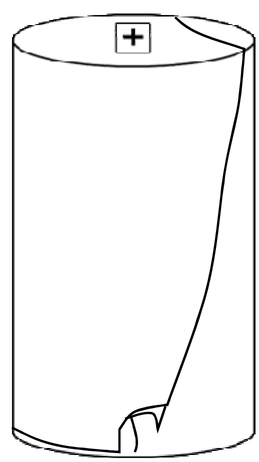


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch

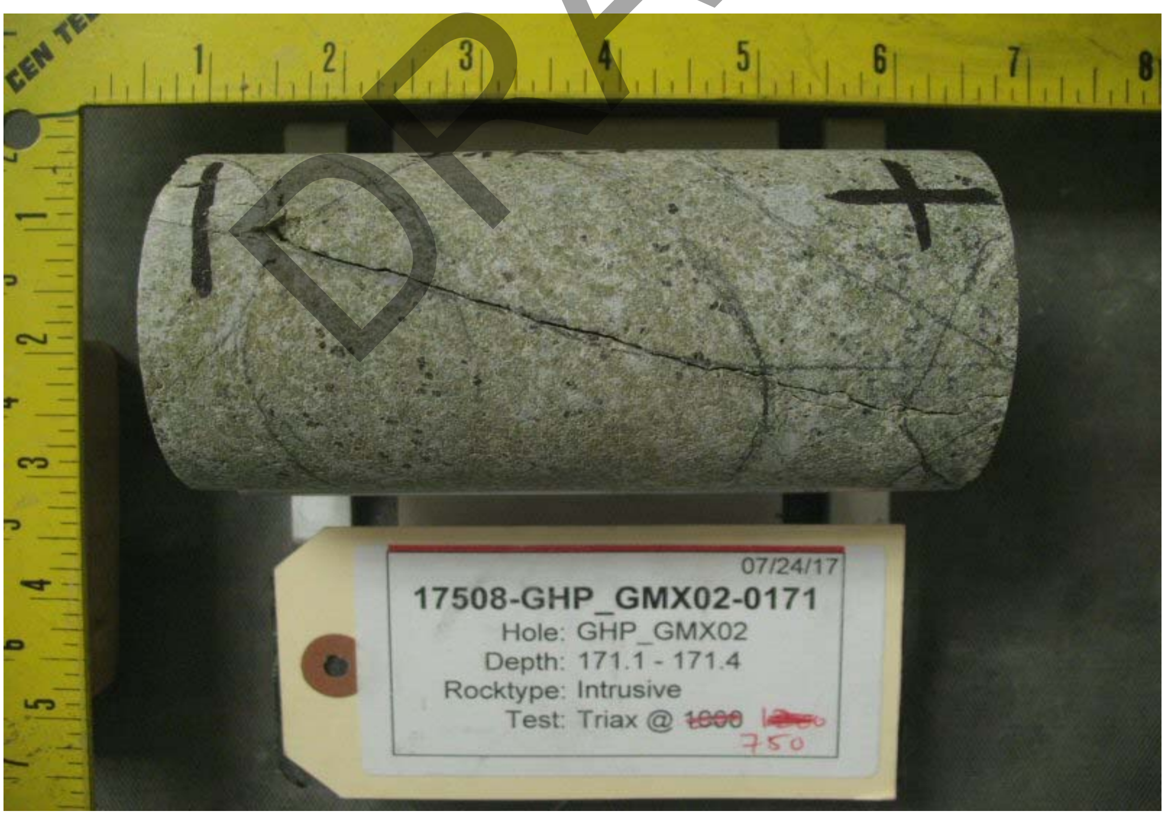


NOTES:

Dia. 1	2.393	Ht. 1	5.077
Dia. 2	2.395	Ht. 2	5.075
Dia. 3	2.396	Ht. 3	5.073
Dia. 4	2.395	Ht. 4	5.072
Dia. 5	2.394	Weight (gm)	943.47
Dia. 6	2.396	Sample #	17508-GHP_GMX02-0171

Sigma 3 (psi)	**Fail Load** gage (lbs)
750	70,860

17508-GHP_GMX02-0171 Pre Test



17508-GHP_GMX02-0171 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX02-0200**
		Sample # 17508-GHP_GMX02-0200	Rock Type	Skarn
			Density :	251.5 (pcf)
				4,027.8 (kg/m^3)

Sample Data :	
Sample # :	17508-GHP_GMX02-0200
Rock Type:	Skarn
Hole # :	GHP_GMX02
Depth :	200.7 - 200.9
Alterations:	
Diameter :	2.387 (in)
Height :	5.002 (in)
Weight :	1478.06 (gm)
Area :	4.477 (in^2)
Volume :	22.393 (in^3)

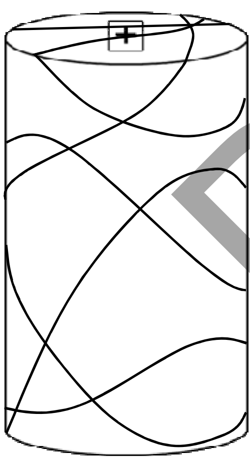
U.S. Standard		
Sigma 3 (psi)	**Sigma 1** (psi)	
2,400	30,372	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)

Metric Standard		
Sigma 3 (MPa)	**Sigma 1** (MPa)	
16.55	209.5	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

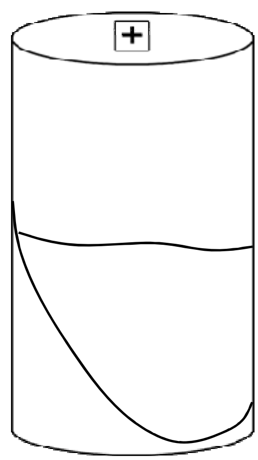


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch



NOTES: Heavy sulfides.

Dia. 1	2.388	Ht. 1	4.999
Dia. 2	2.389	Ht. 2	5.003
Dia. 3	2.386	Ht. 3	5.007
Dia. 4	2.387	Ht. 4	5.000
Dia. 5	2.389	Weight (gm)	1478.06
Dia. 6	2.387	Sample #	17508-GHP_GMX02-0200

Sigma 3 (psi)	**Fail Load** gage (lbs)
2,400	135,970

17508-GHP_GMX02-0200 Pre Test

17508-GHP_GMX02-0200 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX02-0218**
		Sample # 17508-GHP_GMX02-0218	Rock Type	Skarn
			Density :	184.9 (pcf)
				2,961.4 (kg/m^3)

Sample Data :	
Sample # :	17508-GHP_GMX02-0218
Rock Type:	Skarn
Hole # :	GHP_GMX02
Depth :	218.8 - 219.4
Alterations:	
Diameter :	2.388 (in)
Height :	5.060 (in)
Weight :	1099.76 (gm)
Area :	4.479 (in^2)
Volume :	22.662 (in^3)

U.S. Standard		
Sigma 3 (psi)	**Sigma 1** (psi)	
1,200	18,380	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

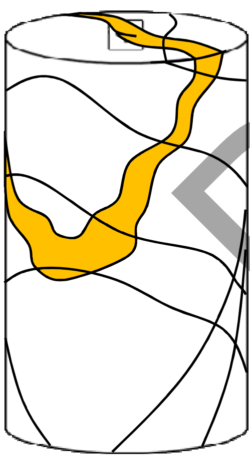
Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)

Metric Standard		
Sigma 3 (MPa)	**Sigma 1** (MPa)	
8.28	126.8	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

DRAFT

Pre-Failure Sketch

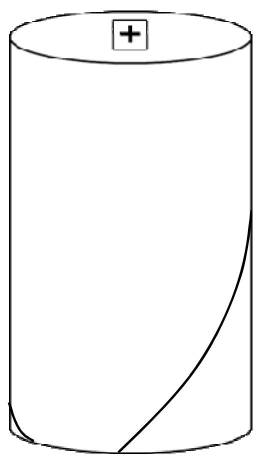


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

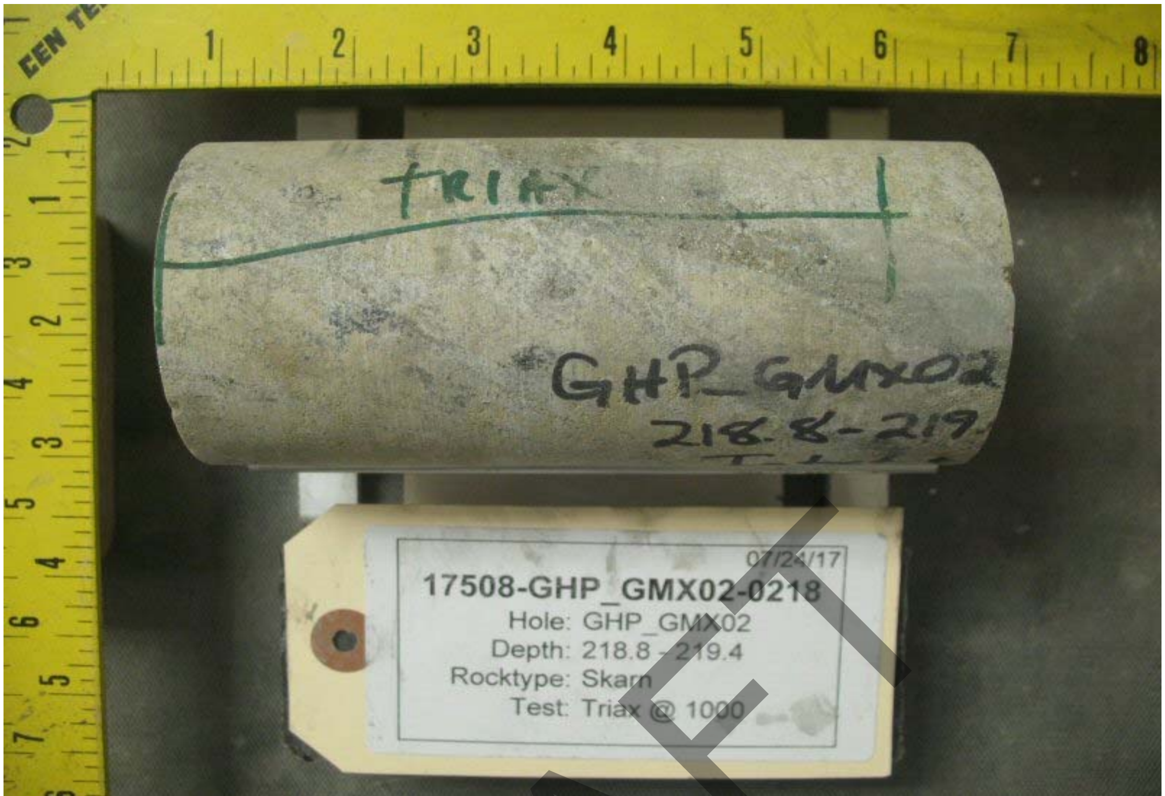
Post-Failure Sketch



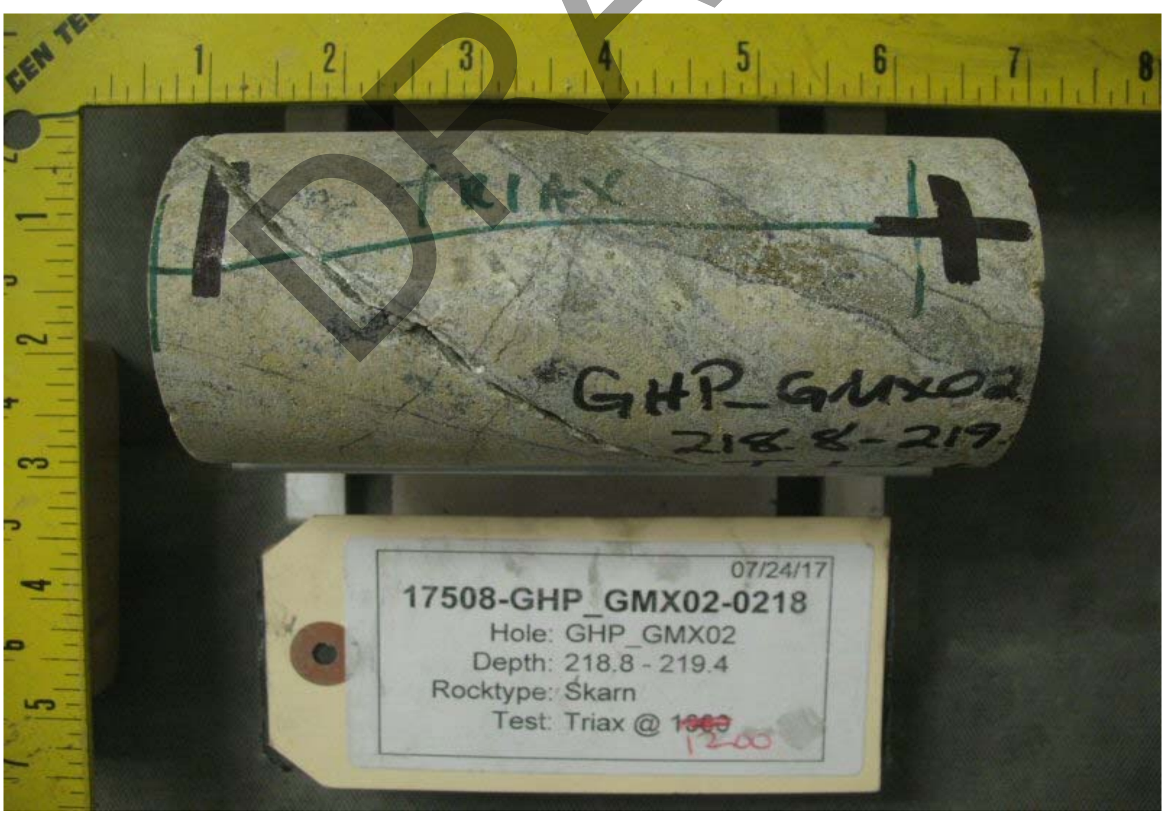
NOTES: Sulfides

Dia. 1	2.388	Ht. 1	5.060
Dia. 2	2.388	Ht. 2	5.064
Dia. 3	2.389	Ht. 3	5.060
Dia. 4	2.387	Ht. 4	5.056
Dia. 5	2.388	Weight (gm)	1099.76
Dia. 6	2.389	Sample #	17508-GHP_GMX02-0218

Sigma 3 (psi)	**Fail Load** gage (lbs)
1,200	82,320



17508-GHP_GMX02-0218 Pre Test



17508-GHP_GMX02-0218 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX02-0245**
		Sample # 17508-GHP_GMX02-0245	Rock Type	Intrusive
			Density :	168.2 (pcf)
				2,694.8 (kg/m^3)

U.S. Standard

Sigma 3 (psi)	**Sigma 1** (psi)	
2,400	29,498	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Sample Data :	
Sample # :	17508-GHP_GMX02-0245
Rock Type:	Intrusive
Hole # :	GHP_GMX02
Depth :	245.8 - 246.1
Alterations:	
Diameter :	2.397 (in)
Height :	5.058 (in)
Weight :	1008.01 (gm)
Area :	4.513 (in^2)
Volume :	22.826 (in^3)

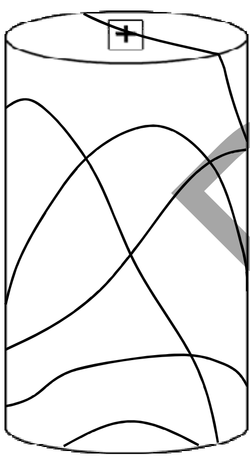
Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)

Metric Standard

Sigma 3 (MPa)	**Sigma 1** (MPa)	
16.55	203.4	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

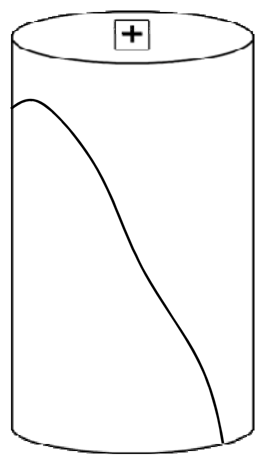


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

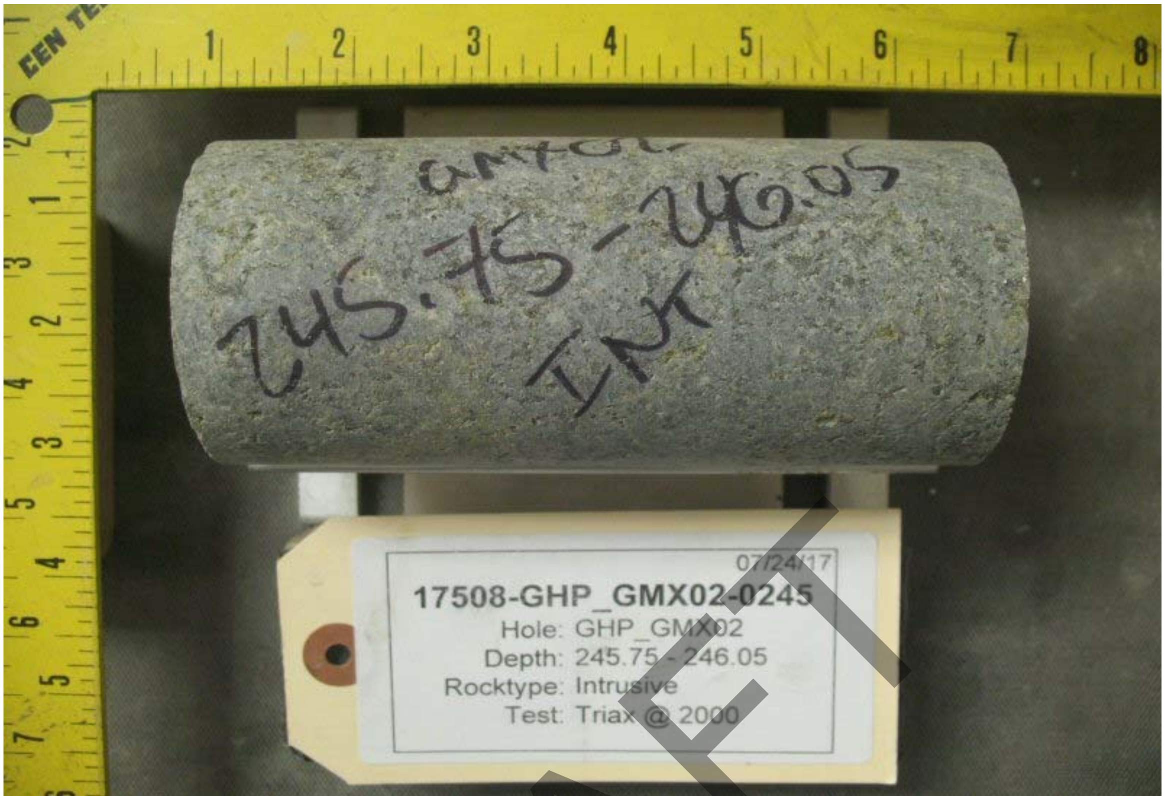
Post-Failure Sketch



NOTES:

Dia. 1	2.398	Ht. 1	5.060
Dia. 2	2.398	Ht. 2	5.059
Dia. 3	2.397	Ht. 3	5.056
Dia. 4	2.397	Ht. 4	5.057
Dia. 5	2.397	Weight (gm)	1008.01
Dia. 6	2.396	Sample #	17508-GHP_GMX02-0245

Sigma 3 (psi)	**Fail Load** gage (lbs)
2,400	133,130



17508-GHP_GMX02-0245 Pre Test

17508-GHP_GMX02-0245 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX04-0045**
		Sample # 17508-GHP_GMX04-0045	Rock Type	Marble
			Density :	169.1 (pcf)
				2,709.2 (kg/m^3)

U.S. Standard

Sigma 3 (psi)	**Sigma 1** (psi)	
1,200	19,193	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Sample Data :	
Sample # :	17508-GHP_GMX04-0045
Rock Type:	Marble
Hole # :	GHP_GMX04
Depth :	45.8 - 46.2
Alterations:	
Diameter :	2.401 (in)
Height :	4.885 (in)
Weight :	982.07 (gm)
Area :	4.528 (in^2)
Volume :	22.121 (in^3)

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Both
Test Duration :	(sec)

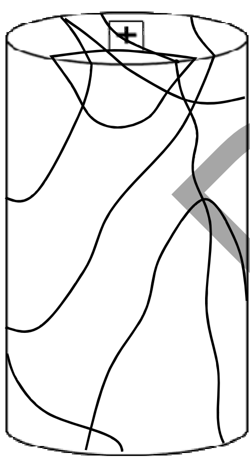
Metric Standard

Sigma 3 (MPa)	**Sigma 1** (MPa)	
8.28	132.4	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

DRAFT

Pre-Failure Sketch

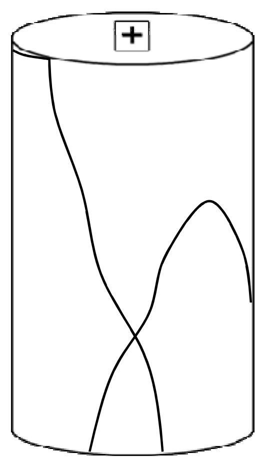


Worksheet

Mode of Failure :

Fracture	
Intact	
Both	XX

Post-Failure Sketch



NOTES:

Dia. 1	2.403	Ht. 1	4.882
Dia. 2	2.400	Ht. 2	4.890
Dia. 3	2.401	Ht. 3	4.886
Dia. 4	2.401	Ht. 4	4.883
Dia. 5	2.400	Weight (gm)	982.07
Dia. 6	2.401	Sample #	17508-GHP_GMX04-0045

Sigma 3 (psi)	**Fail Load** gage (lbs)
1,200	86,910

17508-GHP_GMX04-0045 Pre Test

17508-GHP_GMX04-0045 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX04-0064**
		Sample # 17508-GHP_GMX04-0064	Rock Type	Skarn
			Density :	225.2 (pcf)
				3,607.0 (kg/m^3)

U.S. Standard

Sigma 3 (psi)	**Sigma 1** (psi)	
2,400	33,277	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Sample Data :	
Sample # :	17508-GHP_GMX04-0064
Rock Type:	Skarn
Hole # :	GHP_GMX04
Depth :	64.3 - 64.6
Alterations:	
Diameter :	2.400 (in)
Height :	5.125 (in)
Weight :	1370.55 (gm)
Area :	4.524 (in^2)
Volume :	23.187 (in^3)

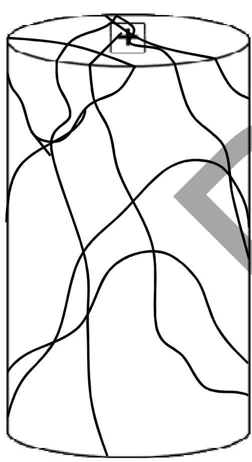
Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)

Metric Standard

Sigma 3 (MPa)	**Sigma 1** (MPa)	
16.55	229.5	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

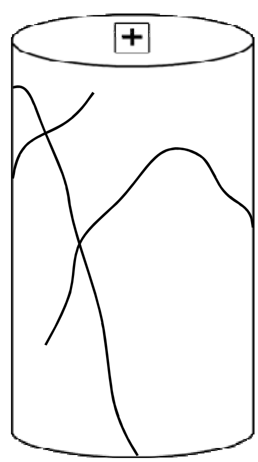


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch



NOTES: Minimal to some sulfides.

Dia. 1	2.400	Ht. 1	5.124
Dia. 2	2.400	Ht. 2	5.128
Dia. 3	2.400	Ht. 3	5.125
Dia. 4	2.400	Ht. 4	5.122
Dia. 5	2.400	Weight (gm)	1370.55
Dia. 6	2.400	Sample #	17508-GHP_GMX04-0064

Sigma 3 (psi)	**Fail Load** gage (lbs)
2,400	150,560

17508-GHP_GMX04-0064 Pre Test

17508-GHP_GMX04-0064 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	8/2/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX04-0066**
		Sample # 17508-GHP_GMX04-0066	Rock Type	Skarn
			Density :	226.6 (pcf)
				3,629.2 (kg/m^3)

Sample Data :	
Sample # :	17508-GHP_GMX04-0066
Rock Type:	Skarn
Hole # :	GHP_GMX04
Depth :	66.7 - 67.0
Alterations:	
Diameter :	2.397 (in)
Height :	5.121 (in)
Weight :	1374.96 (gm)
Area :	4.515 (in^2)
Volume :	23.119 (in^3)

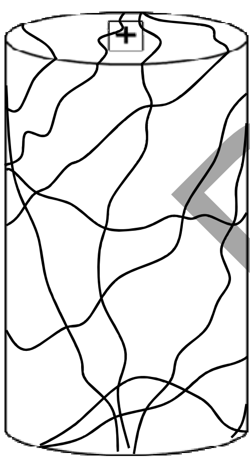
U.S. Standard		
Sigma 3 (psi)	**Sigma 1** (psi)	
750	38,518	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)

Metric Standard		
Sigma 3 (MPa)	**Sigma 1** (MPa)	
5.17	265.6	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

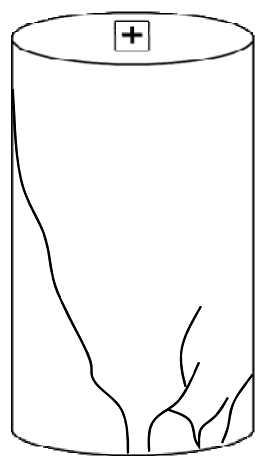


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch



NOTES: Minimal Sulfides.

Dia. 1	2.398	Ht. 1	5.120
Dia. 2	2.398	Ht. 2	5.127
Dia. 3	2.397	Ht. 3	5.121
Dia. 4	2.398	Ht. 4	5.117
Dia. 5	2.397	Weight (gm)	1374.96
Dia. 6	2.397	Sample #	17508-GHP_GMX04-0066

Sigma 3 (psi)	**Fail Load** gage (lbs)
750	173,900

17508-GHP_GMX04-0066 Pre Test

17508-GHP_GMX04-0066 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX04-0071**
		Sample # 17508-GHP_GMX04-0071	Rock Type	Hornfels
			Density :	182.6 (pcf)
				2,924.2 (kg/m^3)

Sample Data :	
Sample # :	17508-GHP_GMX04-0071
Rock Type:	Hornfels
Hole # :	GHP_GMX04
Depth :	71.1 - 71.3
Alterations:	
Diameter :	2.381 (in)
Height :	4.499 (in)
Weight :	960.22 (gm)
Area :	4.454 (in^2)
Volume :	20.038 (in^3)

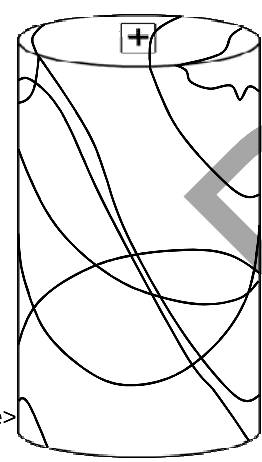
U.S. Standard		
Sigma 3 (psi)	**Sigma 1** (psi)	
2,400	11,931	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)

Metric Standard		
Sigma 3 (MPa)	**Sigma 1** (MPa)	
16.55	82.3	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch



<Hydrostone

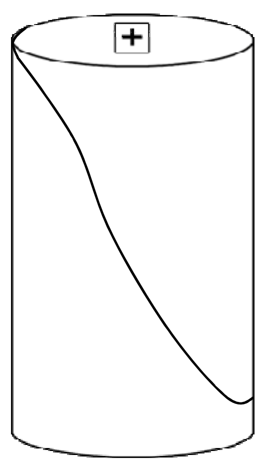
Hydrostone>

Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch



NOTES:

Dia. 1	2.386	Ht. 1	4.501
Dia. 2	2.381	Ht. 2	4.497
Dia. 3	2.386	Ht. 3	4.497
Dia. 4	2.380	Ht. 4	4.502
Dia. 5	2.370	Weight (gm)	960.22
Dia. 6	2.386	Sample #	17508-GHP_GMX04-0071

Sigma 3 (psi)	**Fail Load** gage (lbs)
2,400	53,140

17508-GHP_GMX04-0071 Pre Test

17508-GHP_GMX04-0071 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX04-0081**
		Sample # 17508-GHP_GMX04-0081	Rock Type	Hornfels
			Density :	189.9 (pcf)
				3,041.4 (kg/m^3)

U.S. Standard

Sigma 3 (psi)	**Sigma 1** (psi)	
750	11,207	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Sample Data :	
Sample # :	17508-GHP_GMX04-0081
Rock Type:	Hornfels
Hole # :	GHP_GMX04
Depth :	81.0 - 81.4
Alterations:	
Diameter :	2.387 (in)
Height :	4.378 (in)
Weight :	976.86 (gm)
Area :	4.477 (in^2)
Volume :	19.599 (in^3)

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Both
Test Duration :	(sec)

Metric Standard

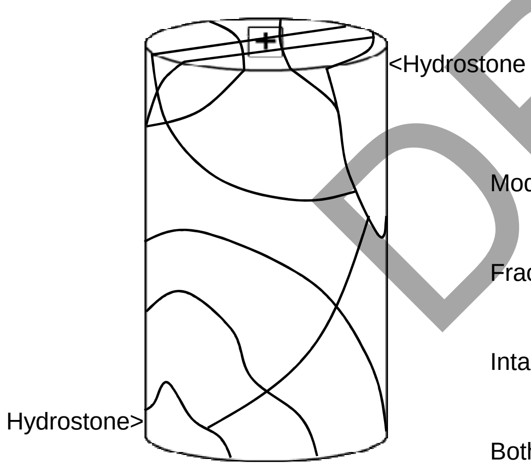
Sigma 3 (MPa)	**Sigma 1** (MPa)	
5.17	77.3	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

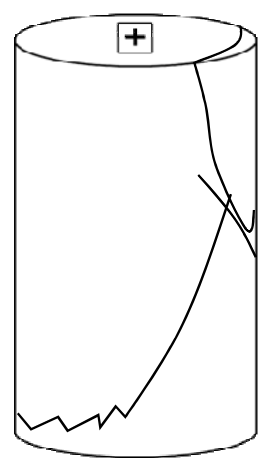
Worksheet

Post-Failure Sketch



Mode of Failure :

Fracture	
Intact	
Both	XX



NOTES:

Dia. 1	2.392	Ht. 1	4.377
Dia. 2	2.384	Ht. 2	4.378
Dia. 3	2.395	Ht. 3	4.380
Dia. 4	2.389	Ht. 4	4.379
Dia. 5	2.376	Weight (gm)	976.86
Dia. 6	2.389	Sample #	17508-GHP_GMX04-0081

Sigma 3 (psi)	**Fail Load** gage (lbs)
750	50,170

17508-GHP_GMX04-0081 Pre Test

17508-GHP_GMX04-0081 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX04-0205**
		Sample # 17508-GHP_GMX04-0205	Rock Type	Hornfels
			Density :	167.0 (pcf)
				2,674.3 (kg/m^3)

U.S. Standard		
Sigma 3 (psi)	**Sigma 1** (psi)	
2,400	13,004	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

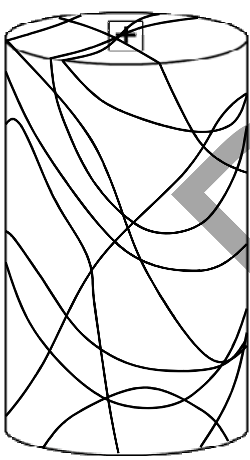
Sample Data :	
Sample # :	17508-GHP_GMX04-0205
Rock Type:	Hornfels
Hole # :	GHP_GMX04
Depth :	205.7 - 206.0
Alterations:	
Diameter :	2.401 (in)
Height :	4.854 (in)
Weight :	963.15 (gm)
Area :	4.528 (in^2)
Volume :	21.977 (in^3)

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)

Metric Standard		
Sigma 3 (MPa)	**Sigma 1** (MPa)	
16.55	89.7	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

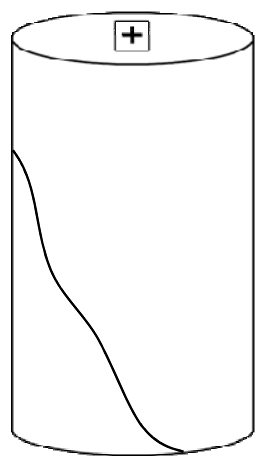


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch

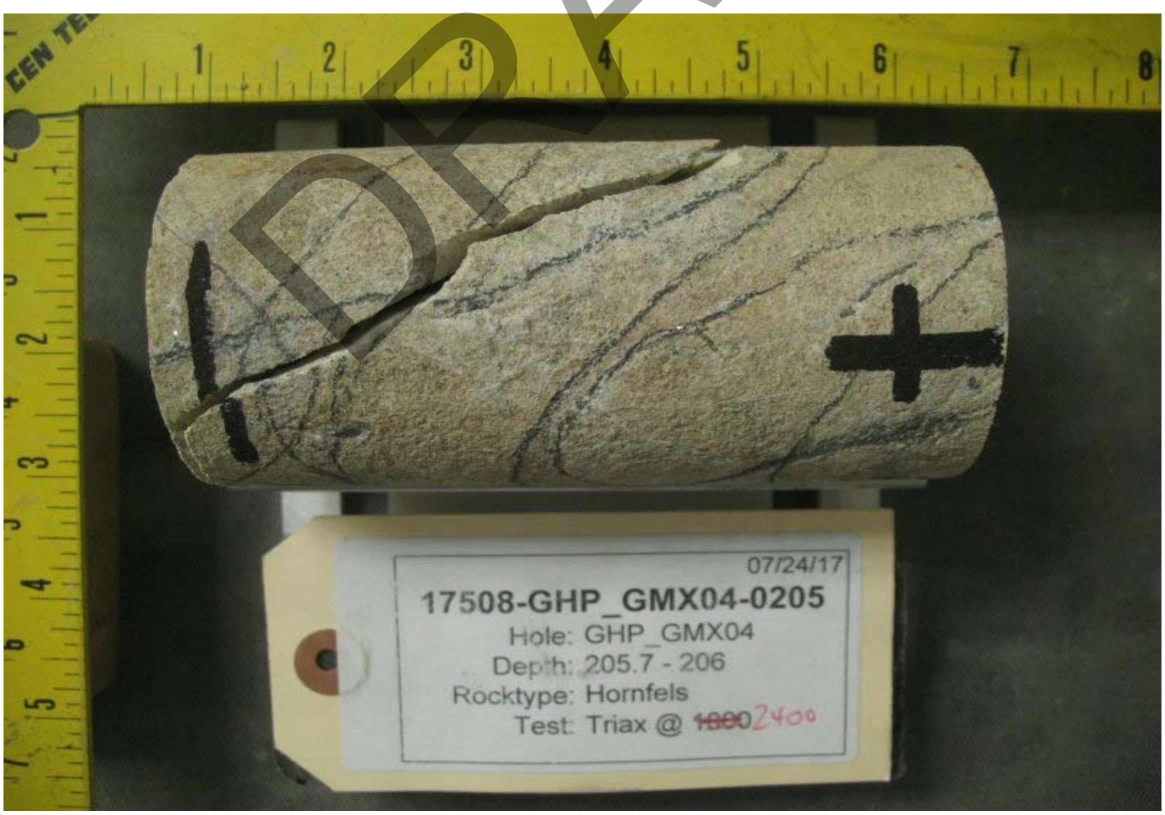


NOTES:

Dia. 1	2.400	Ht. 1	4.850
Dia. 2	2.401	Ht. 2	4.849
Dia. 3	2.403	Ht. 3	4.859
Dia. 4	2.400	Ht. 4	4.858
Dia. 5	2.401	Weight (gm)	963.15
Dia. 6	2.402	Sample #	17508-GHP_GMX04-0205

Sigma 3 (psi)	**Fail Load** gage (lbs)
2,400	58,880

17508-GHP_GMX04-0205 Pre Test



17508-GHP_GMX04-0205 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX04-0226**
		Sample # 17508-GHP_GMX04-0226	Rock Type	Skarn
			Density :	248.3 (pcf)
				3,977.5 (kg/m^3)

U.S. Standard

Sigma 3 (psi)	**Sigma 1** (psi)	
1,200	19,329	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Sample Data :	
Sample # :	17508-GHP_GMX04-0226
Rock Type:	Skarn
Hole # :	GHP_GMX04
Depth :	226.9 - 227.1
Alterations:	
Diameter :	2.399 (in)
Height :	4.771 (in)
Weight :	1405.45 (gm)
Area :	4.519 (in^2)
Volume :	21.562 (in^3)

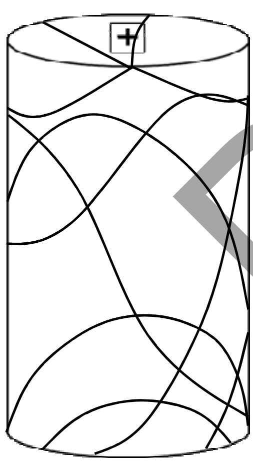
Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Both
Test Duration :	(sec)

Metric Standard

Sigma 3 (MPa)	**Sigma 1** (MPa)	
8.28	133.3	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

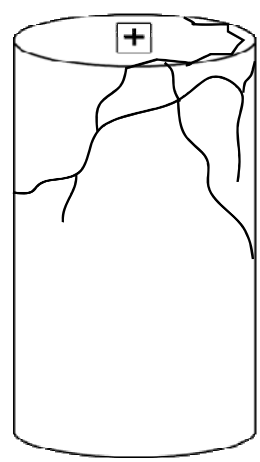


Worksheet

Mode of Failure :

Fracture	
Intact	
Both	XX

Post-Failure Sketch



NOTES: Heavy sulfides

Dia. 1	2.398	Ht. 1	4.774
Dia. 2	2.402	Ht. 2	4.768
Dia. 3	2.397	Ht. 3	4.769
Dia. 4	2.397	Ht. 4	4.775
Dia. 5	2.403	Weight (gm)	1405.45
Dia. 6	2.396	Sample #	17508-GHP_GMX04-0226

Sigma 3 (psi)	**Fail Load** gage (lbs)
1,200	87,350

17508-GHP_GMX04-0226 Pre Test

17508-GHP_GMX04-0226 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX05-0105**
		Sample # 17508-GHP_GMX05-0105	Rock Type	Hornfels
			Density :	159.7 (pcf)
				2,558.0 (kg/m^3)

U.S. Standard

Sigma 3 (psi)	Sigma 1 (psi)	
750	8,751	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Sample Data :	
Sample # :	17508-GHP_GMX05-0105
Rock Type:	Hornfels
Hole # :	GHP_GMX05
Depth :	105.8 - 106.3
Alterations:	
Diameter :	2.392 (in)
Height :	4.952 (in)
Weight :	933.03 (gm)
Area :	4.494 (in^2)
Volume :	22.258 (in^3)

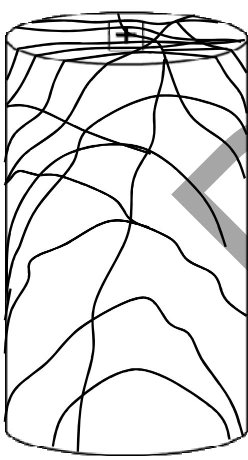
Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)

Metric Standard

Sigma 3 (MPa)	Sigma 1 (MPa)	
5.17	60.4	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

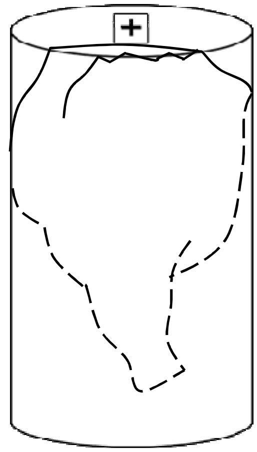


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch

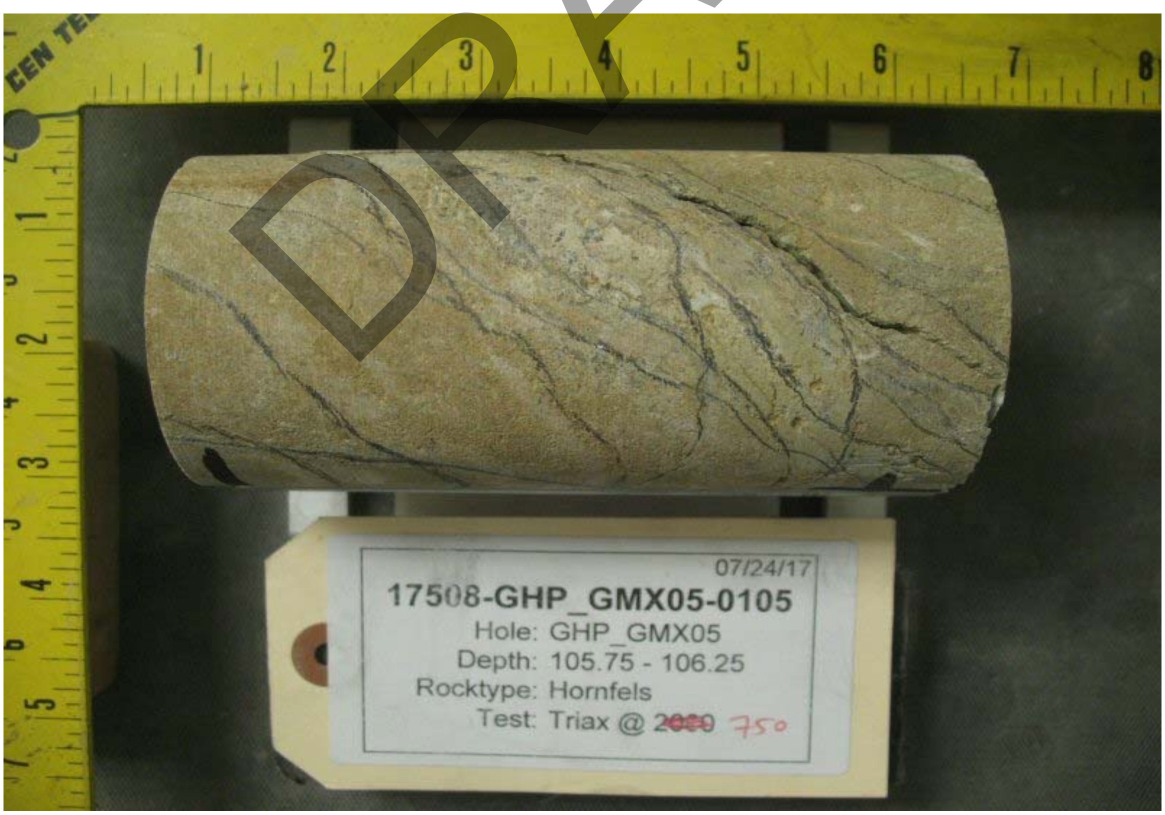


NOTES:

Dia. 1	2.389	Ht. 1	4.954
Dia. 2	2.392	Ht. 2	4.955
Dia. 3	2.391	Ht. 3	4.952
Dia. 4	2.394	Ht. 4	4.950
Dia. 5	2.392	Weight (gm)	933.03
Dia. 6	2.395	Sample #	17508-GHP_GMX05-0105

Sigma 3 (psi)	**Fail Load** gage (lbs)
750	39,330

17508-GHP_GMX05-0105 Pre Test



17508-GHP_GMX05-0105 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	8/19/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX05-0146**
		Sample # 17508-GHP_GMX05-0146	Rock Type	Hornfels
			Density :	182.8 (pcf)
				2,928.0 (kg/m^3)

U.S. Standard		
Sigma 3 (psi)	**Sigma 1** (psi)	
2,400	64,074	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Sample Data :	
Sample # :	17508-GHP_GMX05-0146
Rock Type:	Hornfels
Hole # :	GHP_GMX05
Depth :	146.5 - 146.75
Alterations:	
Diameter :	2.400 (in)
Height :	3.470 (in)
Weight :	753.65 (gm)
Area :	4.526 (in^2)
Volume :	15.707 (in^3)

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Both
Test Duration :	(sec)

Metric Standard		
Sigma 3 (MPa)	**Sigma 1** (MPa)	
16.55	441.9	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

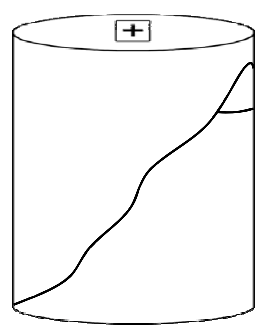
Pre-Failure Sketch

Worksheet

Post-Failure Sketch

Mode of Failure :

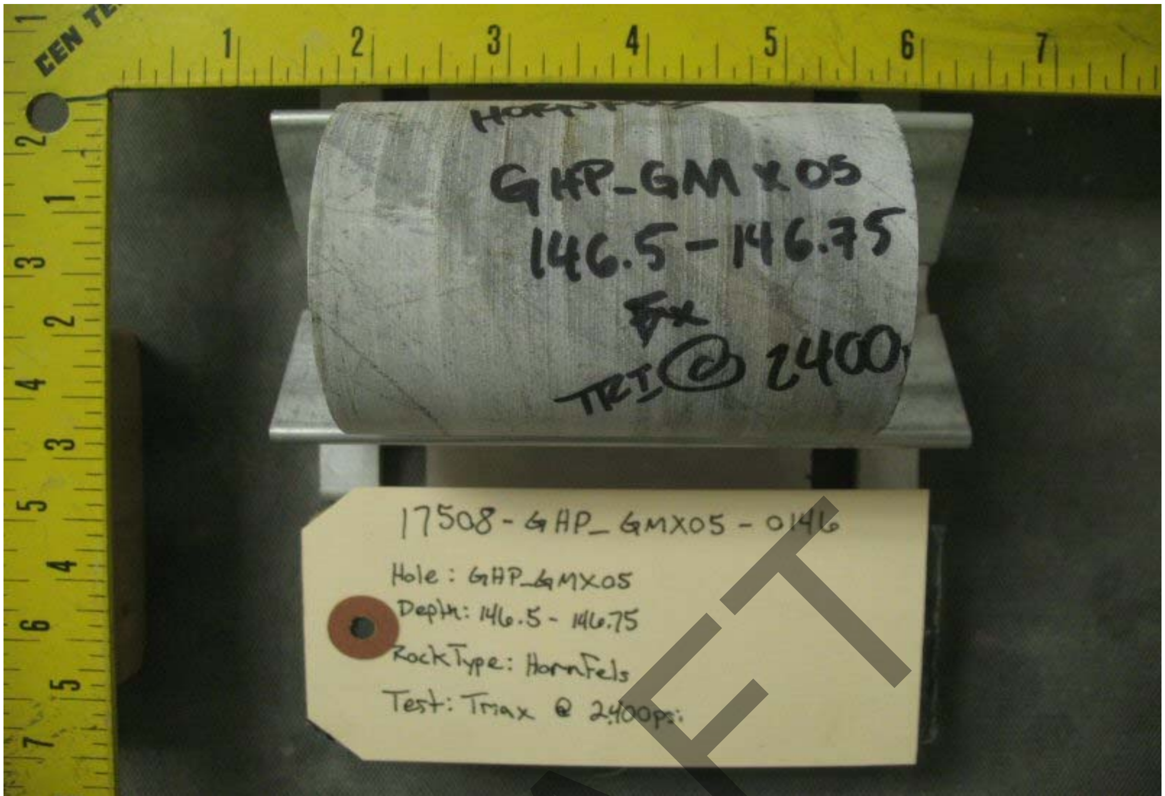
Fracture	
Intact	
Both	XX



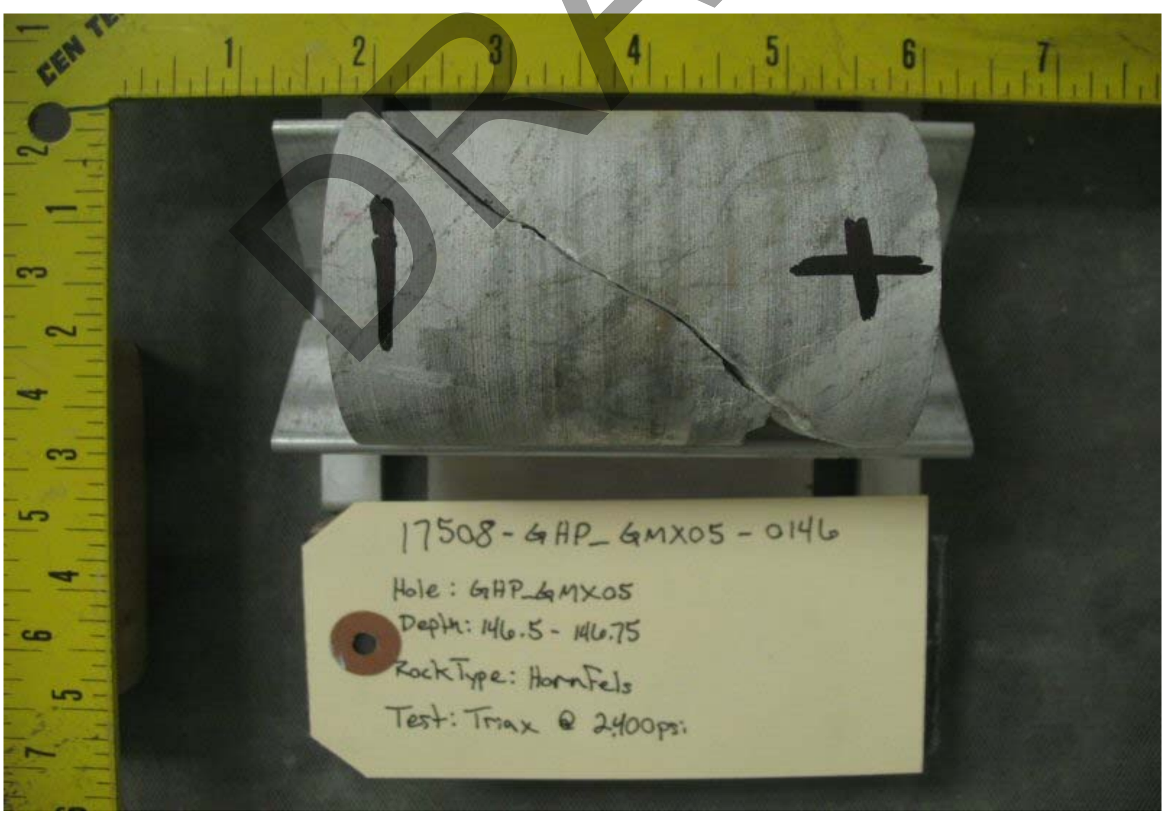
NOTES: Sample height outside normal testing parameter

Dia. 1	2.402	Ht. 1	3.467
Dia. 2	2.400	Ht. 2	3.473
Dia. 3	2.399	Ht. 3	3.475
Dia. 4	2.401	Ht. 4	3.468
Dia. 5	2.403	Weight (gm)	753.65
Dia. 6	2.400	Sample #	17508-GHP_GMX05-0146

Sigma 3 (psi)	**Fail Load** gage (lbs)
2,400	290,000



17508-GHP_GMX05-0146 Pre Test



17508-GHP_GMX05-0146 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX05-0167**
		Sample # 17508-GHP_GMX05-0167	Rock Type	Skarn
			Density :	199.1 (pcf)
				3,189.7 (kg/m^3)

U.S. Standard

Sigma 3 (psi)	**Sigma 1** (psi)	
2,400	9,430	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Sample Data :	
Sample # :	17508-GHP_GMX05-0167
Rock Type:	Skarn
Hole # :	GHP_GMX05
Depth :	168.0 - 168.2
Alterations:	
Diameter :	2.388 (in)
Height :	4.739 (in)
Weight :	1109.49 (gm)
Area :	4.479 (in^2)
Volume :	21.226 (in^3)

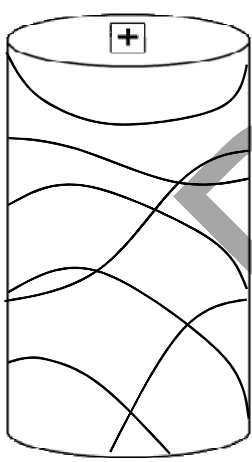
Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Both
Test Duration :	(sec)

Metric Standard

Sigma 3 (MPa)	**Sigma 1** (MPa)	
16.55	65.0	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

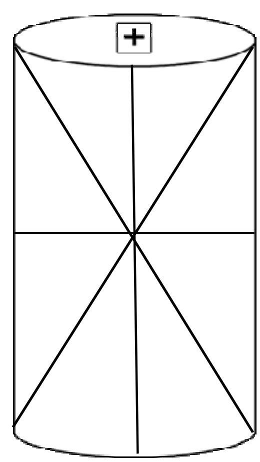


Worksheet

Mode of Failure :

Fracture	
Intact	
Both	XX

Post-Failure Sketch



NOTES: Heavy sulfides. Testing surfaces capped and voids filled with hydrostone to keep sample intact. Resid Load: 35,000 lbs

Dia. 1	2.402	Ht. 1	4.738
Dia. 2	2.394	Ht. 2	4.737
Dia. 3	2.399	Ht. 3	4.736
Dia. 4	2.381	Ht. 4	4.745
Dia. 5	2.368	Weight (gm)	1109.49
Dia. 6	2.386	Sample #	17508-GHP_GMX05-0167

Sigma 3 (psi)	**Fail Load** gage (lbs)
2,400	42,240

17508-GHP_GMX05-0167 Pre Test

17508-GHP_GMX05-0167 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	8/2/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX05-0179**
		Sample # 17508-GHP_GMX05-0179	Rock Type	Skarn
			Density :	175.2 (pcf)
				2,806.2 (kg/m^3)

U.S. Standard

Sigma 3 (psi)	**Sigma 1** (psi)	
750	8,383	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Sample Data :	
Sample # :	17508-GHP_GMX05-0179
Rock Type:	Skarn
Hole # :	GHP_GMX05
Depth :	179.9 - 180.1
Alterations:	
Diameter :	2.407 (in)
Height :	5.030 (in)
Weight :	1052.80 (gm)
Area :	4.552 (in^2)
Volume :	22.894 (in^3)

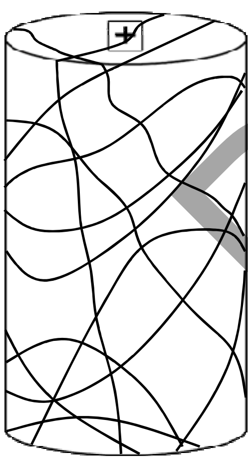
Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)

Metric Standard

Sigma 3 (MPa)	**Sigma 1** (MPa)	
5.17	57.8	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

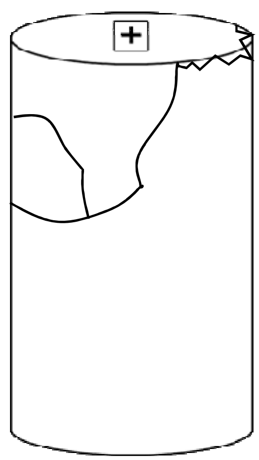


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch



NOTES:

Dia. 1	2.407	Ht. 1	5.026
Dia. 2	2.406	Ht. 2	5.032
Dia. 3	2.410	Ht. 3	5.034
Dia. 4	2.407	Ht. 4	5.027
Dia. 5	2.407	Weight (gm)	1052.80
Dia. 6	2.409	Sample #	17508-GHP_GMX05-0179

Sigma 3 (psi)	**Fail Load** gage (lbs)
750	38,160

17508-GHP_GMX05-0179 Pre Test

17508-GHP_GMX05-0179 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX05-0203-B**
		Sample # 17508-GHP_GMX05-0203-B	Rock Type	Fault
			Density :	162.9 (pcf)
				2,608.6 (kg/m^3)

Sample Data :	
Sample # :	17508-GHP_GMX05-0203-B
Rock Type:	Fault
Hole # :	GHP_GMX05
Depth :	203.3 - 203.5
Alterations:	
Diameter :	2.418 (in)
Height :	3.769 (in)
Weight :	740.13 (gm)
Area :	4.593 (in^2)
Volume :	17.314 (in^3)

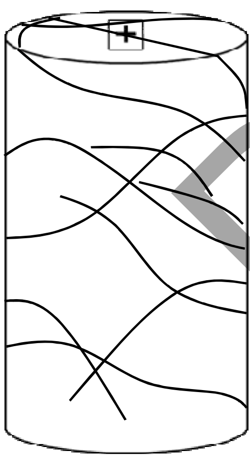
U.S. Standard		
Sigma 3 (psi)	**Sigma 1** (psi)	
750	4,489	**Peak**
1,200	4,243	**Residuals**
2,400	5,619	
0	0	
0	0	

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)

Metric Standard		
Sigma 3 (MPa)	**Sigma 1** (MPa)	
5.17	31.0	**Peak**
8.28	29.3	**Residuals**
16.55	38.8	
0.00	0.0	
0.00	0.0	

Rock Code:	
Clay:	

Pre-Failure Sketch

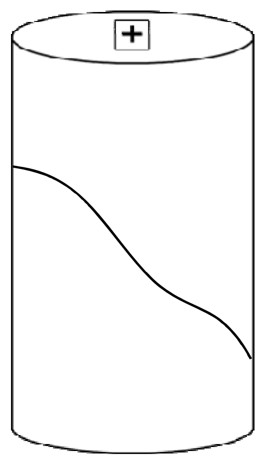


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch

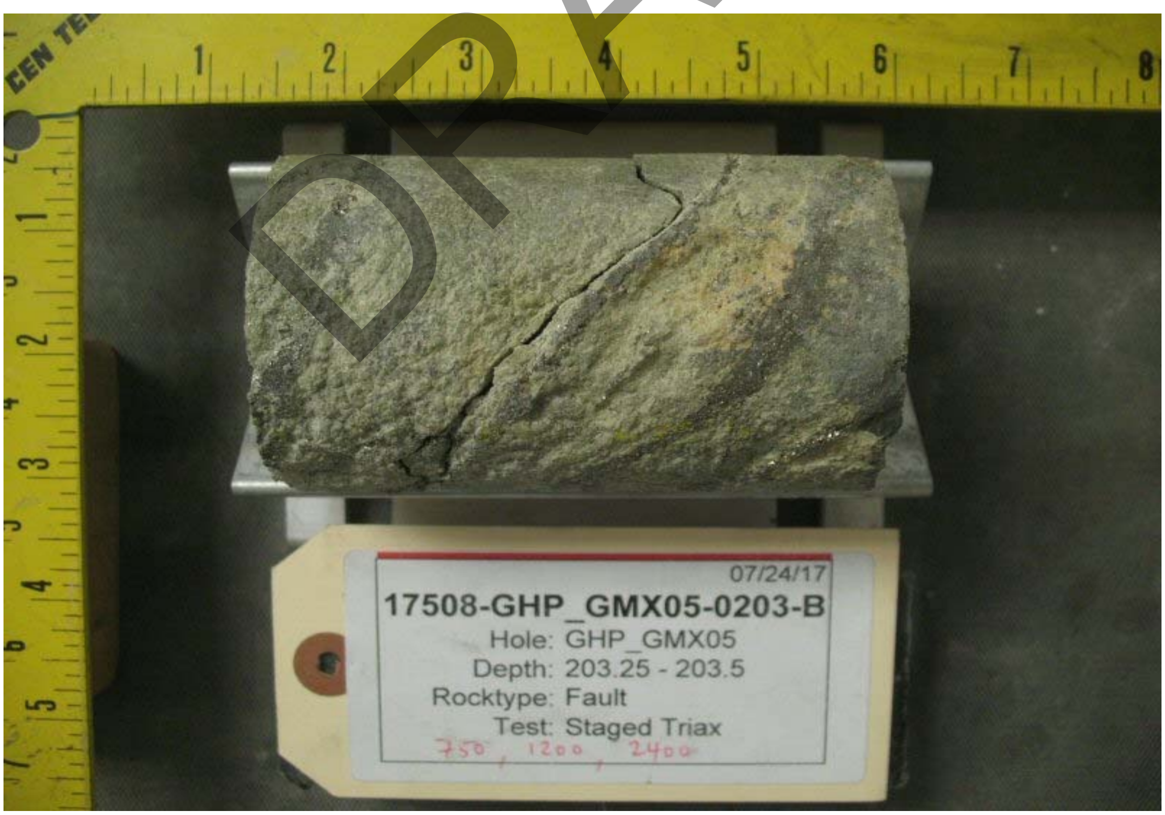


NOTES:

Dia. 1	2.422	Ht. 1	3.768
Dia. 2	2.424	Ht. 2	3.767
Dia. 3	2.423	Ht. 3	3.770
Dia. 4	2.401	Ht. 4	3.774
Dia. 5	2.419	Weight (gm)	740.13
Dia. 6	2.422	Sample #	17508-GHP_GMX05-0203-B

Sigma 3 (psi)	**Fail Load** gage (lbs)
750	20,620
1,200	19,490
2,400	25,810

17508-GHP_GMX05-0203-B Pre Test



17508-GHP_GMX05-0203-B Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	8/7/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX05-0221**
		Sample # 17508-GHP_GMX05-0221	Rock Type	Intrusive
			Density :	172.3 (pcf)
				2,760.6 (kg/m^3)

U.S. Standard		
Sigma 3 (psi)	**Sigma 1** (psi)	
1,200	36,062	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

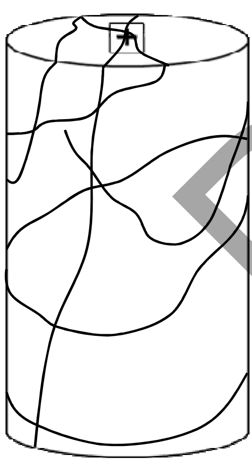
Sample Data :	
Sample # :	17508-GHP_GMX05-0221
Rock Type:	Intrusive
Hole # :	GHP_GMX05
Depth :	221.8 - 222.1
Alterations:	
Diameter :	2.404 (in)
Height :	5.109 (in)
Weight :	1049.02 (gm)
Area :	4.539 (in^2)
Volume :	23.188 (in^3)

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Both
Test Duration :	(sec)

Metric Standard		
Sigma 3 (MPa)	**Sigma 1** (MPa)	
8.28	248.7	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

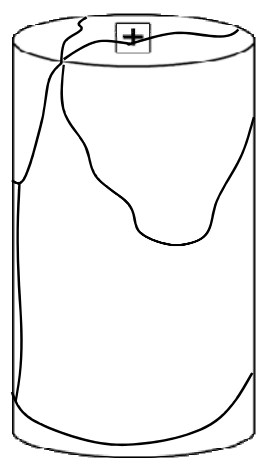


Worksheet

Mode of Failure :

Fracture	
Intact	
Both	XX

Post-Failure Sketch



NOTES:

Dia. 1	2.404	Ht. 1	5.109
Dia. 2	2.403	Ht. 2	5.109
Dia. 3	2.404	Ht. 3	5.110
Dia. 4	2.404	Ht. 4	5.110
Dia. 5	2.405	Weight (gm)	1049.02
Dia. 6	2.403	Sample #	17508-GHP_GMX05-0221

Sigma 3 (psi)	**Fail Load** gage (lbs)
1,200	163,670

17508-GHP_GMX05-0221 Pre Test

17508-GHP_GMX05-0221 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX06-0093**
		Sample # 17508-GHP_GMX06-0093	Rock Type	Skarn
			Density :	184.1 (pcf)
				2,948.8 (kg/m^3)

U.S. Standard

Sigma 3 (psi)	**Sigma 1** (psi)	
1,200	6,110	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Sample Data :	
Sample # :	17508-GHP_GMX06-0093
Rock Type:	Skarn
Hole # :	GHP_GMX06
Depth :	93.0 - 93.2
Alterations:	
Diameter :	2.326 (in)
Height :	4.378 (in)
Weight :	899.05 (gm)
Area :	4.250 (in^2)
Volume :	18.605 (in^3)

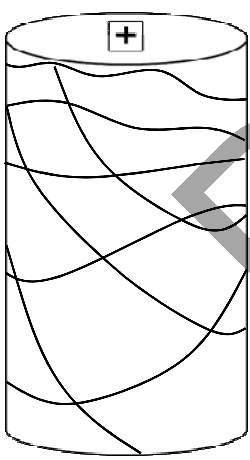
Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)

Metric Standard

Sigma 3 (MPa)	**Sigma 1** (MPa)	
8.28	42.1	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

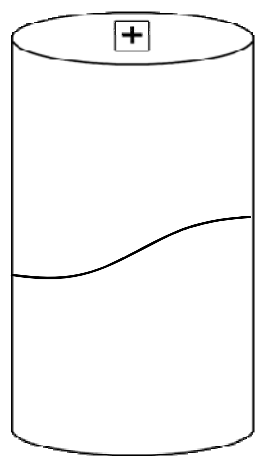


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch



NOTES: Heavy sulfides. Testing surfaces capped and voids filled with hydrostone.

Dia. 1	2.342	Ht. 1	4.374
Dia. 2	2.298	Ht. 2	4.373
Dia. 3	2.322	Ht. 3	4.384
Dia. 4	2.345	Ht. 4	4.380
Dia. 5	2.339	Weight (gm)	899.05
Dia. 6	2.313	Sample #	17508-GHP_GMX06-0093

Sigma 3 (psi)	**Fail Load** gage (lbs)
1,200	25,970

17508-GHP_GMX06-0093 Pre Test

17508-GHP_GMX06-0093 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX06-0136**
		Sample # 17508-GHP_GMX06-0136	Rock Type	Intrusive
			Density :	168.8 (pcf)
				2,703.9 (kg/m^3)

Sample Data :	
Sample # :	17508-GHP_GMX06-0136
Rock Type:	Intrusive
Hole # :	GHP_GMX06
Depth :	136.5 - 136.7
Alterations:	
Diameter :	2.390 (in)
Height :	4.669 (in)
Weight :	928.30 (gm)
Area :	4.487 (in^2)
Volume :	20.950 (in^3)

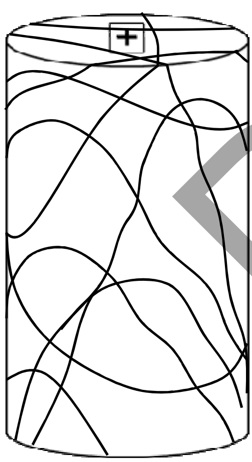
U.S. Standard		
Sigma 3 (psi)	**Sigma 1** (psi)	
750	14,378	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)

Metric Standard		
Sigma 3 (MPa)	**Sigma 1** (MPa)	
5.17	99.2	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

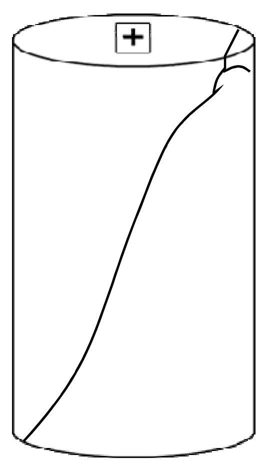


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch



NOTES:

Dia. 1	2.389	Ht. 1	4.670
Dia. 2	2.391	Ht. 2	4.668
Dia. 3	2.396	Ht. 3	4.668
Dia. 4	2.391	Ht. 4	4.669
Dia. 5	2.388	Weight (gm)	928.30
Dia. 6	2.388	Sample #	17508-GHP_GMX06-0136

Sigma 3 (psi)	**Fail Load** gage (lbs)
750	64,520

17508-GHP_GMX06-0136 Pre Test

17508-GHP_GMX06-0136 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX07-0030**
		Sample # 17508-GHP_GMX07-0030	Rock Type	Intrusive
			Density :	153.9 (pcf)
				2,465.9 (kg/m^3)

U.S. Standard

Sigma 3 (psi)	**Sigma 1** (psi)	
2,400	15,926	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Sample Data :	
Sample # :	17508-GHP_GMX07-0030
Rock Type:	Intrusive
Hole # :	GHP_GMX07
Depth :	30.0 - 30.5
Alterations:	
Diameter :	2.399 (in)
Height :	5.040 (in)
Weight :	920.69 (gm)
Area :	4.520 (in^2)
Volume :	22.784 (in^3)

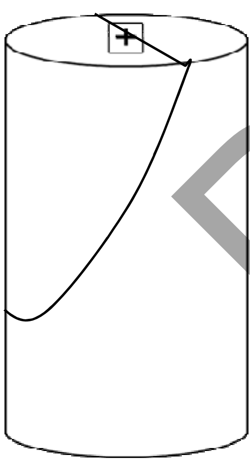
Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)

Metric Standard

Sigma 3 (MPa)	**Sigma 1** (MPa)	
16.55	109.8	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

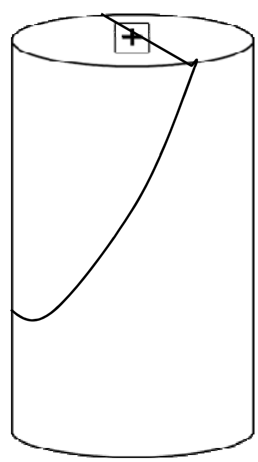


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch



NOTES:

Dia. 1	2.399	Ht. 1	5.038
Dia. 2	2.399	Ht. 2	5.041
Dia. 3	2.398	Ht. 3	5.043
Dia. 4	2.401	Ht. 4	5.040
Dia. 5	2.398	Weight (gm)	920.69
Dia. 6	2.400	Sample #	17508-GHP_GMX07-0030

Sigma 3 (psi)	**Fail Load** gage (lbs)
2,400	71,990

17508-GHP_GMX07-0030 Pre Test

17508-GHP_GMX07-0030 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX07-0032**
		Sample # 17508-GHP_GMX07-0032	Rock Type	Intrusive
			Density :	151.7 (pcf)
				2,429.3 (kg/m^3)

U.S. Standard

Sigma 3 (psi)	**Sigma 1** (psi)	
1,200	10,605	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Sample Data :	
Sample # :	17508-GHP_GMX07-0032
Rock Type:	Intrusive
Hole # :	GHP_GMX07
Depth :	32.2 - 32.6
Alterations:	
Diameter :	2.400 (in)
Height :	4.973 (in)
Weight :	895.63 (gm)
Area :	4.524 (in^2)
Volume :	22.498 (in^3)

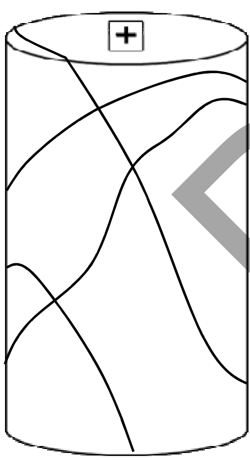
Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)

Metric Standard

Sigma 3 (MPa)	**Sigma 1** (MPa)	
8.28	73.1	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

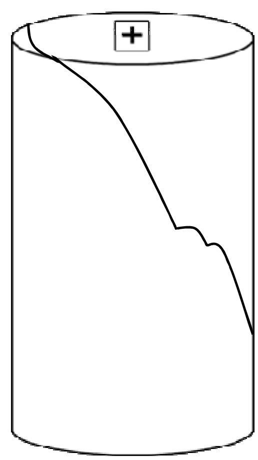


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch



NOTES:

Dia. 1	2.400	Ht. 1	4.974
Dia. 2	2.399	Ht. 2	4.973
Dia. 3	2.400	Ht. 3	4.972
Dia. 4	2.401	Ht. 4	4.974
Dia. 5	2.400	Weight (gm)	895.63
Dia. 6	2.401	Sample #	17508-GHP_GMX07-0032

Sigma 3 (psi)	**Fail Load** gage (lbs)
1,200	47,980

17508-GHP_GMX07-0032 Pre Test

17508-GHP_GMX07-0032 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX07-0090**
		Sample # 17508-GHP_GMX07-0090	Rock Type	Hornfels
			Density :	162.2 (pcf)
				2,598.0 (kg/m^3)

U.S. Standard

Sigma 3 (psi)	**Sigma 1** (psi)	
1,200	15,095	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Sample Data :	
Sample # :	17508-GHP_GMX07-0090
Rock Type:	Hornfels
Hole # :	GHP_GMX07
Depth :	90.8 - 91.0
Alterations:	
Diameter :	2.399 (in)
Height :	4.869 (in)
Weight :	936.97 (gm)
Area :	4.520 (in^2)
Volume :	22.008 (in^3)

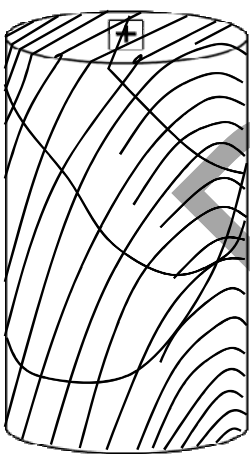
Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)

Metric Standard

Sigma 3 (MPa)	**Sigma 1** (MPa)	
8.28	104.1	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

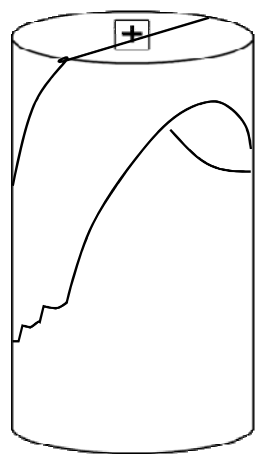


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch



NOTES: Strata

Dia. 1	2.398	Ht. 1	4.869
Dia. 2	2.399	Ht. 2	4.869
Dia. 3	2.400	Ht. 3	4.869
Dia. 4	2.398	Ht. 4	4.869
Dia. 5	2.399	Weight (gm)	936.97
Dia. 6	2.401	Sample #	17508-GHP_GMX07-0090

Sigma 3 (psi)	**Fail Load** gage (lbs)
1,200	68,230

17508-GHP_GMX07-0090 Pre Test

17508-GHP_GMX07-0090 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX07-0148**
		Sample # 17508-GHP_GMX07-0148	Rock Type	Marble
			Density :	169.6 (pcf)
				2,716.1 (kg/m^3)

Sample Data :	
Sample # :	17508-GHP_GMX07-0148
Rock Type:	Marble
Hole # :	GHP_GMX07
Depth :	148.3 - 148.5
Alterations:	
Diameter :	2.399 (in)
Height :	5.019 (in)
Weight :	1009.55 (gm)
Area :	4.519 (in^2)
Volume :	22.682 (in^3)

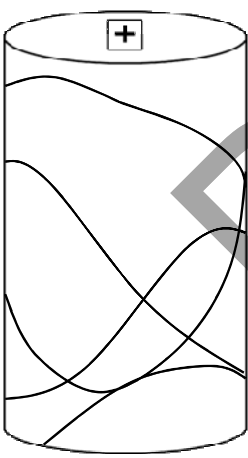
U.S. Standard		
Sigma 3 (psi)	**Sigma 1** (psi)	
1,200	10,434	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Both
Test Duration :	(sec)

Metric Standard		
Sigma 3 (MPa)	**Sigma 1** (MPa)	
8.28	72.0	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

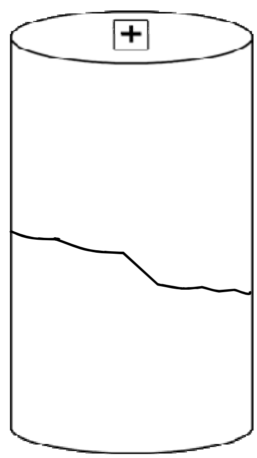


Worksheet

Mode of Failure :

Fracture	
Intact	
Both	XX

Post-Failure Sketch



NOTES: Quartz

Dia. 1	2.398	Ht. 1	5.017
Dia. 2	2.398	Ht. 2	5.019
Dia. 3	2.398	Ht. 3	5.022
Dia. 4	2.398	Ht. 4	5.021
Dia. 5	2.401	Weight (gm)	1009.55
Dia. 6	2.399	Sample #	17508-GHP_GMX07-0148

Sigma 3 (psi)	**Fail Load** gage (lbs)
1,200	47,150

17508-GHP_GMX07-0148 Pre Test

17508-GHP_GMX07-0148 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	7/28/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX07-0160**
		Sample # 17508-GHP_GMX07-0160	Rock Type	Skarn
			Density :	212.8 (pcf)
				3,408.2 (kg/m^3)

U.S. Standard

Sigma 3 (psi)	Sigma 1 (psi)	
1,200	13,101	**Peak**
0	0	**Residuals**
0	0	
0	0	
0	0	

Sample Data :	
Sample # :	17508-GHP_GMX07-0160
Rock Type:	Skarn
Hole # :	GHP_GMX07
Depth :	160.6 - 160.8
Alterations:	
Diameter :	2.403 (in)
Height :	5.133 (in)
Weight :	1300.64 (gm)
Area :	4.537 (in^2)
Volume :	23.288 (in^3)

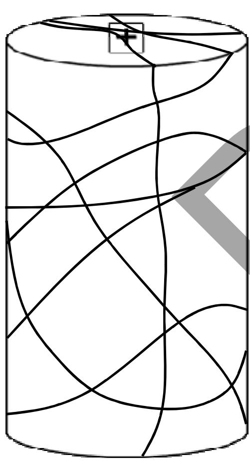
Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)

Metric Standard

Sigma 3 (MPa)	Sigma 1 (MPa)	
8.28	90.4	**Peak**
0.00	0.0	**Residuals**
0.00	0.0	
0.00	0.0	
0.00	0.0	

Rock Code:	
Hardness:	

Pre-Failure Sketch

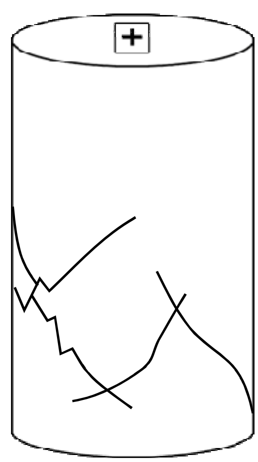


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch



NOTES: Heavy sulfides. Breccia.

Dia. 1	2.404	Ht. 1	5.134
Dia. 2	2.404	Ht. 2	5.134
Dia. 3	2.404	Ht. 3	5.132
Dia. 4	2.403	Ht. 4	5.133
Dia. 5	2.403	Weight (gm)	1300.64
Dia. 6	2.404	Sample #	17508-GHP_GMX07-0160

Sigma 3 (psi)	**Fail Load** gage (lbs)
1,200	59,440

17508-GHP_GMX07-0160 Pre Test

17508-GHP_GMX07-0160 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	8/3/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX07-0167**
		Sample # 17508-GHP_GMX07-0167	Rock Type	Skarn
			Density :	178.1 (pcf)
				2,853.0 (kg/m^3)

U.S. Standard

Sigma 3 (psi)	**Sigma 1** (psi)	
2,400	9,582	**Peak**
750	4,010	**Residuals**
1,200	5,745	
0	0	
0	0	

Sample Data :	
Sample # :	17508-GHP_GMX07-0167
Rock Type:	Skarn
Hole # :	GHP_GMX07
Depth :	167.3 - 167.5
Alterations:	
Diameter :	2.361 (in)
Height :	3.822 (in)
Weight :	782.60 (gm)
Area :	4.379 (in^2)
Volume :	16.739 (in^3)

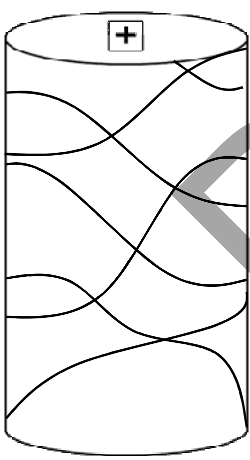
Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Both
Test Duration :	(sec)

Metric Standard

Sigma 3 (MPa)	**Sigma 1** (MPa)	
16.55	66.1	**Peak**
5.17	27.7	**Residuals**
8.28	39.6	
0.00	0.0	
0.00	0.0	

Rock Code:	
Clay:	

Pre-Failure Sketch

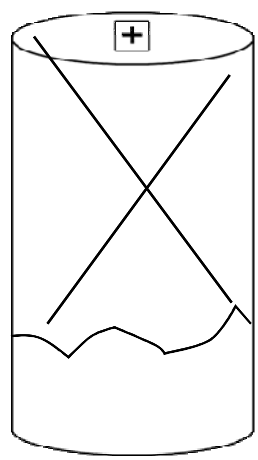


Worksheet

Mode of Failure :

Fracture	
Intact	
Both	XX

Post-Failure Sketch



NOTES: Heavy sulfides. Testing surfaces capped and voids filled with hydrostone.

Dia. 1	2.382	Ht. 1	3.822
Dia. 2	2.306	Ht. 2	3.824
Dia. 3	2.353	Ht. 3	3.825
Dia. 4	2.383	Ht. 4	3.819
Dia. 5	2.367	Weight (gm)	782.60
Dia. 6	2.378	Sample #	17508-GHP_GMX07-0167

Sigma 3 (psi)	**Fail Load** gage (lbs)
2,400	41,960
750	17,560
1,200	25,160

17508-GHP_GMX07-0167 Pre Test

17508-GHP_GMX07-0167 Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	8/3/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX07-0168-B**
		Sample # 17508-GHP_GMX07-0168-B	Rock Type	Skarn
			Density :	192.4 (pcf)
				3,082.4 (kg/m^3)

U.S. Standard

Sigma 3 (psi)	Sigma 1 (psi)	
750	4,558	**Peak**
1,200	5,890	**Residuals**
2,400	9,490	
0	0	
0	0	

Sample Data :	
Sample # :	17508-GHP_GMX07-0168-B
Rock Type:	Skarn
Hole # :	GHP_GMX07
Depth :	168.8 - 169.1
Alterations:	
Diameter :	2.396 (in)
Height :	4.103 (in)
Weight :	934.90 (gm)
Area :	4.511 (in^2)
Volume :	18.508 (in^3)

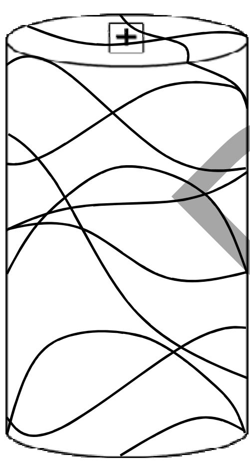
Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Both
Test Duration :	(sec)

Metric Standard

Sigma 3 (MPa)	Sigma 1 (MPa)	
5.17	31.4	**Peak**
8.28	40.6	**Residuals**
16.55	65.4	
0.00	0.0	
0.00	0.0	

Rock Code:	
Clay:	

Pre-Failure Sketch

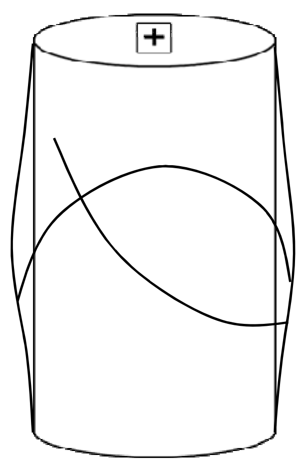


Worksheet

Mode of Failure :

Fracture	
Intact	
Both	XX

Post-Failure Sketch



NOTES: Heavy sulfides.

Dia. 1	2.408	Ht. 1	4.108
Dia. 2	2.397	Ht. 2	4.100
Dia. 3	2.399	Ht. 3	4.100
Dia. 4	2.388	Ht. 4	4.105
Dia. 5	2.396	Weight (gm)	934.90
Dia. 6	2.393	Sample #	17508-GHP_GMX07-0168-B

Sigma 3 (psi)	**Fail Load** gage (lbs)
750	20,560
1,200	26,570
2,400	42,810

17508-GHP_GMX07-0168-B Pre Test

17508-GHP_GMX07-0168-B Post Test

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triaxial Compression Test Results	Client	Aura Minerals
Date	8/3/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK	**Failure Data:**	Sample #	**17508-GHP_GMX07-0172-B**
		Sample # 17508-GHP_GMX07-0172-B	Rock Type	Skarn
			Density :	154.1 (pcf)
				2,468.8 (kg/m^3)

Sample Data :	
Sample # :	17508-GHP_GMX07-0172-B
Rock Type:	Skarn
Hole # :	GHP_GMX07
Depth :	172.5 - 172.8
Alterations:	
Diameter :	2.381 (in)
Height :	4.319 (in)
Weight :	778.20 (gm)
Area :	4.454 (in^2)
Volume :	19.235 (in^3)

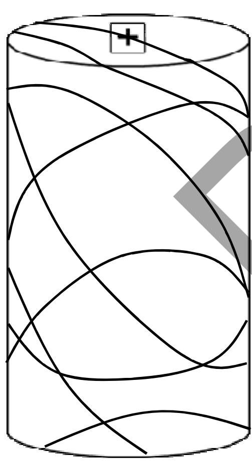
U.S. Standard		
Sigma 3 (psi)	**Sigma 1** (psi)	
1,200	4,977	**Peak**
2,400	7,984	**Residuals**
750	3,399	
0	0	
0	0	

Test Data:	
Disp. Rate :	0.0003 (in/sec)
Load Rate :	(lbs/sec)
Gage Reading :	(lbs)
Mode of Failure :	Fracture
Test Duration :	(sec)

Metric Standard		
Sigma 3 (MPa)	**Sigma 1** (MPa)	
8.28	34.3	**Peak**
16.55	55.1	**Residuals**
5.17	23.4	
0.00	0.0	
0.00	0.0	

Rock Code:	
Clay:	

Pre-Failure Sketch

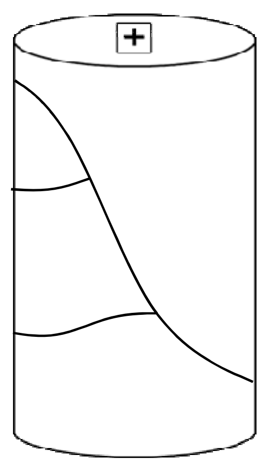


Worksheet

Mode of Failure :

Fracture	XX
Intact	
Both	

Post-Failure Sketch



NOTES: Sandstone. Heavy sulfides.

Dia. 1	2.383	Ht. 1	4.318
Dia. 2	2.387	Ht. 2	4.318
Dia. 3	2.396	Ht. 3	4.322
Dia. 4	2.383	Ht. 4	4.318
Dia. 5	2.361	Weight (gm)	778.20
Dia. 6	2.379	Sample #	17508-GHP_GMX07-0172-B

Sigma 3 (psi)	**Fail Load** gage (lbs)
1,200	22,170
2,400	35,560
750	15,140

17508-GHP_GMX07-0172-B Pre Test

17508-GHP_GMX07-0172-B Post Test

BRAZILIAN DISK TENSION TEST RESULTS

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/8/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX01-0018**
		Sample # **17508-GHP_GMX01-0018**	Rock Type	Marble

T psi **739** psi

5.10 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX01-0018**
Rock Type:	Marble
Hole # :	GHP_GMX01
Depth :	18.6 - 19.0
Alterations:	
Diameter :	2.417 (in)
Length:	1.213 (in)
Density:	167.49 (pcf)

T= Indirect tensile strength

T psi	739 (psi)
	5.1 Mpa

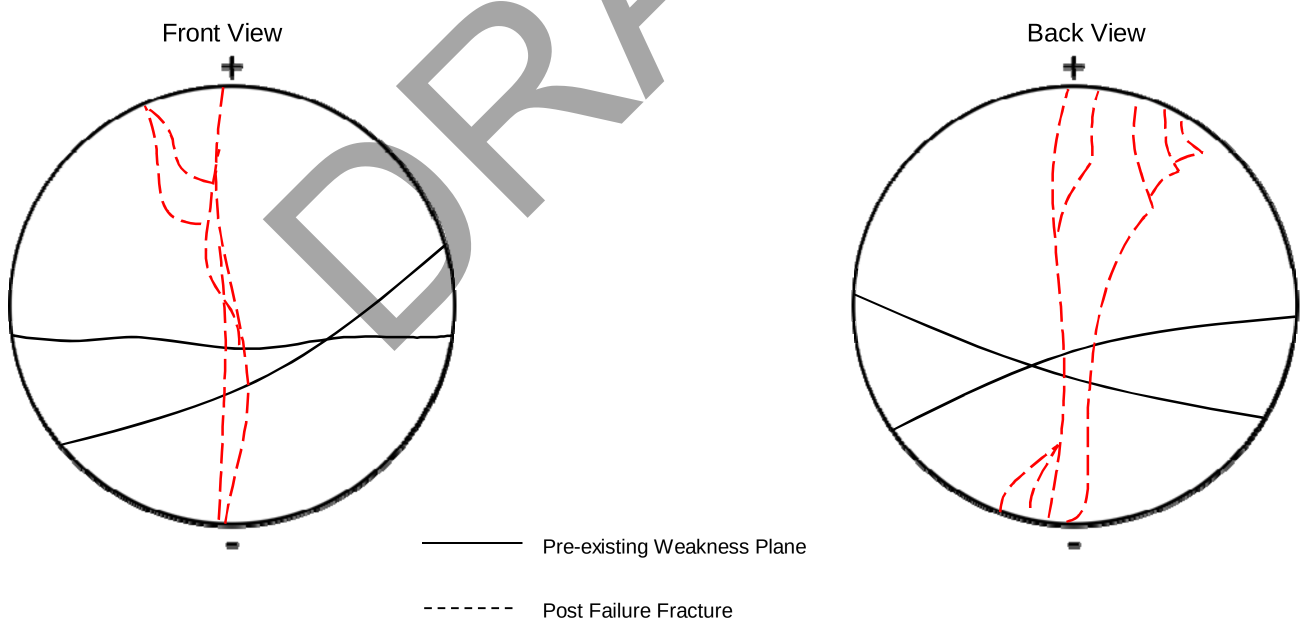
Test Data:	
Disp. Rate :	
Load Rate :	84 (lbs/sec)
Gage Reading :	3,400 (lbs)
Mode of Failure :	Intact

Mode of Failure :

Fracture	
Intact	XX
Both	

Rock Code:	

Worksheet



Dia. 1	2.422	Ht. 1	1.203
Dia. 2	2.412	Ht. 2	1.239
Dia. 3	2.415	Ht. 3	1.204
Dia. 4	2.414	Ht. 4	1.205
Dia. 5	2.415	Weight	244.530
Dia. 6	2.424	Sample #	**17508-GHP_GMX01-0018**

Fail Load 3,400 lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Brazilian Disk Test Results

Project #	17508
Date	8/8/2017
Technician	EK

Client	Aura Minerals
Location	Aranzazu, Zacatecas Mexico
Sample #	**17508-GHP_GMX01-0035**
Rock Type	Contact

Sample # **17508-GHP_GMX01-0035**

T psi	**658**	psi
	4.53	Mpa

T psi	658 (psi)
	4.5 Mpa

T= Indirect tensile strength

Sample Data :	
Sample # :	**17508-GHP_GMX01-0035**
Rock Type:	Contact
Hole # :	GHP_GMX01
Depth :	35.9 - 36.1
Alterations:	
Diameter :	2.416 (in)
Length:	1.135 (in)
Density:	180.54 (pcf)

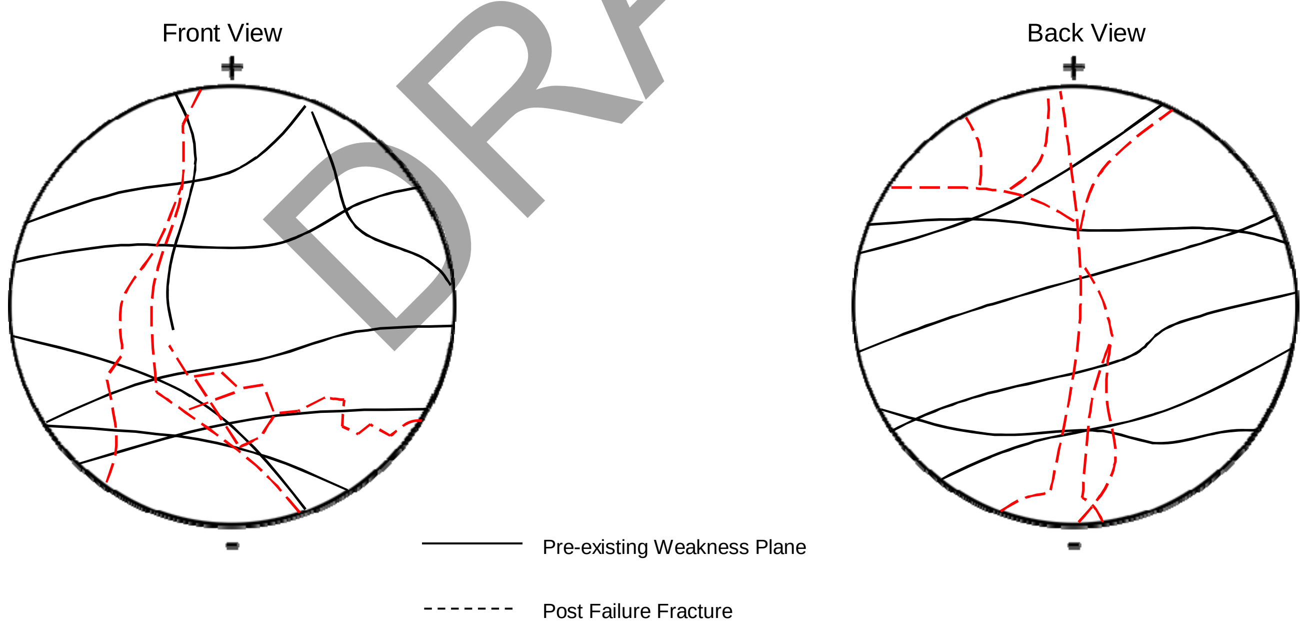
Test Data:	
Disp. Rate :	
Load Rate :	79 (lbs/sec)
Gage Reading :	2,830 (lbs)
Mode of Failure :	Both

Mode of Failure :

Fracture	
Intact	
Both	XX

Rock Code:	

Worksheet



Dia. 1	2.416	Ht. 1	1.127
Dia. 2	2.415	Ht. 2	1.145
Dia. 3	2.414	Ht. 3	1.139
Dia. 4	2.422	Ht. 4	1.129
Dia. 5	2.418	Weight	246.520
Dia. 6	2.411	Sample #	**17508-GHP_GMX01-0035**

Fail Load	2,830	lbs Force

NOTES: Sulfides

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/8/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX02-0037**
		Sample # **17508-GHP_GMX02-0037**	Rock Type	Hornfels

T psi **746** psi

5.14 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX02-0037**
Rock Type:	Hornfels
Hole # :	GHP_GMX02
Depth :	37.9 - 38.3
Alterations:	
Diameter :	2.404 (in)
Length:	1.347 (in)
Density:	162.97 (pcf)

T= Indirect tensile strength

T psi	746 (psi)
	5.1 Mpa

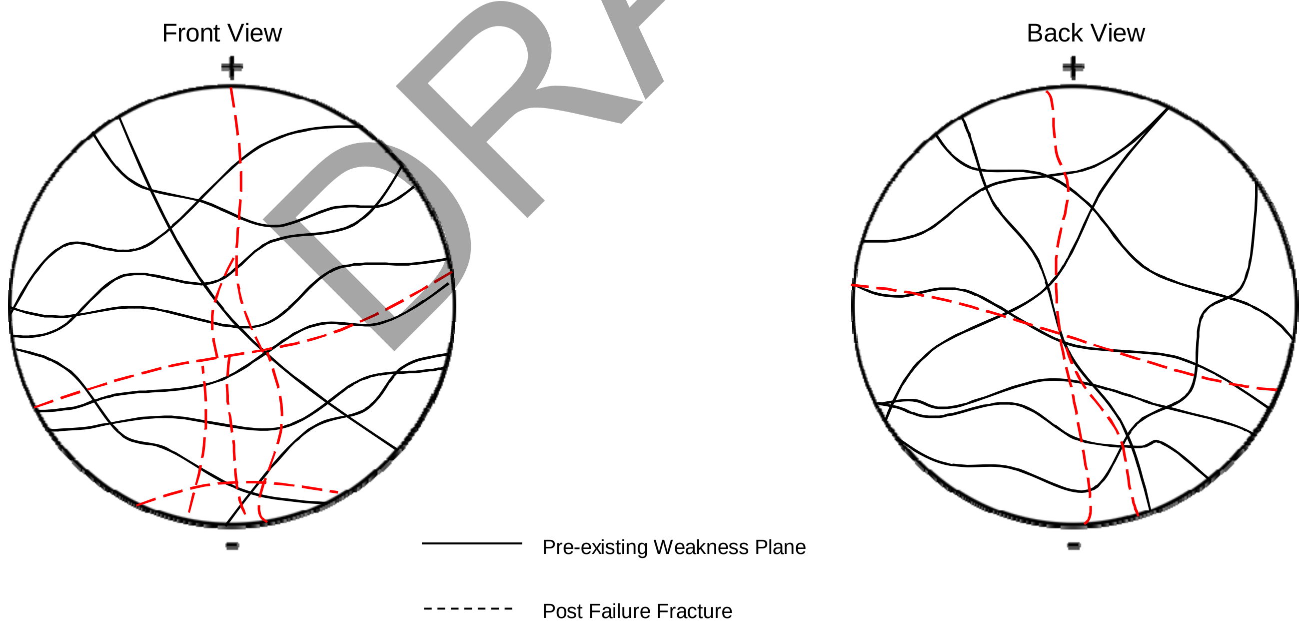
Test Data:	
Disp. Rate :	
Load Rate :	93 (lbs/sec)
Gage Reading :	3,790 (lbs)
Mode of Failure :	Both

Mode of Failure :

Fracture	
Intact	
Both	XX

Rock Code:	

Worksheet



Dia. 1	2.406	Ht. 1	1.345
Dia. 2	2.396	Ht. 2	1.344
Dia. 3	2.394	Ht. 3	1.351
Dia. 4	2.398	Ht. 4	1.347
Dia. 5	2.432	Weight	261.410
Dia. 6	2.398	Sample #	**17508-GHP_GMX02-0037**

Fail Load 3,790 lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/8/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX02-0056**
		Sample # **17508-GHP_GMX02-0056**	Rock Type	Intrusive

T psi		
	1,993	psi
	13.74	Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX02-0056**
Rock Type:	Intrusive
Hole # :	GHP_GMX02
Depth :	56.1 - 56.4
Alterations:	
Diameter :	2.408 (in)
Length:	1.315 (in)
Density:	163.94 (pcf)

T= Indirect tensile strength

T psi	1,993 (psi)
	13.7 Mpa

Test Data:	
Disp. Rate :	
Load Rate :	91 (lbs/sec)
Gage Reading :	9,910 (lbs)
Mode of Failure :	Intact

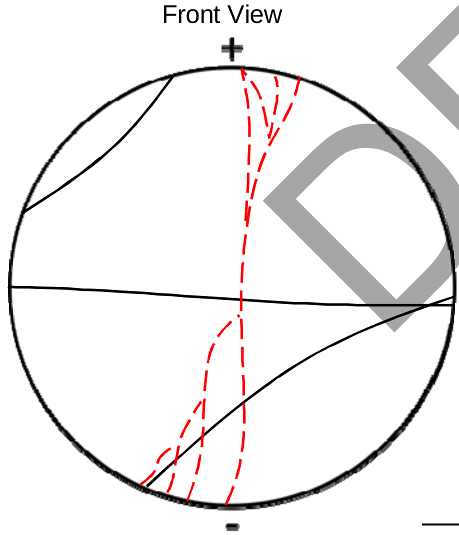
Mode of Failure :

Fracture	
Intact	XX
Both	

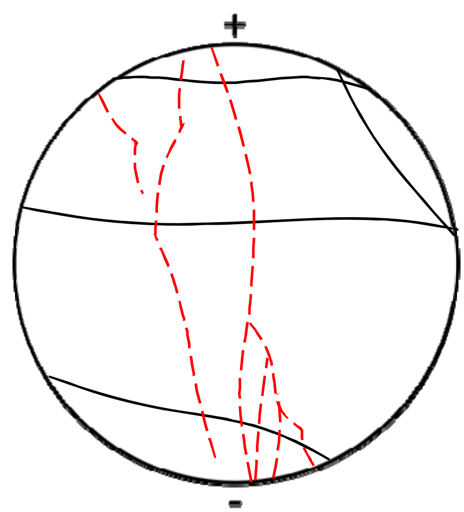
Rock Code:	

Worksheet

Front View



Back View



Pre-existing Weakness Plane

Post Failure Fracture

Dia. 1	2.410	Ht. 1	1.312
Dia. 2	2.405	Ht. 2	1.313
Dia. 3	2.404	Ht. 3	1.326
Dia. 4	2.409	Ht. 4	1.311
Dia. 5	2.417	Weight	257.750
Dia. 6	2.404	Sample #	**17508-GHP_GMX02-0056**

Fail Load	9,910	lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Brazilian Disk Test Results

Project #	17508	Client	Aura Minerals
Date	8/8/2017	Location	Aranzazu, Zacatecas Mexico
Technician	EK	Sample #	**17508-GHP_GMX02-0159**
		Rock Type	Intrusive

Sample # **17508-GHP_GMX02-0159**

T psi		
	1,239	psi
	8.54	Mpa

Sample Data :

Sample # :	**17508-GHP_GMX02-0159**
Rock Type:	Intrusive
Hole # :	GHP_GMX02
Depth :	159.1 - 159.4
Alterations:	
Diameter :	2.399 (in)
Length:	1.282 (in)
Density:	156.66 (pcf)

T= Indirect tensile strength

T psi	1,239 (psi)
	8.5 Mpa

Test Data:

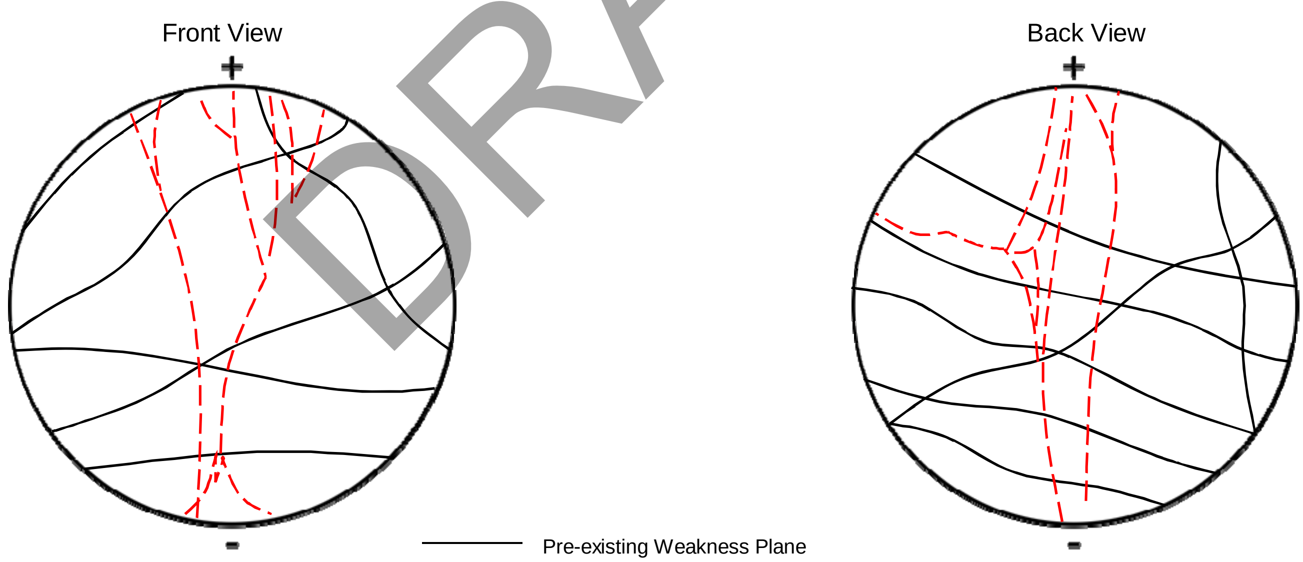
Disp. Rate :	
Load Rate :	88 (lbs/sec)
Gage Reading :	5,980 (lbs)
Mode of Failure :	Both

Mode of Failure :

Fracture	
Intact	
Both	XX

Rock Code:

Worksheet



Pre-existing Weakness Plane

Post Failure Fracture

Dia. 1	2.397	Ht. 1	1.284
Dia. 2	2.398	Ht. 2	1.281
Dia. 3	2.398	Ht. 3	1.281
Dia. 4	2.402	Ht. 4	1.283
Dia. 5	2.401	Weight	238.270
Dia. 6	2.398	Sample #	**17508-GHP_GMX02-0159**

Fail Load 5,980 lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/8/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX02-0171**
		Sample # **17508-GHP_GMX02-0171**	Rock Type	Intrusive

T psi **1,478** psi

10.19 Mpa

T psi	1,478 (psi)
	10.2 Mpa

T= Indirect tensile strength

Sample Data :	
Sample # :	**17508-GHP_GMX02-0171**
Rock Type:	Intrusive
Hole # :	GHP_GMX02
Depth :	171.1 - 171.4
Alterations:	
Diameter :	2.403 (in)
Length:	1.279 (in)
Density:	156.79 (pcf)

Mode of Failure :

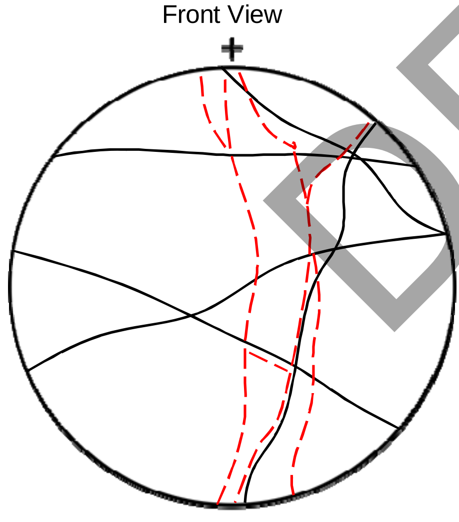
Fracture	
Intact	
Both	XX

Test Data:	
Disp. Rate :	
Load Rate :	88 (lbs/sec)
Gage Reading :	7,130 (lbs)
Mode of Failure :	Both

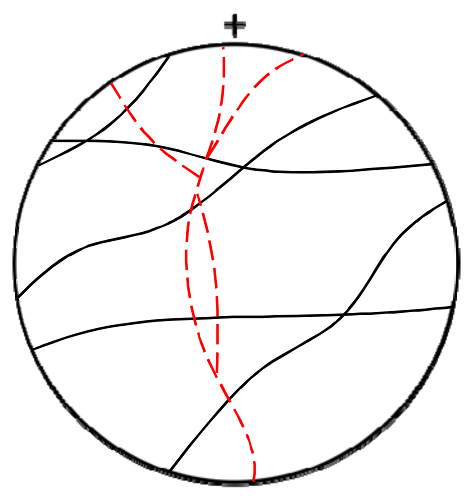
Rock Code:	

Worksheet

Front View



Back View



Pre-existing Weakness Plane

Post Failure Fracture

Dia. 1	2.403	Ht. 1	1.272
Dia. 2	2.405	Ht. 2	1.299
Dia. 3	2.403	Ht. 3	1.274
Dia. 4	2.403	Ht. 4	1.271
Dia. 5	2.400	Weight	238.610
Dia. 6	2.404	Sample #	**17508-GHP_GMX02-0171**

Fail Load	7,130	lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/8/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX02-0196**
		Sample # **17508-GHP_GMX02-0196**	Rock Type	Skarn

T psi	**1,159**	psi
	8.00	Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX02-0196**
Rock Type:	Skarn
Hole # :	GHP_GMX02
Depth :	196.9 - 197.1
Alterations:	
Diameter :	2.395 (in)
Length:	1.161 (in)
Density:	241.73 (pcf)

T= Indirect tensile strength

T psi	1,159 (psi)
	8.0 Mpa

Test Data:	
Disp. Rate :	
Load Rate :	80 (lbs/sec)
Gage Reading :	5,060 (lbs)
Mode of Failure :	Intact

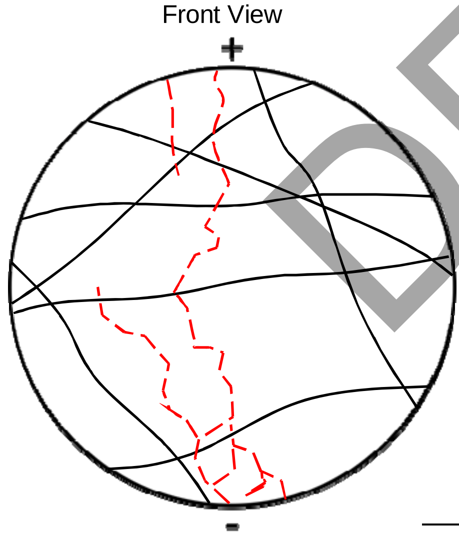
Mode of Failure :

Fracture	
Intact	XX
Both	

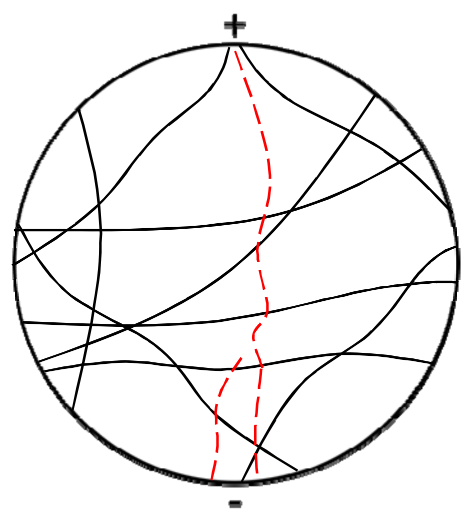
Rock Code:	

Worksheet

Front View



Back View



Pre-existing Weakness Plane

Post Failure Fracture

Dia. 1	2.399	Ht. 1	1.165		
Dia. 2	2.390	Ht. 2	1.159	**Fail Load**	5,060 lbs Force
Dia. 3	2.390	Ht. 3	1.162		
Dia. 4	2.401	Ht. 4	1.158		
Dia. 5	2.402	Weight	331.840		
Dia. 6	2.390	Sample #	**17508-GHP_GMX02-0196**		

NOTES: Heavy sulfides.

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/8/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX02-0200**
		Sample # **17508-GHP_GMX02-0200**	Rock Type	Skarn

T psi **594** psi

4.10 Mpa

T= Indirect tensile strength

T psi	594 (psi)
	4.1 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX02-0200**
Rock Type:	Skarn
Hole # :	GHP_GMX02
Depth :	200.7 - 200.9
Alterations:	
Diameter :	2.396 (in)
Length:	1.217 (in)
Density:	231.12 (pcf)

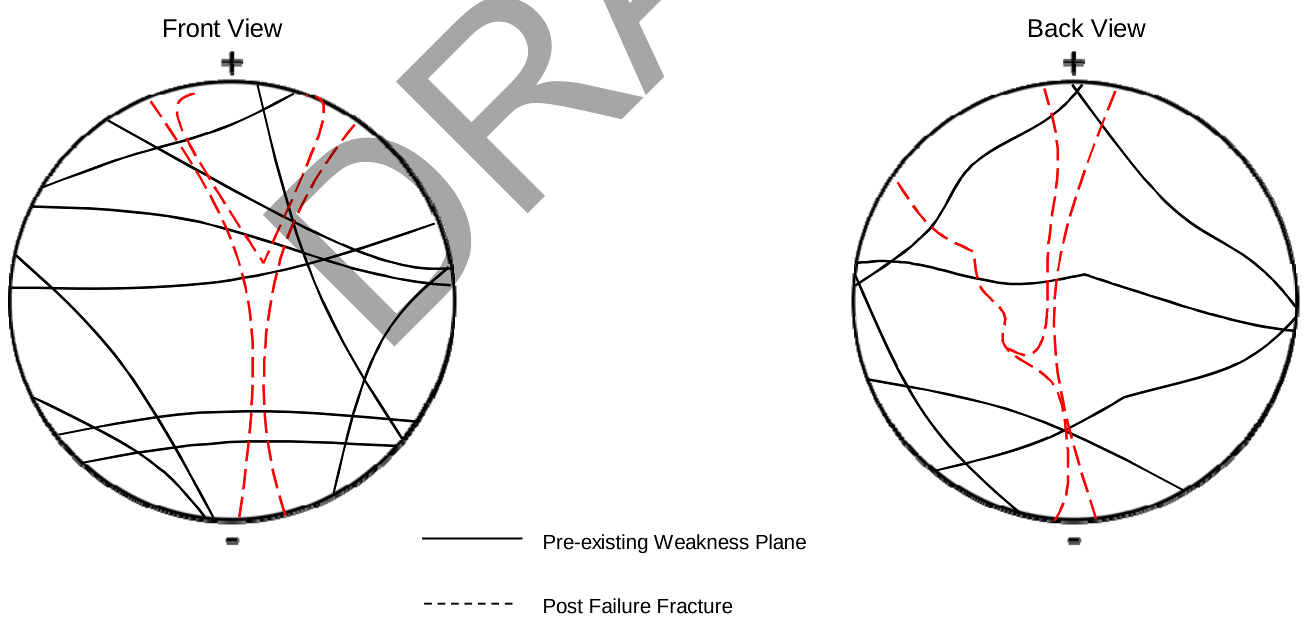
Test Data:	
Disp. Rate :	
Load Rate :	84 (lbs/sec)
Gage Reading :	2,720 (lbs)
Mode of Failure :	Both

Mode of Failure :

Fracture	
Intact	
Both	XX

Rock Code:	

Worksheet



Dia. 1	2.395	Ht. 1	1.213
Dia. 2	2.399	Ht. 2	1.216
Dia. 3	2.390	Ht. 3	1.221
Dia. 4	2.393	Ht. 4	1.218
Dia. 5	2.399	Weight	332.690
Dia. 6	2.399	Sample #	**17508-GHP_GMX02-0200**

Fail Load	2,720	lbs Force

NOTES: Heavy sulfides

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Brazilian Disk Test Results

Project #	17508	Client	Aura Minerals
Date	8/8/2017	Location	Aranzazu, Zacatecas Mexico
Technician	EK	Sample #	**17508-GHP_GMX02-0218**
		Rock Type	Skarn

Sample # **17508-GHP_GMX02-0218**

T psi		
	588	psi
	4.06	Mpa

T psi	588 (psi)
	4.1 Mpa

T= Indirect tensile strength

Sample Data :	
Sample # :	**17508-GHP_GMX02-0218**
Rock Type:	Skarn
Hole # :	GHP_GMX02
Depth :	218.8 - 219.4
Alterations:	
Diameter :	2.398 (in)
Length:	1.342 (in)
Density:	173.01 (pcf)

Mode of Failure :

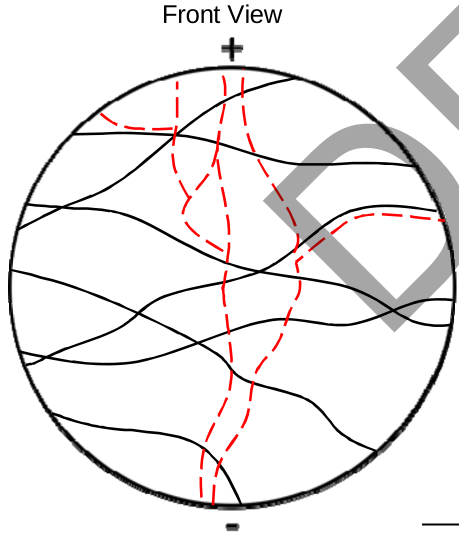
Fracture	
Intact	
Both	XX

Test Data:	
Disp. Rate :	
Load Rate :	92 (lbs/sec)
Gage Reading :	2,970 (lbs)
Mode of Failure :	Both

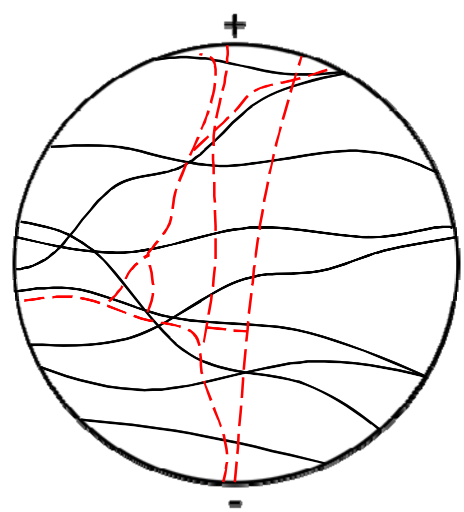
Rock Code:	

Worksheet

Front View



Back View



——— Pre-existing Weakness Plane

- - - - - - - Post Failure Fracture

Dia. 1	2.397	Ht. 1	1.347
Dia. 2	2.399	Ht. 2	1.335
Dia. 3	2.398	Ht. 3	1.334
Dia. 4	2.395	Ht. 4	1.352
Dia. 5	2.402	Weight	275.140
Dia. 6	2.398	Sample #	**17508-GHP_GMX02-0218**

Fail Load	2,970	lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Brazilian Disk Test Results

Project #	17508	Client	Aura Minerals
Date	8/8/2017	Location	Aranzazu, Zacatecas Mexico
Technician	EK	Sample #	17508-GHP_GMX02-0224
		Rock Type	Skarn

Sample # **17508-GHP_GMX02-0224**

T psi	
794	psi
5.47	Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX02-0224**
Rock Type:	Skarn
Hole # :	GHP_GMX02
Depth :	224.0 - 224.3
Alterations:	
Diameter :	2.402 (in)
Length:	1.226 (in)
Density:	210.95 (pcf)

T= Indirect tensile strength

T psi	794 (psi)
	5.5 Mpa

Test Data:	
Disp. Rate :	
Load Rate :	84 (lbs/sec)
Gage Reading :	3,670 (lbs)
Mode of Failure :	Both

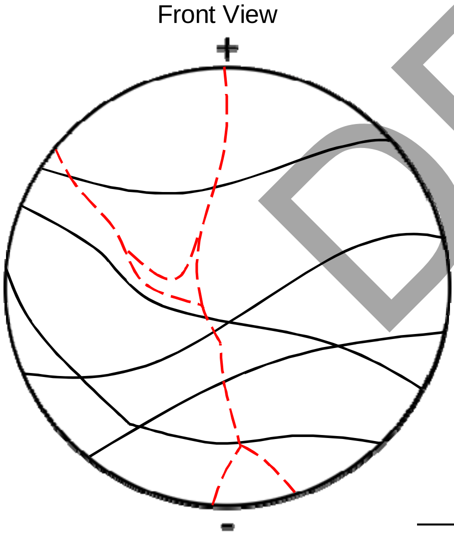
Mode of Failure :

Fracture	
Intact	
Both	XX

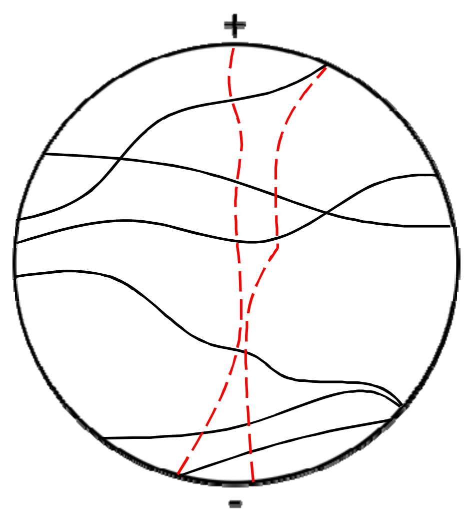
Rock Code:	

Worksheet

Front View



Back View



——— Pre-existing Weakness Plane

- - - - - - - Post Failure Fracture

Dia. 1	2.402	Ht. 1	1.220
Dia. 2	2.401	Ht. 2	1.222
Dia. 3	2.404	Ht. 3	1.242
Dia. 4	2.401	Ht. 4	1.220
Dia. 5	2.402	Weight	307.670
Dia. 6	2.406	Sample #	**17508-GHP_GMX02-0224**

Fail Load 3,670 lbs Force

NOTES: Heavy sulfides.

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Brazilian Disk Test Results

Project #	17508	Client	Aura Minerals
Date	8/8/2017	Location	Aranzazu, Zacatecas Mexico
Technician	EK	Sample #	17508-GHP_GMX02-0245
		Rock Type	Intrusive

Sample # **17508-GHP_GMX02-0245**

T psi **1,763** psi

12.16 Mpa

T psi	1,763 (psi)
	12.2 Mpa

T= Indirect tensile strength

Sample Data :	
Sample # :	**17508-GHP_GMX02-0245**
Rock Type:	Intrusive
Hole # :	GHP_GMX02
Depth :	245.8 - 246.1
Alterations:	
Diameter :	2.405 (in)
Length:	1.198 (in)
Density:	167.09 (pcf)

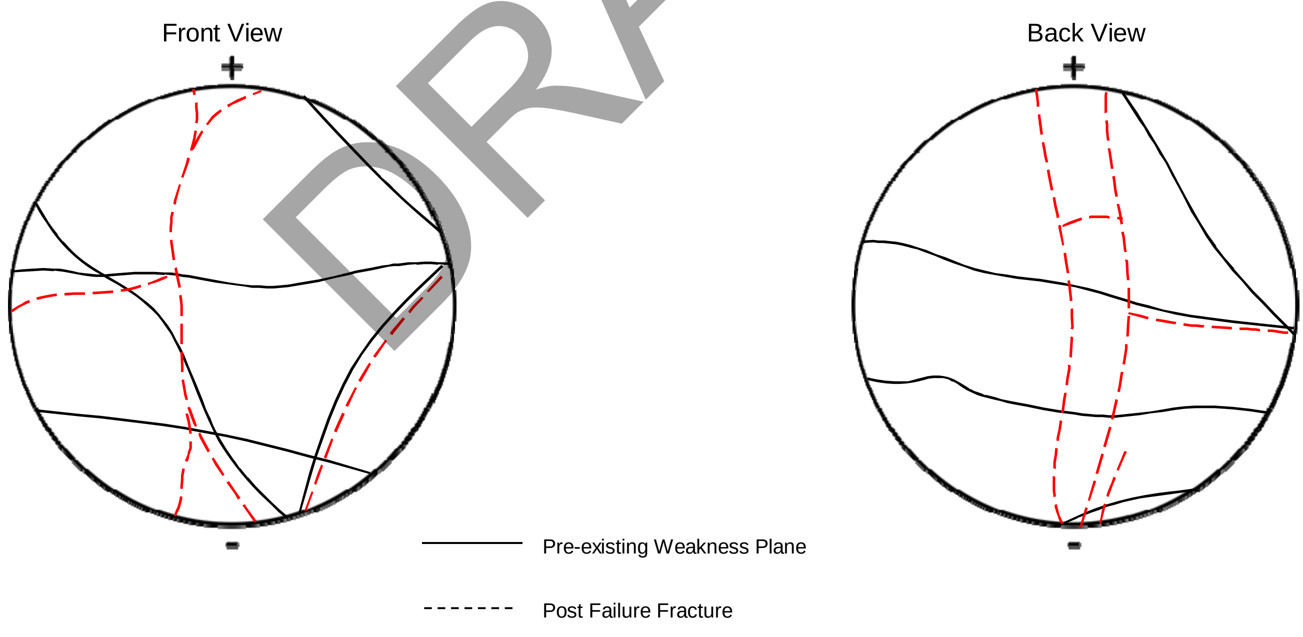
Mode of Failure :

Fracture	
Intact	
Both	XX

Test Data:	
Disp. Rate :	
Load Rate :	83 (lbs/sec)
Gage Reading :	7,970 (lbs)
Mode of Failure :	Both

Rock Code:	

Worksheet



Dia. 1	2.403	Ht. 1	1.194
Dia. 2	2.404	Ht. 2	1.201
Dia. 3	2.406	Ht. 3	1.201
Dia. 4	2.404	Ht. 4	1.195
Dia. 5	2.407	Weight	238.530
Dia. 6	2.405	Sample #	**17508-GHP_GMX02-0245**

Fail Load	7,970	lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/8/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX04-0017**
		Sample # **17508-GHP_GMX04-0017**	Rock Type	Marble

T psi **1,348** psi

9.30 Mpa

T= Indirect tensile strength

T psi	1,348 (psi)
	9.3 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX04-0017**
Rock Type:	Marble
Hole # :	GHP_GMX04
Depth :	17.6 - 17.9
Alterations:	
Diameter :	2.411 (in)
Length:	1.260 (in)
Density:	172.54 (pcf)

Mode of Failure :

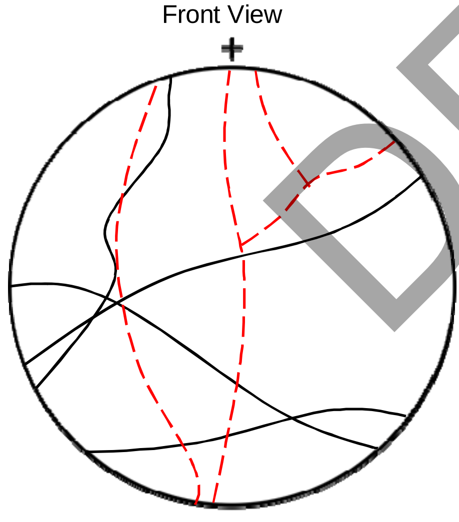
Fracture	
Intact	
Both	XX

Test Data:	
Disp. Rate :	
Load Rate :	87 (lbs/sec)
Gage Reading :	6,430 (lbs)
Mode of Failure :	Both

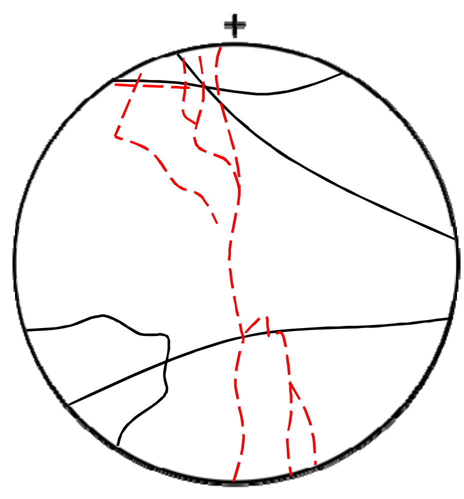
Rock Code:	

Worksheet

Front View



Back View



——— Pre-existing Weakness Plane

- - - - - - - Post Failure Fracture

Dia. 1	2.410	Ht. 1	1.257
Dia. 2	2.415	Ht. 2	1.250
Dia. 3	2.410	Ht. 3	1.255
Dia. 4	2.410	Ht. 4	1.279
Dia. 5	2.412	Weight	260.470
Dia. 6	2.409	Sample #	**17508-GHP_GMX04-0017**

Fail Load 6,430 lbs Force

NOTES: Controller error, no data saved.

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/8/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX04-0040**
		Sample # **17508-GHP_GMX04-0040**	Rock Type	Marble

T psi		
	1,226	psi
	8.46	Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX04-0040**
Rock Type:	Marble
Hole # :	GHP_GMX04
Depth :	40.5 - 40.7
Alterations:	
Diameter :	2.410 (in)
Length:	1.192 (in)
Density:	188.93 (pcf)

T= Indirect tensile strength

T psi	1,226 (psi)
	8.5 Mpa

Test Data:	
Disp. Rate :	
Load Rate :	82 (lbs/sec)
Gage Reading :	5,530 (lbs)
Mode of Failure :	Intact

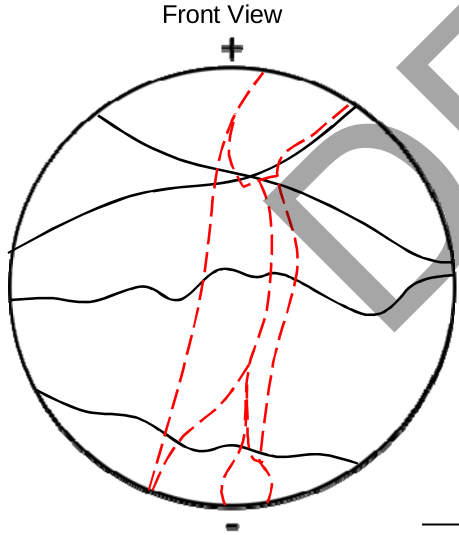
Mode of Failure :

Fracture	
Intact	XX
Both	

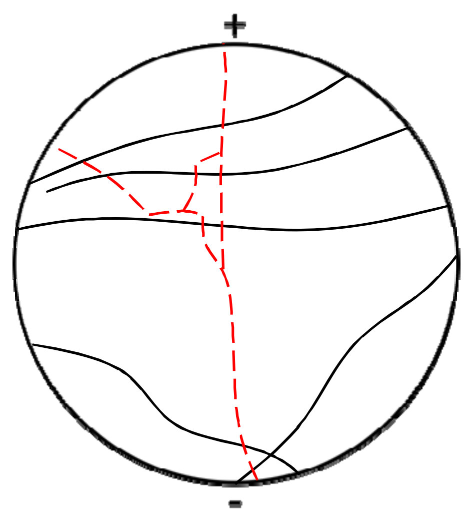
Rock Code:	

Worksheet

Front View



Back View



Pre-existing Weakness Plane

Post Failure Fracture

Dia. 1	2.413	Ht. 1	1.186
Dia. 2	2.409	Ht. 2	1.195
Dia. 3	2.411	Ht. 3	1.192
Dia. 4	2.406	Ht. 4	1.196
Dia. 5	2.406	Weight	269.550
Dia. 6	2.412	Sample #	**17508-GHP_GMX04-0040**

Fail Load	5,530	lbs Force

NOTES: Controller error, no data saved.

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/8/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX04-0045**
		Sample # **17508-GHP_GMX04-0045**	Rock Type	Marble

T psi **1,094** psi

7.55 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX04-0045**
Rock Type:	Marble
Hole # :	GHP_GMX04
Depth :	45.8 - 46.2
Alterations:	
Diameter :	2.413 (in)
Length:	1.146 (in)
Density:	170.70 (pcf)

T= Indirect tensile strength

T psi	1,094 (psi)
	7.5 Mpa

Test Data:	
Disp. Rate :	
Load Rate :	79 (lbs/sec)
Gage Reading :	4,750 (lbs)
Mode of Failure :	Intact

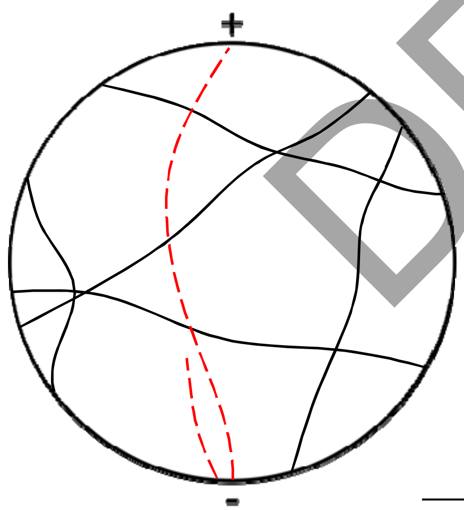
Mode of Failure :

Fracture	
Intact	XX
Both	

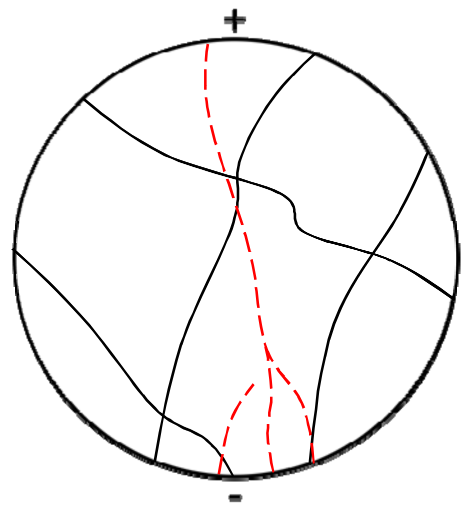
Rock Code:	

Worksheet

Front View



Back View



Pre-existing Weakness Plane

Post Failure Fracture

Dia. 1	2.411	Ht. 1	1.143
Dia. 2	2.410	Ht. 2	1.157
Dia. 3	2.413	Ht. 3	1.142
Dia. 4	2.409	Ht. 4	1.144
Dia. 5	2.414	Weight	234.780
Dia. 6	2.421	Sample #	**17508-GHP_GMX04-0045**

Fail Load 4,750 lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/8/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX04-0064**
		Sample # **17508-GHP_GMX04-0064**	Rock Type	Skarn

T psi	**1,673**	psi
	11.53	Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX04-0064**
Rock Type:	Skarn
Hole # :	GHP_GMX04
Depth :	64.3 - 64.6
Alterations:	
Diameter :	2.410 (in)
Length:	1.329 (in)
Density:	223.35 (pcf)

T= Indirect tensile strength

T psi	1,673 (psi)
	11.5 Mpa

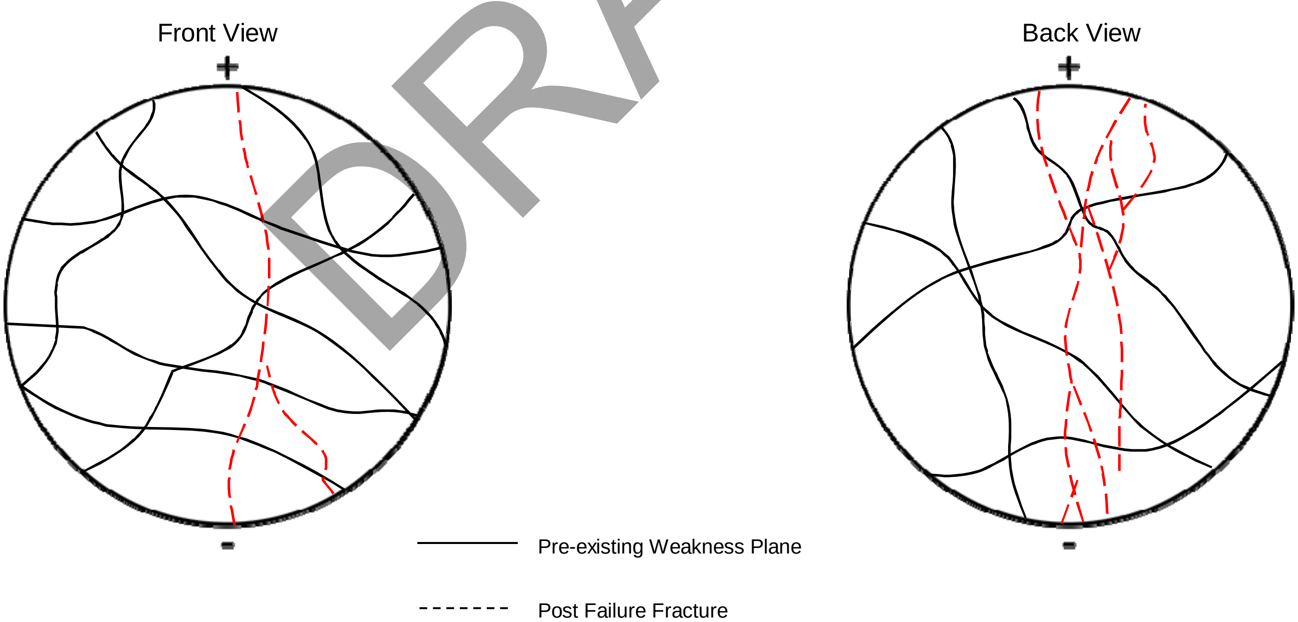
Test Data:	
Disp. Rate :	
Load Rate :	92 (lbs/sec)
Gage Reading :	8,410 (lbs)
Mode of Failure :	Intact

Mode of Failure :

Fracture	
Intact	XX
Both	

Rock Code:	

Worksheet



Dia. 1	2.409	Ht. 1	1.323
Dia. 2	2.411	Ht. 2	1.325
Dia. 3	2.408	Ht. 3	1.346
Dia. 4	2.407	Ht. 4	1.323
Dia. 5	2.408	Weight	355.410
Dia. 6	2.419	Sample #	**17508-GHP_GMX04-0064**

Fail Load	8,410	lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Brazilian Disk Test Results

Project #	17508	Client	Aura Minerals
Date	8/8/2017	Location	Aranzazu, Zacatecas Mexico
Technician	EK	Sample #	**17508-GHP_GMX04-0066**
		Rock Type	Skarn

Sample # **17508-GHP_GMX04-0066**

T psi **2,016** psi

13.90 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX04-0066**
Rock Type:	Skarn
Hole # :	GHP_GMX04
Depth :	66.7 - 67.0
Alterations:	
Diameter :	2.407 (in)
Length:	1.259 (in)
Density:	216.17 (pcf)

T= Indirect tensile strength

T psi	2,016 (psi)
	13.9 Mpa

Mode of Failure :

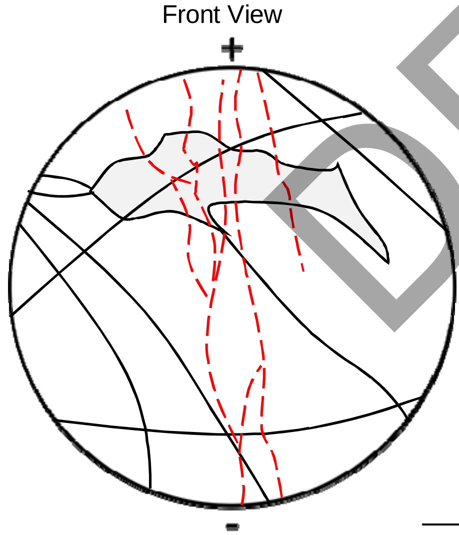
Fracture	
Intact	XX
Both	

Test Data:	
Disp. Rate :	
Load Rate :	87 (lbs/sec)
Gage Reading :	9,590 (lbs)
Mode of Failure :	Intact

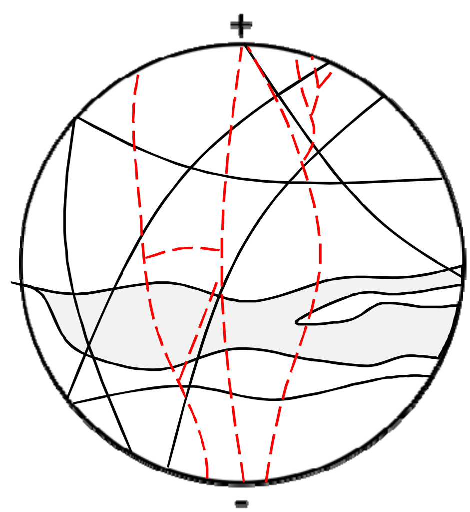
Rock Code:	

Worksheet

Front View



Back View



Pre-existing Weakness Plane

Post Failure Fracture

Dia. 1	2.409	Ht. 1	1.256
Dia. 2	2.404	Ht. 2	1.255
Dia. 3	2.405	Ht. 3	1.270
Dia. 4	2.404	Ht. 4	1.256
Dia. 5	2.413	Weight	324.960
Dia. 6	2.406	Sample #	**17508-GHP_GMX04-0066**

Fail Load	9,590	lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/8/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX04-0205**
		Sample # **17508-GHP_GMX04-0205**	Rock Type	Hornfels

T psi **525** psi

3.62 Mpa

T psi	525 (psi)
	3.6 Mpa

T= Indirect tensile strength

Sample Data :	
Sample # :	**17508-GHP_GMX04-0205**
Rock Type:	Hornfels
Hole # :	GHP_GMX04
Depth :	205.7 - 206.0
Alterations:	
Diameter :	2.407 (in)
Length:	1.201 (in)
Density:	162.00 (pcf)

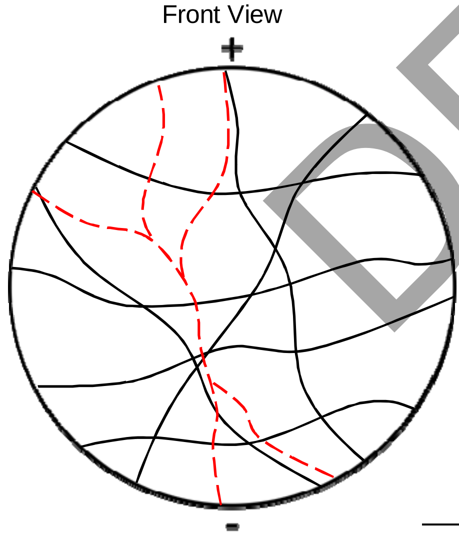
Test Data:	
Disp. Rate :	
Load Rate :	83 (lbs/sec)
Gage Reading :	2,380 (lbs)
Mode of Failure :	Both

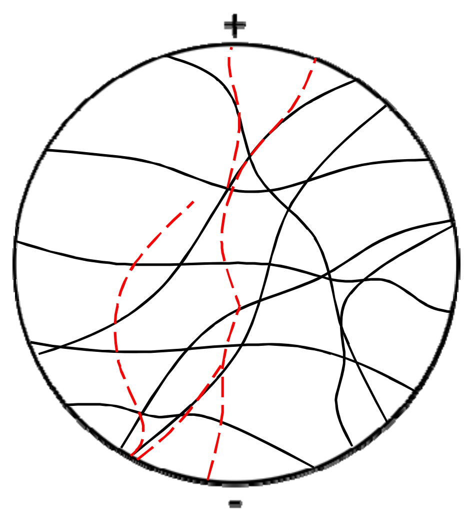
Mode of Failure :

Fracture	
Intact	
Both	XX

Rock Code:	

Worksheet





Pre-existing Weakness Plane

Post Failure Fracture

Dia. 1	2.404	Ht. 1	1.203
Dia. 2	2.407	Ht. 2	1.202
Dia. 3	2.408	Ht. 3	1.201
Dia. 4	2.405	Ht. 4	1.198
Dia. 5	2.408	Weight	232.290
Dia. 6	2.410	Sample #	**17508-GHP_GMX04-0205**

Fail Load	2,380	lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/8/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX04-0224**
		Sample # **17508-GHP_GMX04-0224**	Rock Type	Skarn

T psi **1,380** psi

9.52 Mpa

T psi	1,380 (psi)
	9.5 Mpa

T= Indirect tensile strength

Sample Data :	
Sample # :	**17508-GHP_GMX04-0224**
Rock Type:	Skarn
Hole # :	GHP_GMX04
Depth :	224.3 - 224.5
Alterations:	
Diameter :	2.410 (in)
Length:	1.236 (in)
Density:	251.08 (pcf)

Test Data:	
Disp. Rate :	
Load Rate :	85 (lbs/sec)
Gage Reading :	6,450 (lbs)
Mode of Failure :	Intact

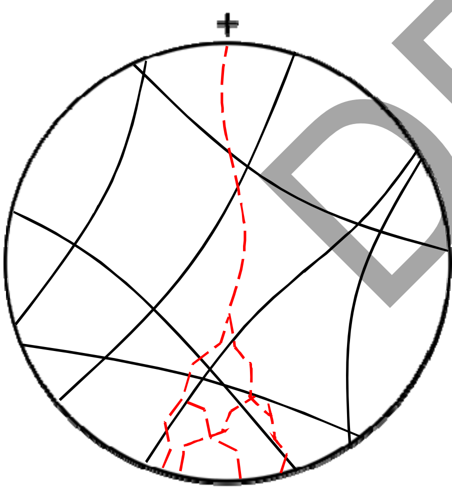
Mode of Failure :

Fracture	
Intact	XX
Both	

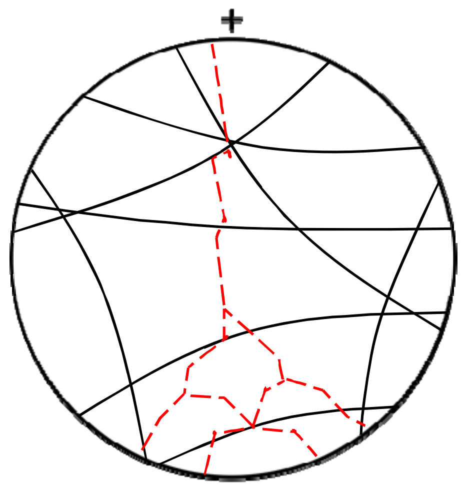
Rock Code:	

Worksheet

Front View



Back View



Pre-existing Weakness Plane

Post Failure Fracture

Dia. 1	2.410	Ht. 1	1.233
Dia. 2	2.409	Ht. 2	1.232
Dia. 3	2.408	Ht. 3	1.238
Dia. 4	2.406	Ht. 4	1.240
Dia. 5	2.410	Weight	371.400
Dia. 6	2.418	Sample #	**17508-GHP_GMX04-0224**

Fail Load	6,450	lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Brazilian Disk Test Results

Project #	17508
Date	8/8/2017
Technician	EK

Client	Aura Minerals
Location	Aranzazu, Zacatecas Mexico
Sample #	**17508-GHP_GMX04-0226**
Rock Type	Skarn

Sample # **17508-GHP_GMX04-0226**

T psi **359** psi

2.47 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX04-0226**
Rock Type:	Skarn
Hole # :	GHP_GMX04
Depth :	226.9 - 227.1
Alterations:	
Diameter :	2.405 (in)
Length:	1.271 (in)
Density:	250.13 (pcf)

T= Indirect tensile strength

T psi	359 (psi)
	2.5 Mpa

Test Data:	
Disp. Rate :	
Load Rate :	88 (lbs/sec)
Gage Reading :	1,720 (lbs)
Mode of Failure :	Both

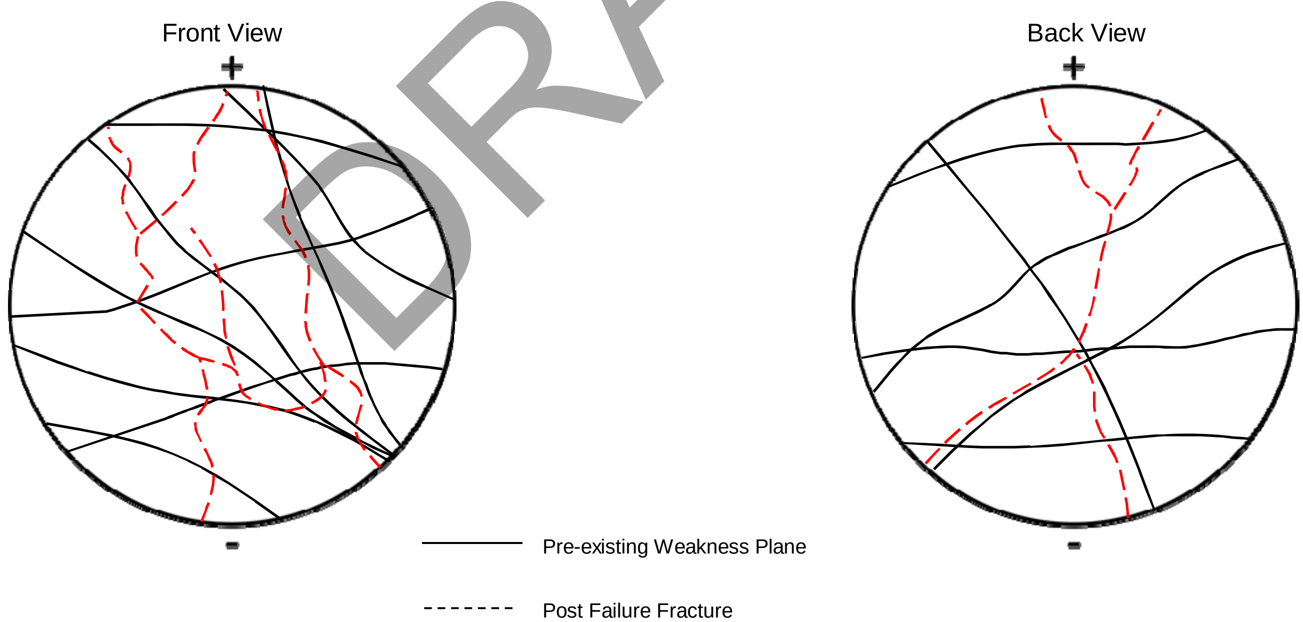
Mode of Failure :

Fracture	
Intact	
Both	XX

Rock Code:	

DRAFT

Worksheet



Dia. 1	2.409	Ht. 1	1.272
Dia. 2	2.408	Ht. 2	1.281
Dia. 3	2.399	Ht. 3	1.260
Dia. 4	2.408	Ht. 4	1.270
Dia. 5	2.404	Weight	378.860
Dia. 6	2.402	Sample #	**17508-GHP_GMX04-0226**

Fail Load 1,720 lbs Force

NOTES: Heavy sulfides

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/8/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX04-0253**
		Sample # **17508-GHP_GMX04-0253**	Rock Type	Intrusive

T psi **1,928** psi

13.29 Mpa

T= Indirect tensile strength

T psi	1,928 (psi)
	13.3 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX04-0253**
Rock Type:	Intrusive
Hole # :	GHP_GMX04
Depth :	253.3 - 253.5
Alterations:	
Diameter :	2.412 (in)
Length:	1.270 (in)
Density:	169.07 (pcf)

Test Data:	
Disp. Rate :	
Load Rate :	88 (lbs/sec)
Gage Reading :	9,270 (lbs)
Mode of Failure :	Intact

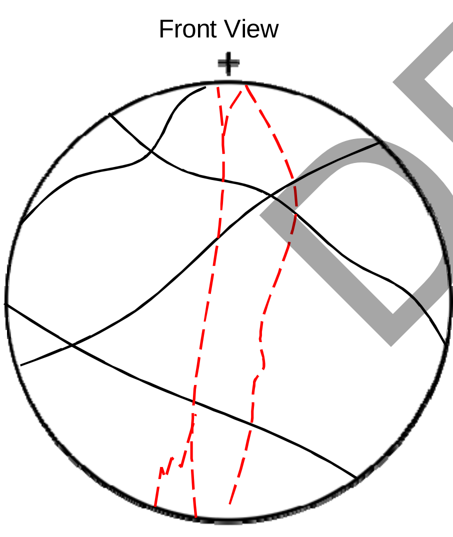
Mode of Failure :

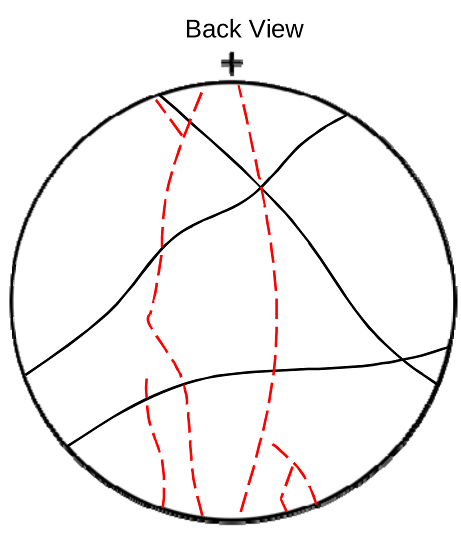
Fracture	
Intact	XX
Both	

Rock Code:	

DRAFT

Worksheet





Pre-existing Weakness Plane

Post Failure Fracture

Dia. 1	2.416	Ht. 1	1.267
Dia. 2	2.416	Ht. 2	1.269
Dia. 3	2.411	Ht. 3	1.278
Dia. 4	2.415	Ht. 4	1.268
Dia. 5	2.408	Weight	257.530
Dia. 6	2.408	Sample #	**17508-GHP_GMX04-0253**

Fail Load	9,270	lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Brazilian Disk Test Results

Project #	17508	Client	Aura Minerals
Date	8/8/2017	Location	Aranzazu, Zacatecas Mexico
Technician	EK	Sample #	**17508-GHP_GMX04-0257**
		Rock Type	Intrusive

Sample # **17508-GHP_GMX04-0257**

T psi **1,978** psi

13.64 Mpa

T psi	1,978 (psi)
	13.6 Mpa

T= Indirect tensile strength

Sample Data :	
Sample # :	**17508-GHP_GMX04-0257**
Rock Type:	Intrusive
Hole # :	GHP_GMX04
Depth :	257.4 - 257.6
Alterations:	
Diameter :	2.411 (in)
Length:	1.282 (in)
Density:	168.68 (pcf)

Test Data:	
Disp. Rate :	
Load Rate :	89 (lbs/sec)
Gage Reading :	9,600 (lbs)
Mode of Failure :	Intact

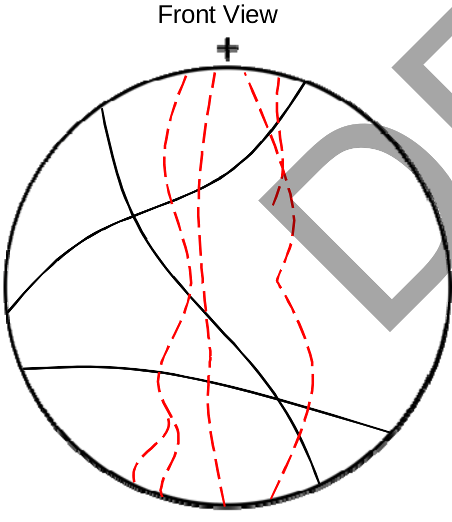
Mode of Failure :

Fracture	
Intact	XX
Both	

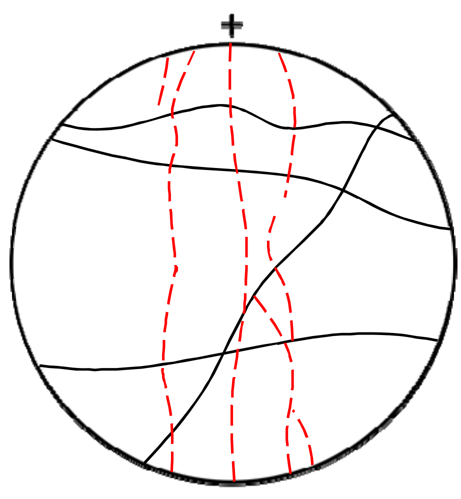
Rock Code:	

Worksheet

Front View



Back View



Pre-existing Weakness Plane

Post Failure Fracture

Dia. 1	2.410	Ht. 1	1.281
Dia. 2	2.410	Ht. 2	1.281
Dia. 3	2.411	Ht. 3	1.285
Dia. 4	2.406	Ht. 4	1.281
Dia. 5	2.413	Weight	259.170
Dia. 6	2.418	Sample #	**17508-GHP_GMX04-0257**

Fail Load	9,600	lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Brazilian Disk Test Results

Project #	17508	Client	Aura Minerals
Date	8/8/2017	Location	Aranzazu, Zacatecas Mexico
Technician	EK	Sample #	**17508-GHP_GMX05-0086**
		Rock Type	Hornfels

Sample # **17508-GHP_GMX05-0086**

T psi **1,398** psi

9.64 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX05-0086**
Rock Type:	Hornfels
Hole # :	GHP_GMX05
Depth :	86.7 - 86.9
Alterations:	
Diameter :	2.409 (in)
Length:	1.341 (in)
Density:	159.46 (pcf)

T= Indirect tensile strength

T psi	1,398 (psi)
	9.6 Mpa

Test Data:	
Disp. Rate :	
Load Rate :	93 (lbs/sec)
Gage Reading :	7,090 (lbs)
Mode of Failure :	Both

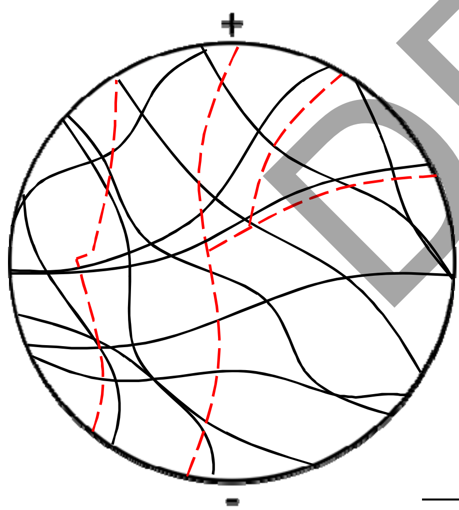
Mode of Failure :

Fracture	
Intact	
Both	XX

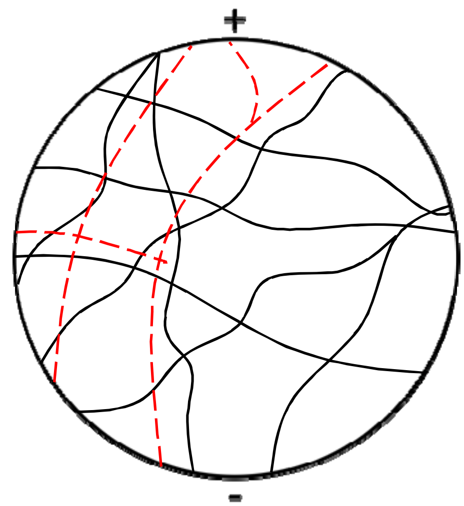
Rock Code:	

Worksheet

Front View



Back View



Pre-existing Weakness Plane

Post Failure Fracture

Dia. 1	2.418	Ht. 1	1.345
Dia. 2	2.403	Ht. 2	1.351
Dia. 3	2.405	Ht. 3	1.329
Dia. 4	2.408	Ht. 4	1.340
Dia. 5	2.409	Weight	255.780
Dia. 6	2.412	Sample #	**17508-GHP_GMX05-0086**

Fail Load 7,090 lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/8/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX05-0105**
		Sample # **17508-GHP_GMX05-0105**	Rock Type	Hornfels

T psi **360** psi

2.48 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX05-0105**
Rock Type:	Hornfels
Hole # :	GHP_GMX05
Depth :	105.8 - 106.3
Alterations:	
Diameter :	2.395 (in)
Length:	1.233 (in)
Density:	157.96 (pcf)

T= Indirect tensile strength

T psi	360 (psi)
	2.5 Mpa

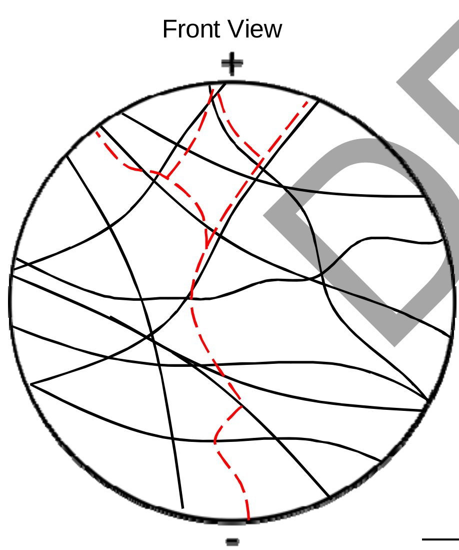
Test Data:	
Disp. Rate :	
Load Rate :	85 (lbs/sec)
Gage Reading :	1,670 (lbs)
Mode of Failure :	Fracture

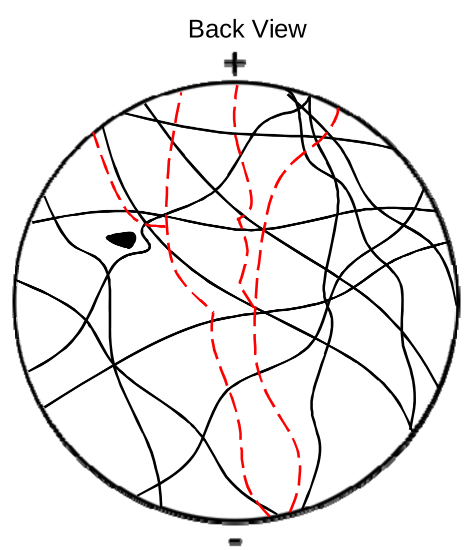
Mode of Failure :

Fracture	XX
Intact	
Both	

Rock Code:	

Worksheet





Pre-existing Weakness Plane

Post Failure Fracture

Dia. 1	2.399	Ht. 1	1.233
Dia. 2	2.389	Ht. 2	1.230
Dia. 3	2.390	Ht. 3	1.238
Dia. 4	2.394	Ht. 4	1.234
Dia. 5	2.404	Weight	230.290
Dia. 6	2.392	Sample #	**17508-GHP_GMX05-0105**

Fail Load 1,670 lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/8/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX05-0148**
		Sample # **17508-GHP_GMX05-0148**	Rock Type	Intrusive

T psi **1,142** psi

7.87 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX05-0148**
Rock Type:	Intrusive
Hole # :	GHP_GMX05
Depth :	148.2 - 148.4
Alterations:	
Diameter :	2.412 (in)
Length:	1.256 (in)
Density:	153.31 (pcf)

T= Indirect tensile strength

T psi	1,142 (psi)
	7.9 Mpa

Test Data:	
Disp. Rate :	
Load Rate :	87 (lbs/sec)
Gage Reading :	5,430 (lbs)
Mode of Failure :	Intact

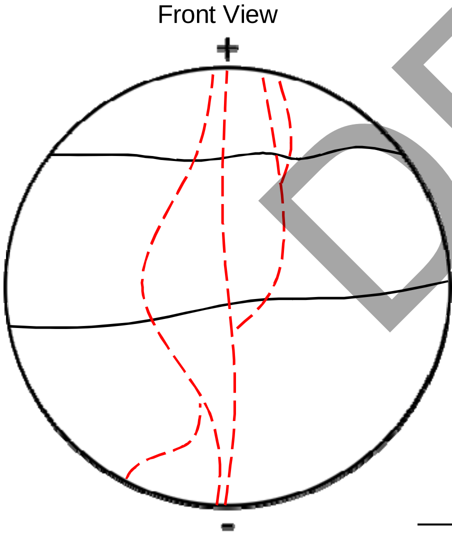
Mode of Failure :

Fracture	
Intact	XX
Both	

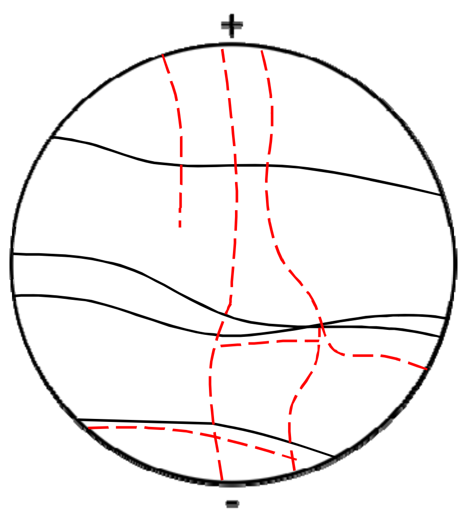
Rock Code:	

Worksheet

Front View



Back View



Pre-existing Weakness Plane

Post Failure Fracture

Dia. 1	2.410	Ht. 1	1.255
Dia. 2	2.411	Ht. 2	1.256
Dia. 3	2.409	Ht. 3	1.256
Dia. 4	2.409	Ht. 4	1.258
Dia. 5	2.423	Weight	230.900
Dia. 6	2.409	Sample #	**17508-GHP_GMX05-0148**

Fail Load 5,430 lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/8/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX05-0167**
		Sample # **17508-GHP_GMX05-0167**	Rock Type	Skarn

T psi **156** psi

1.07 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX05-0167**
Rock Type:	Skarn
Hole # :	GHP_GMX05
Depth :	168.0 - 168.2
Alterations:	
Diameter :	2.410 (in)
Length:	1.272 (in)
Density:	192.89 (pcf)

T= Indirect tensile strength

T psi	156 (psi)
	1.1 Mpa

Test Data:	
Disp. Rate :	
Load Rate :	88 (lbs/sec)
Gage Reading :	750 (lbs)
Mode of Failure :	Both

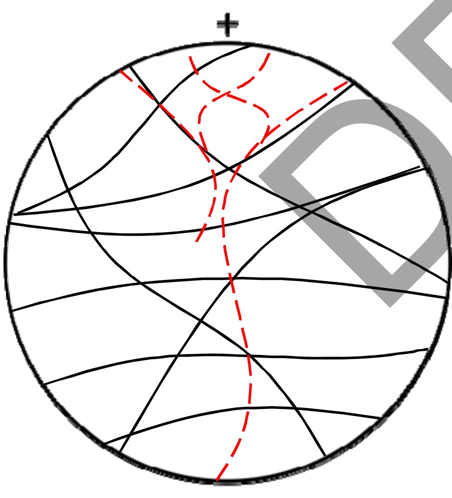
Mode of Failure :

Fracture	
Intact	
Both	XX

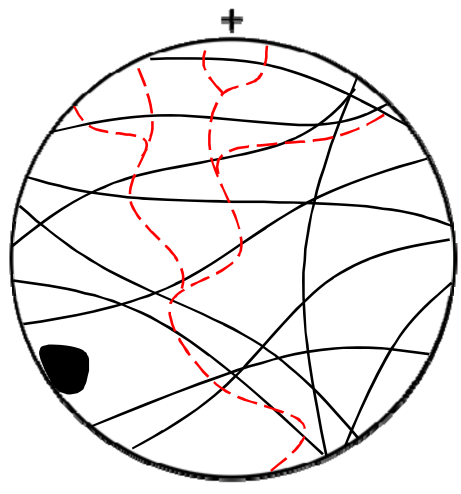
Rock Code:	

Worksheet

Front View



Back View



Pre-existing Weakness Plane

Post Failure Fracture

Dia. 1	2.408	Ht. 1	1.265
Dia. 2	2.410	Ht. 2	1.270
Dia. 3	2.410	Ht. 3	1.271
Dia. 4	2.410	Ht. 4	1.285
Dia. 5	2.412	Weight	293.860
Dia. 6	2.412	Sample #	**17508-GHP_GMX05-0167**

Fail Load 750 lbs Force

NOTES: Heavy sulfides, voids.

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/8/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX05-0179**
		Sample # **17508-GHP_GMX05-0179**	Rock Type	Skarn

T psi **1,102** psi

7.60 Mpa

T psi	1,102 (psi)
	7.6 Mpa

T= Indirect tensile strength

Sample Data :	
Sample # :	**17508-GHP_GMX05-0179**
Rock Type:	Skarn
Hole # :	GHP_GMX05
Depth :	179.9 - 180.1
Alterations:	
Diameter :	2.416 (in)
Length:	1.278 (in)
Density:	169.85 (pcf)

Mode of Failure :

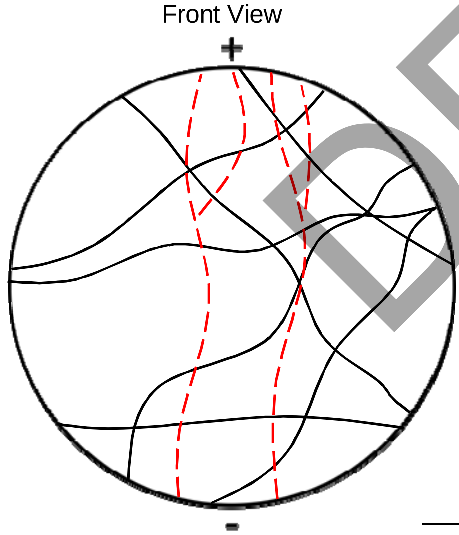
Fracture	
Intact	
Both	XX

Test Data:	
Disp. Rate :	
Load Rate :	88 (lbs/sec)
Gage Reading :	5,340 (lbs)
Mode of Failure :	Both

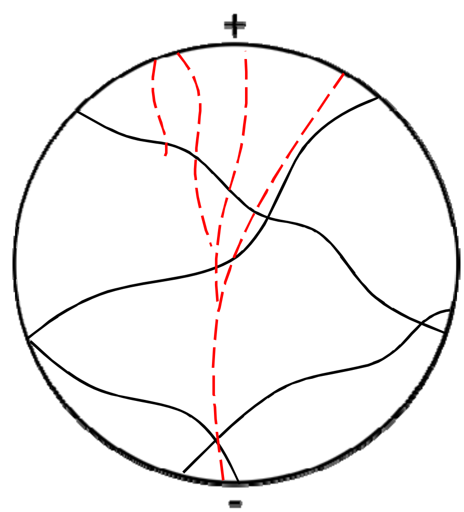
Rock Code:	

Worksheet

Front View



Back View



——— Pre-existing Weakness Plane

- - - - - - - Post Failure Fracture

Dia. 1	2.415	Ht. 1	1.275
Dia. 2	2.419	Ht. 2	1.288
Dia. 3	2.418	Ht. 3	1.277
Dia. 4	2.411	Ht. 4	1.274
Dia. 5	2.409	Weight	261.190
Dia. 6	2.424	Sample #	**17508-GHP_GMX05-0179**

Fail Load	5,340	lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Brazilian Disk Test Results

Project #	17508
Date	8/8/2017
Technician	EK

Client	Aura Minerals
Location	Aranzazu, Zacatecas Mexico
Sample #	**17508-GHP_GMX05-0191**
Rock Type	Skarn

Sample # **17508-GHP_GMX05-0191**

T psi	**2,159**	psi
	14.89	Mpa

T psi	2,159 (psi)
	14.9 Mpa

T= Indirect tensile strength

Sample Data :	
Sample # :	**17508-GHP_GMX05-0191**
Rock Type:	Skarn
Hole # :	GHP_GMX05
Depth :	191.75-192.15
Alterations:	
Diameter :	2.416 (in)
Length:	1.265 (in)
Density:	244.37 (pcf)

Test Data:	
Disp. Rate :	
Load Rate :	88 (lbs/sec)
Gage Reading :	10,360 (lbs)
Mode of Failure :	Intact

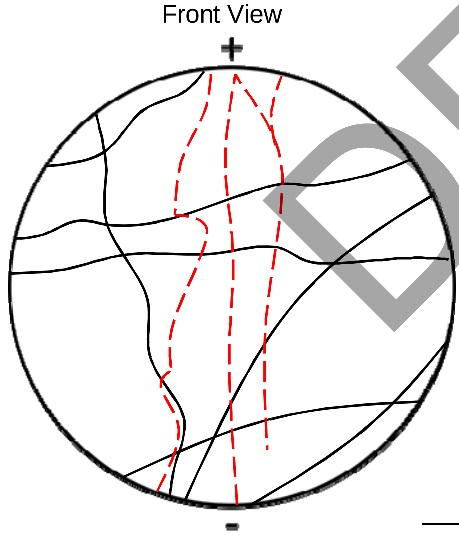
Mode of Failure :

Fracture	
Intact	XX
Both	

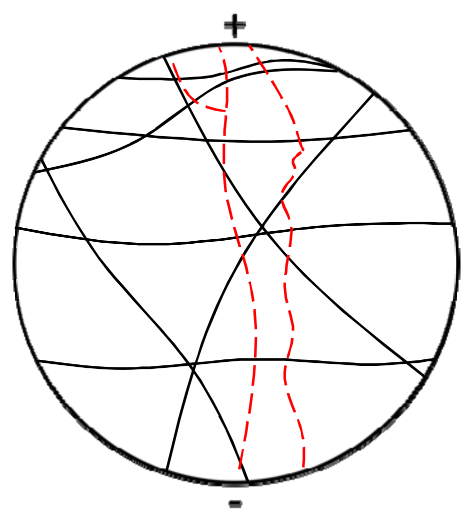
Rock Code:	

Worksheet

Front View



Back View



Pre-existing Weakness Plane

Post Failure Fracture

Dia. 1	2.418	Ht. 1	1.267
Dia. 2	2.414	Ht. 2	1.263
Dia. 3	2.414	Ht. 3	1.263
Dia. 4	2.416	Ht. 4	1.267
Dia. 5	2.418	Weight	371.900
Dia. 6	2.415	Sample #	**17508-GHP_GMX05-0191**

Fail Load	10,360	lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Brazilian Disk Test Results

Project #	17508
Date	8/8/2017
Technician	EK

Client	Aura Minerals
Location	Aranzazu, Zacatecas Mexico
Sample #	**17508-GHP_GMX05-0221**
Rock Type	Intrusive

Sample # **17508-GHP_GMX05-0221**

T psi **2,384** psi

16.44 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX05-0221**
Rock Type:	Intrusive
Hole # :	GHP_GMX05
Depth :	221.8 - 222.1
Alterations:	
Diameter :	2.411 (in)
Length:	1.300 (in)
Density:	173.37 (pcf)

T= Indirect tensile strength

T psi	2,384 (psi)
	16.4 Mpa

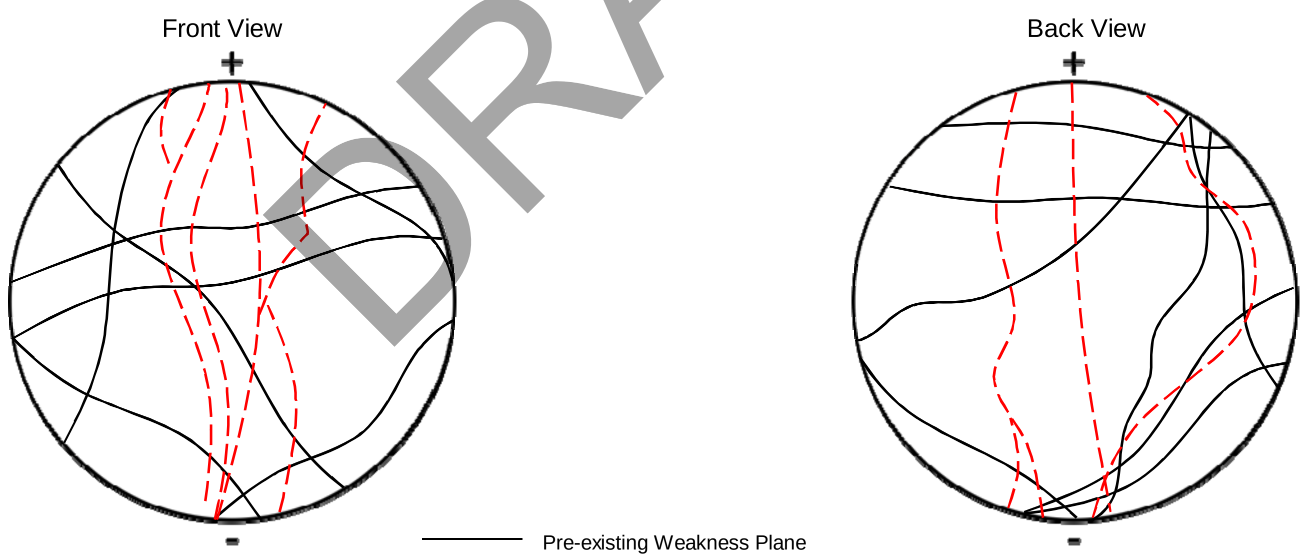
Mode of Failure :

Fracture	
Intact	XX
Both	

Test Data:	
Disp. Rate :	
Load Rate :	90 (lbs/sec)
Gage Reading :	11,730 (lbs)
Mode of Failure :	Intact

Rock Code:	

Worksheet



——— Pre-existing Weakness Plane

------- Post Failure Fracture

Dia. 1	2.411	Ht. 1	1.303
Dia. 2	2.409	Ht. 2	1.298
Dia. 3	2.408	Ht. 3	1.299
Dia. 4	2.410	Ht. 4	1.299
Dia. 5	2.419	Weight	270.050
Dia. 6	2.411	Sample #	**17508-GHP_GMX05-0221**

Fail Load 11,730 lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/8/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX06-0025**
		Sample # **17508-GHP_GMX06-0025**	Rock Type	Hornfels

T psi		
	3,142	psi
	21.67	Mpa

T= Indirect tensile strength

Sample Data :	
Sample # :	**17508-GHP_GMX06-0025**
Rock Type:	Hornfels
Hole # :	GHP_GMX06
Depth :	25.5 - 25.8
Alterations:	
Diameter :	2.416 (in)
Length:	1.301 (in)
Density:	178.47 (pcf)

T psi	3,142 (psi)
	21.7 Mpa

Test Data:	
Disp. Rate :	
Load Rate :	90 (lbs/sec)
Gage Reading :	15,500 (lbs)
Mode of Failure :	Intact

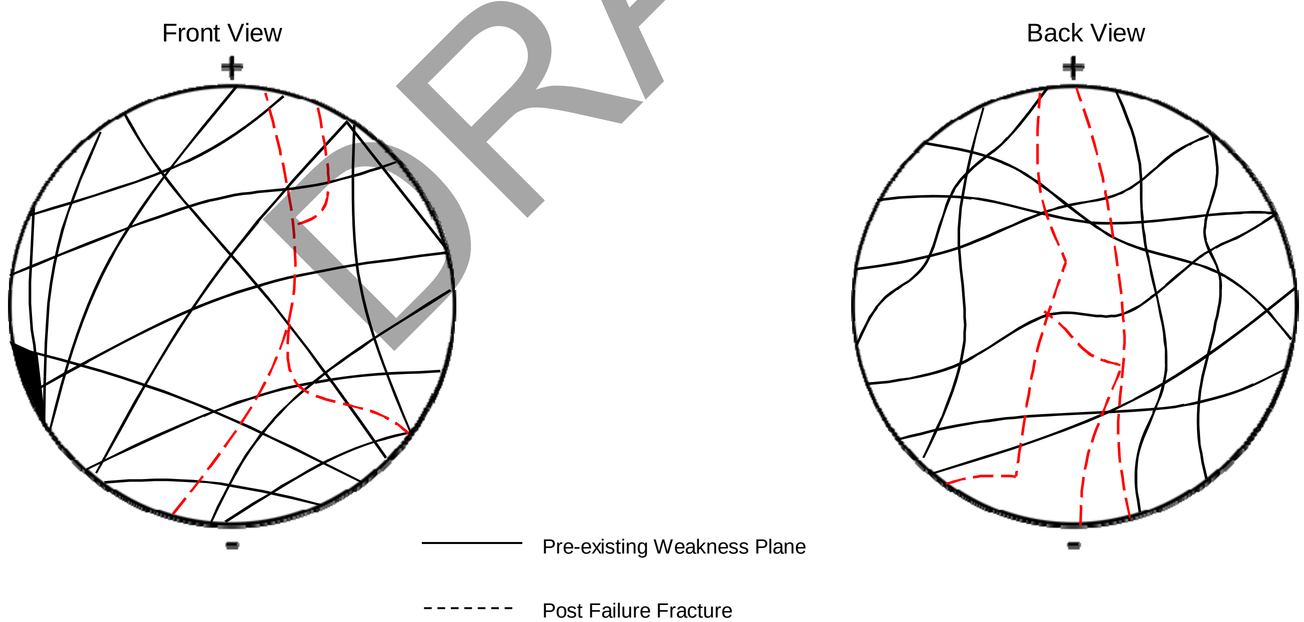
Mode of Failure :

Fracture	
Intact	XX
Both	

Rock Code:	

DRAFT

Worksheet



Dia. 1	2.415	Ht. 1	1.297
Dia. 2	2.417	Ht. 2	1.303
Dia. 3	2.416	Ht. 3	1.304
Dia. 4	2.414	Ht. 4	1.299
Dia. 5	2.419	Weight	279.370
Dia. 6	2.418	Sample #	**17508-GHP_GMX06-0025**

Fail Load 15,500 lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/9/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX06-0093**
		Sample # **17508-GHP_GMX06-0093**	Rock Type	Skarn

T psi **129** psi

0.89 Mpa

T psi	129 (psi)
	0.9 Mpa

T= Indirect tensile strength

Sample Data :	
Sample # :	**17508-GHP_GMX06-0093**
Rock Type:	Skarn
Hole # :	GHP_GMX06
Depth :	93.0 - 93.2
Alterations:	
Diameter :	2.343 (in)
Length:	1.245 (in)
Density:	181.50 (pcf)

Mode of Failure :

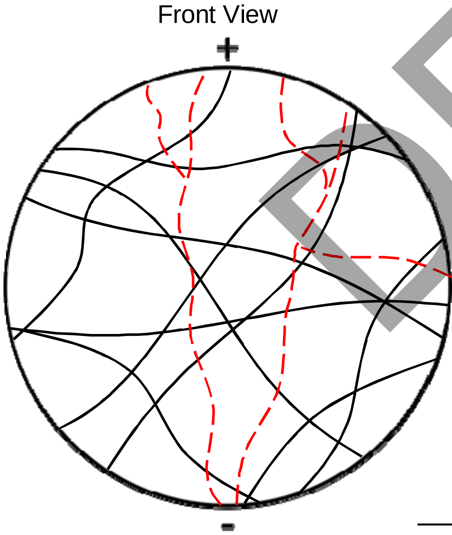
Fracture	
Intact	
Both	XX

Test Data:	
Disp. Rate :	
Load Rate :	84 (lbs/sec)
Gage Reading :	590 (lbs)
Mode of Failure :	Both

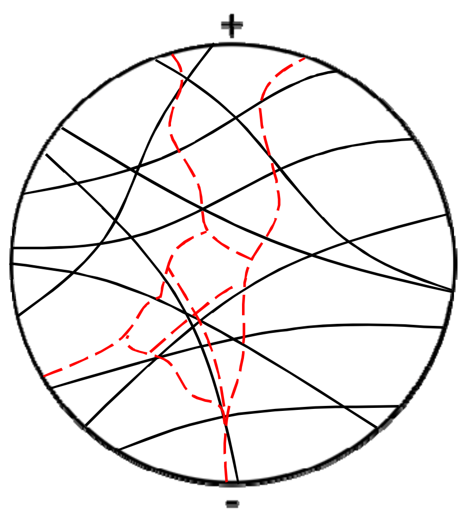
Rock Code:	

Worksheet

Front View



Back View



Pre-existing Weakness Plane

Post Failure Fracture

Dia. 1	2.337	Ht. 1	1.249
Dia. 2	2.345	Ht. 2	1.253
Dia. 3	2.350	Ht. 3	1.243
Dia. 4	2.341	Ht. 4	1.235
Dia. 5	2.331	Weight	255.670
Dia. 6	2.352	Sample #	**17508-GHP_GMX06-0093**

Fail Load	590	lbs Force

NOTES: Heavy sulfides, voids.

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Brazilian Disk Test Results

Project #	17508
Date	8/9/2017
Technician	EK

Client	Aura Minerals
Location	Aranzazu, Zacatecas Mexico
Sample #	**17508-GHP_GMX06-0136**
Rock Type	Intrusive

Sample # **17508-GHP_GMX06-0136**

T psi **1,823** psi
12.57 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX06-0136**
Rock Type:	Intrusive
Hole # :	GHP_GMX06
Depth :	136.5 - 136.7
Alterations:	
Diameter :	2.400 (in)
Length:	1.047 (in)
Density:	166.22 (pcf)

T= Indirect tensile strength

T psi	1,823 (psi)
	12.6 Mpa

Mode of Failure :

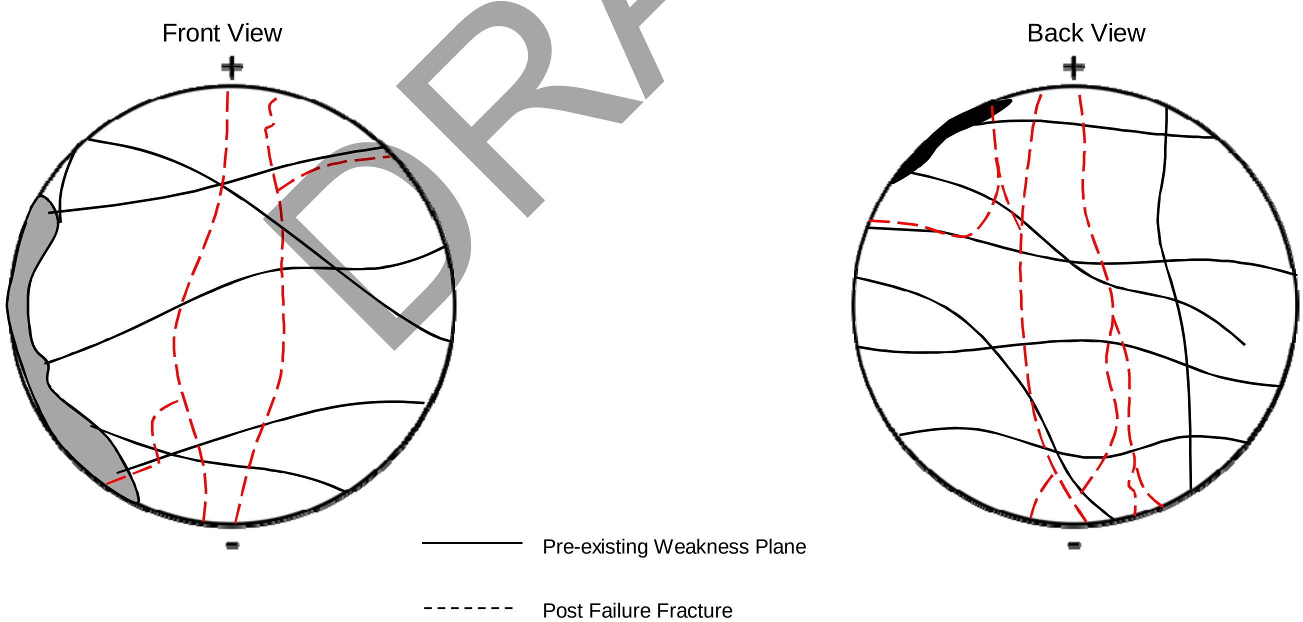
Fracture	
Intact	XX
Both	

Test Data:	
Disp. Rate :	
Load Rate :	72 (lbs/sec)
Gage Reading :	7,190 (lbs)
Mode of Failure :	Intact

Rock Code:	

DRAFT

Worksheet



Dia. 1	2.400	Ht. 1	1.035
Dia. 2	2.406	Ht. 2	1.051
Dia. 3	2.400	Ht. 3	1.063
Dia. 4	2.398	Ht. 4	1.040
Dia. 5	2.398	Weight	206.580
Dia. 6	2.398	Sample #	**17508-GHP_GMX06-0136**

Fail Load	7,190	lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Brazilian Disk Test Results

Project #	17508	Client	Aura Minerals
Date	8/9/2017	Location	Aranzazu, Zacatecas Mexico
Technician	EK	Sample #	17508-GHP_GMX07-0030
		Rock Type	Intrusive

Sample # **17508-GHP_GMX07-0030**

T psi **1,179** psi

8.13 Mpa

T= Indirect tensile strength

T psi	1,179 (psi)
	8.1 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX07-0030**
Rock Type:	Intrusive
Hole # :	GHP_GMX07
Depth :	30.0 - 30.5
Alterations:	
Diameter :	2.409 (in)
Length:	1.314 (in)
Density:	154.15 (pcf)

Rock Code:	

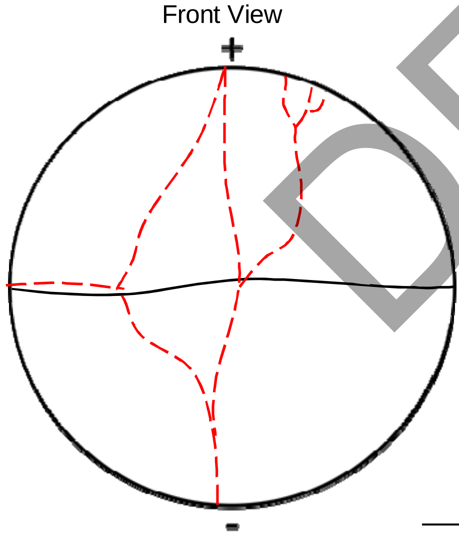
Mode of Failure :

Fracture	
Intact	
Both	XX

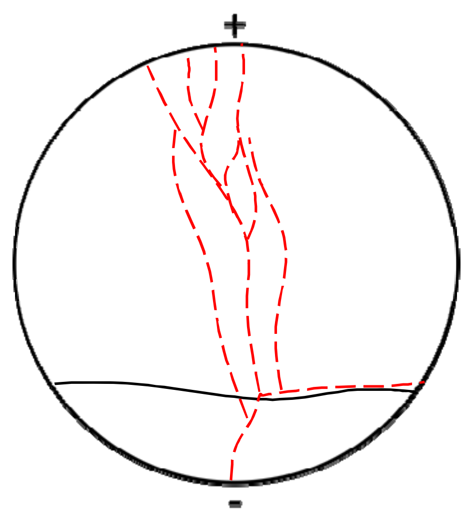
Test Data:	
Disp. Rate :	
Load Rate :	91 (lbs/sec)
Gage Reading :	5,860 (lbs)
Mode of Failure :	Both

Worksheet

Front View



Back View



Pre-existing Weakness Plane

Post Failure Fracture

Dia. 1	2.408	Ht. 1	1.311
Dia. 2	2.408	Ht. 2	1.308
Dia. 3	2.409	Ht. 3	1.328
Dia. 4	2.409	Ht. 4	1.309
Dia. 5	2.409	Weight	242.260
Dia. 6	2.412	Sample #	**17508-GHP_GMX07-0030**

Fail Load 5,860 lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Brazilian Disk Test Results

Project #	17508	Client	Aura Minerals
Date	8/9/2017	Location	Aranzazu, Zacatecas Mexico
Technician	EK	Sample #	**17508-GHP_GMX07-0032**
		Rock Type	Intrusive

Sample # **17508-GHP_GMX07-0032**

T psi		
865	psi	
5.96	Mpa	

T psi	865 (psi)
	6.0 Mpa

T= Indirect tensile strength

Sample Data :	
Sample # :	**17508-GHP_GMX07-0032**
Rock Type:	Intrusive
Hole # :	GHP_GMX07
Depth :	32.2 - 32.6
Alterations:	
Diameter :	2.410 (in)
Length:	1.290 (in)
Density:	149.80 (pcf)

Test Data:	
Disp. Rate :	
Load Rate :	89 (lbs/sec)
Gage Reading :	4,220 (lbs)
Mode of Failure :	Both

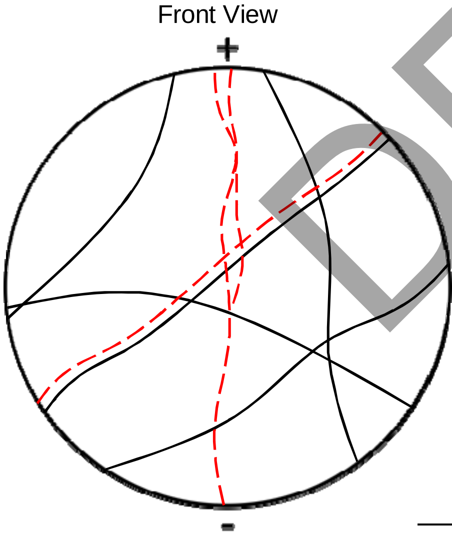
Mode of Failure :

Fracture	
Intact	
Both	XX

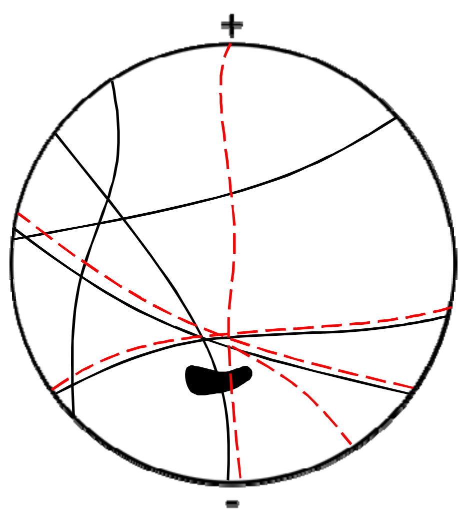
Rock Code:	

Worksheet

Front View



Back View



Pre-existing Weakness Plane

Post Failure Fracture

Dia. 1	2.407	Ht. 1	1.294
Dia. 2	2.417	Ht. 2	1.288
Dia. 3	2.413	Ht. 3	1.288
Dia. 4	2.405	Ht. 4	1.292
Dia. 5	2.404	Weight	231.390
Dia. 6	2.414	Sample #	**17508-GHP_GMX07-0032**

Fail Load	4,220	lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/9/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX07-0090**
		Sample # **17508-GHP_GMX07-0090**	Rock Type	Hornfels

T psi	**950**	psi
	6.55	Mpa

T= Indirect tensile strength

T psi	950 (psi)
	6.6 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX07-0090**
Rock Type:	Hornfels
Hole # :	GHP_GMX07
Depth :	90.8 - 91.0
Alterations:	
Diameter :	2.407 (in)
Length:	1.231 (in)
Density:	162.19 (pcf)

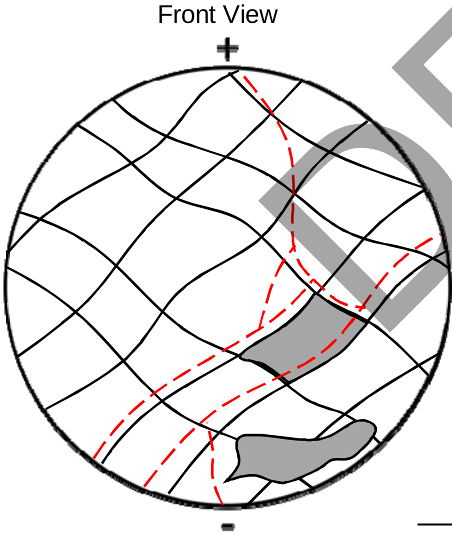
Rock Code:	

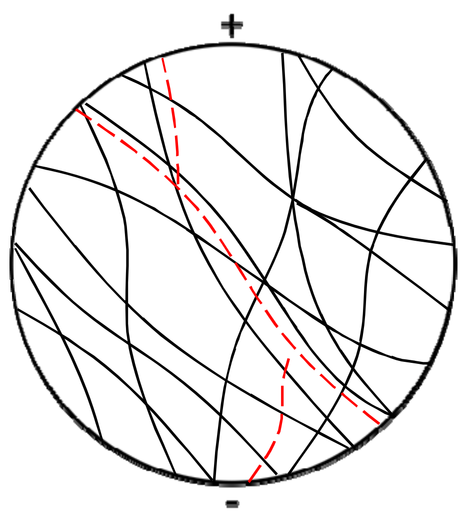
Mode of Failure :

Fracture	XX
Intact	
Both	

Test Data:	
Disp. Rate :	
Load Rate :	85 (lbs/sec)
Gage Reading :	4,420 (lbs)
Mode of Failure :	Fracture

Worksheet





Pre-existing Weakness Plane

Post Failure Fracture

Dia. 1	2.410	Ht. 1	1.226
Dia. 2	2.406	Ht. 2	1.235
Dia. 3	2.404	Ht. 3	1.241
Dia. 4	2.414	Ht. 4	1.225
Dia. 5	2.410	Weight	238.600
Dia. 6	2.402	Sample #	**17508-GHP_GMX07-0090**

Fail Load	4,420	lbs Force

NOTES: Shallow gouges on front side

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/9/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX07-0128**
		Sample # **17508-GHP_GMX07-0128**	Rock Type	Marble

T psi **482** psi

3.32 Mpa

T psi	482 (psi)
	3.3 Mpa

T= Indirect tensile strength

Sample Data :	
Sample # :	**17508-GHP_GMX07-0128**
Rock Type:	Marble
Hole # :	GHP_GMX07
Depth :	128.1 - 128.3
Alterations:	
Diameter :	2.407 (in)
Length:	1.291 (in)
Density:	163.55 (pcf)

Mode of Failure :

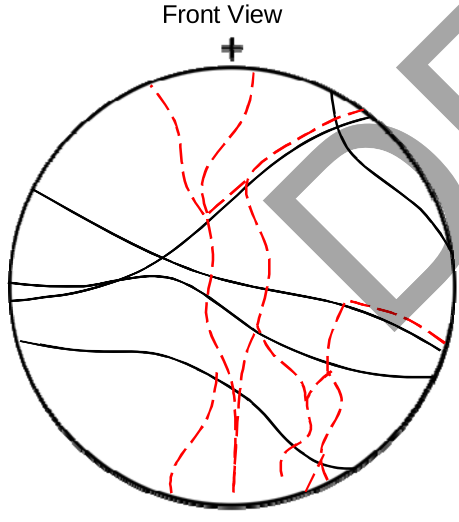
Fracture	
Intact	
Both	XX

Test Data:	
Disp. Rate :	
Load Rate :	89 (lbs/sec)
Gage Reading :	2,350 (lbs)
Mode of Failure :	Both

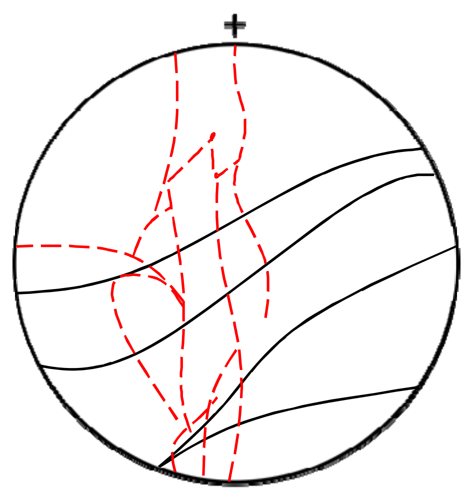
Rock Code:	

Worksheet

Front View



Back View



——— Pre-existing Weakness Plane

- - - - - - - Post Failure Fracture

Dia. 1	2.410	Ht. 1	1.292
Dia. 2	2.411	Ht. 2	1.287
Dia. 3	2.407	Ht. 3	1.294
Dia. 4	2.404	Ht. 4	1.291
Dia. 5	2.406	Weight	252.160
Dia. 6	2.407	Sample #	**17508-GHP_GMX07-0128**

Fail Load	2,350	lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/9/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX07-0148**
		Sample # **17508-GHP_GMX07-0148**	Rock Type	Marble

T psi

633	psi
4.37	Mpa

T psi	633 (psi)
	4.4 Mpa

T= Indirect tensile strength

Sample Data :	
Sample # :	**17508-GHP_GMX07-0148**
Rock Type:	Marble
Hole # :	GHP_GMX07
Depth :	148.3 - 148.5
Alterations:	
Diameter :	2.407 (in)
Length:	1.321 (in)
Density:	168.04 (pcf)

Test Data:	
Disp. Rate :	
Load Rate :	91 (lbs/sec)
Gage Reading :	3,160 (lbs)
Mode of Failure :	Both

Mode of Failure :

Fracture	
Intact	
Both	XX

Rock Code:	

Worksheet

Dia. 1	2.406	Ht. 1	1.321
Dia. 2	2.409	Ht. 2	1.318
Dia. 3	2.409	Ht. 3	1.322
Dia. 4	2.403	Ht. 4	1.323
Dia. 5	2.403	Weight	265.020
Dia. 6	2.410	Sample #	**17508-GHP_GMX07-0148**

Fail Load	3,160	lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Brazilian Disk Test Results

Project #	17508
Date	8/9/2017
Technician	EK

Client	Aura Minerals
Location	Aranzazu, Zacatecas Mexico
Sample #	**17508-GHP_GMX07-0160**
Rock Type	Skarn

Sample # **17508-GHP_GMX07-0160**

T psi	**919**	psi
	6.34	Mpa

T= Indirect tensile strength

T psi	919 (psi)
	6.3 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX07-0160**
Rock Type:	Skarn
Hole # :	GHP_GMX07
Depth :	160.6 - 160.8
Alterations:	
Diameter :	2.411 (in)
Length:	1.274 (in)
Density:	199.13 (pcf)

Rock Code:	

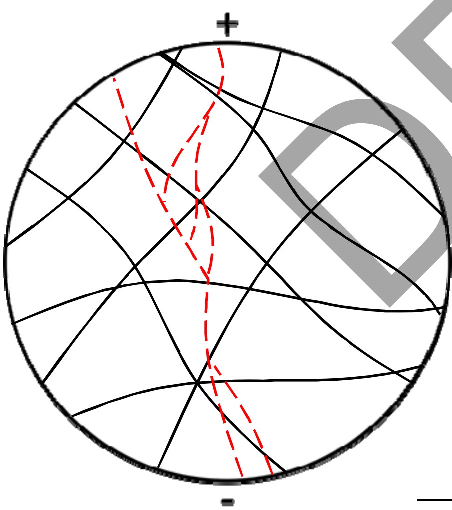
Mode of Failure :

Fracture	
Intact	
Both	XX

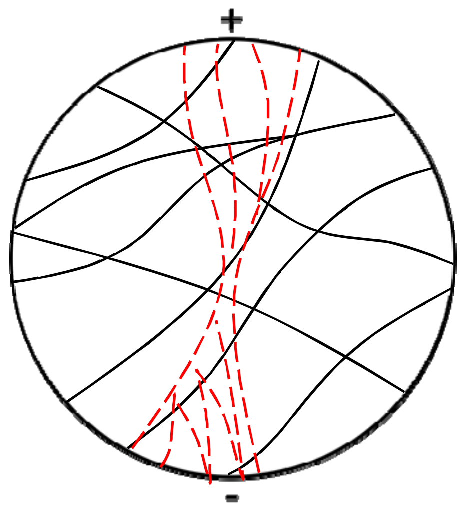
Test Data:	
Disp. Rate :	
Load Rate :	88 (lbs/sec)
Gage Reading :	4,430 (lbs)
Mode of Failure :	Both

Worksheet

Front View



Back View



——— Pre-existing Weakness Plane

- - - - - - - Post Failure Fracture

Dia. 1	2.408	Ht. 1	1.275
Dia. 2	2.411	Ht. 2	1.281
Dia. 3	2.413	Ht. 3	1.270
Dia. 4	2.410	Ht. 4	1.271
Dia. 5	2.412	Weight	303.960
Dia. 6	2.412	Sample #	**17508-GHP_GMX07-0160**

Fail Load	4,430	lbs Force

NOTES:

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Brazilian Disk Test Results

Project #	17508
Date	8/9/2017
Technician	EK

Client	Aura Minerals
Location	Aranzazu, Zacatecas Mexico
Sample #	**17508-GHP_GMX07-0167**
Rock Type	Skarn

Sample # **17508-GHP_GMX07-0167**

T psi **122** psi

0.84 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX07-0167**
Rock Type:	Skarn
Hole # :	GHP_GMX07
Depth :	167.3 - 167.5
Alterations:	
Diameter :	2.398 (in)
Length:	1.267 (in)
Density:	150.94 (pcf)

T= Indirect tensile strength

T psi	122 (psi)
	0.8 Mpa

Test Data:	
Disp. Rate :	
Load Rate :	87 (lbs/sec)
Gage Reading :	580 (lbs)
Mode of Failure :	Both

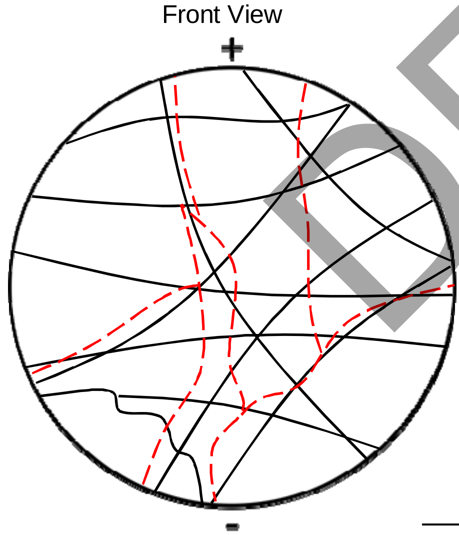
Mode of Failure :

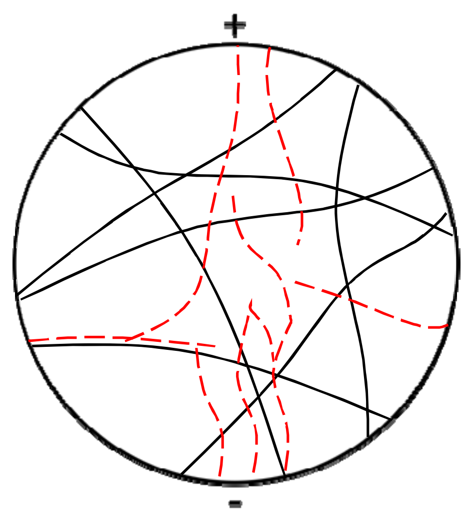
Fracture	
Intact	
Both	XX

Rock Code:	

DRAFT

Worksheet





——— Pre-existing Weakness Plane

- - - - - - - Post Failure Fracture

Dia. 1	2.406	Ht. 1	1.273
Dia. 2	2.404	Ht. 2	1.259
Dia. 3	2.388	Ht. 3	1.269
Dia. 4	2.404	Ht. 4	1.267
Dia. 5	2.406	Weight	226.580
Dia. 6	2.379	Sample #	**17508-GHP_GMX07-0167**

Fail Load 580 lbs Force

NOTES: Heavy sulfides, voids.

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**Brazilian Disk Test Results**	Client	Aura Minerals
Date	8/9/2017		Location	Aranzazu, Zacatecas Mexico
Technician	EK		Sample #	**17508-GHP_GMX07-0189**
		Sample # **17508-GHP_GMX07-0189**	Rock Type	Intrusive

T psi **1,923** psi

13.26 Mpa

Sample Data :	
Sample # :	**17508-GHP_GMX07-0189**
Rock Type:	Intrusive
Hole # :	GHP_GMX07
Depth :	189.3 - 189.6
Alterations:	
Diameter :	2.416 (in)
Length:	1.208 (in)
Density:	163.22 (pcf)

T= Indirect tensile strength

T psi	1,923 (psi)
	13.3 Mpa

Mode of Failure :

Fracture	
Intact	XX
Both	

Test Data:	
Disp. Rate :	
Load Rate :	84 (lbs/sec)
Gage Reading :	8,810 (lbs)
Mode of Failure :	Intact

Rock Code:	

Worksheet

Dia. 1	2.423	Ht. 1	1.207
Dia. 2	2.411	Ht. 2	1.209
Dia. 3	2.412	Ht. 3	1.214
Dia. 4	2.416	Ht. 4	1.203
Dia. 5	2.418	Weight	237.170
Dia. 6	2.415	Sample #	**17508-GHP_GMX07-0189**

Fail Load 8,810 lbs Force

NOTES:

SMALL-SCALE DIRECT SHEAR TEST RESULTS

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/04/17	Area & Load Data for SSDS	*Project #*	17508
Technician	ES		*Client*	Aura Minerals

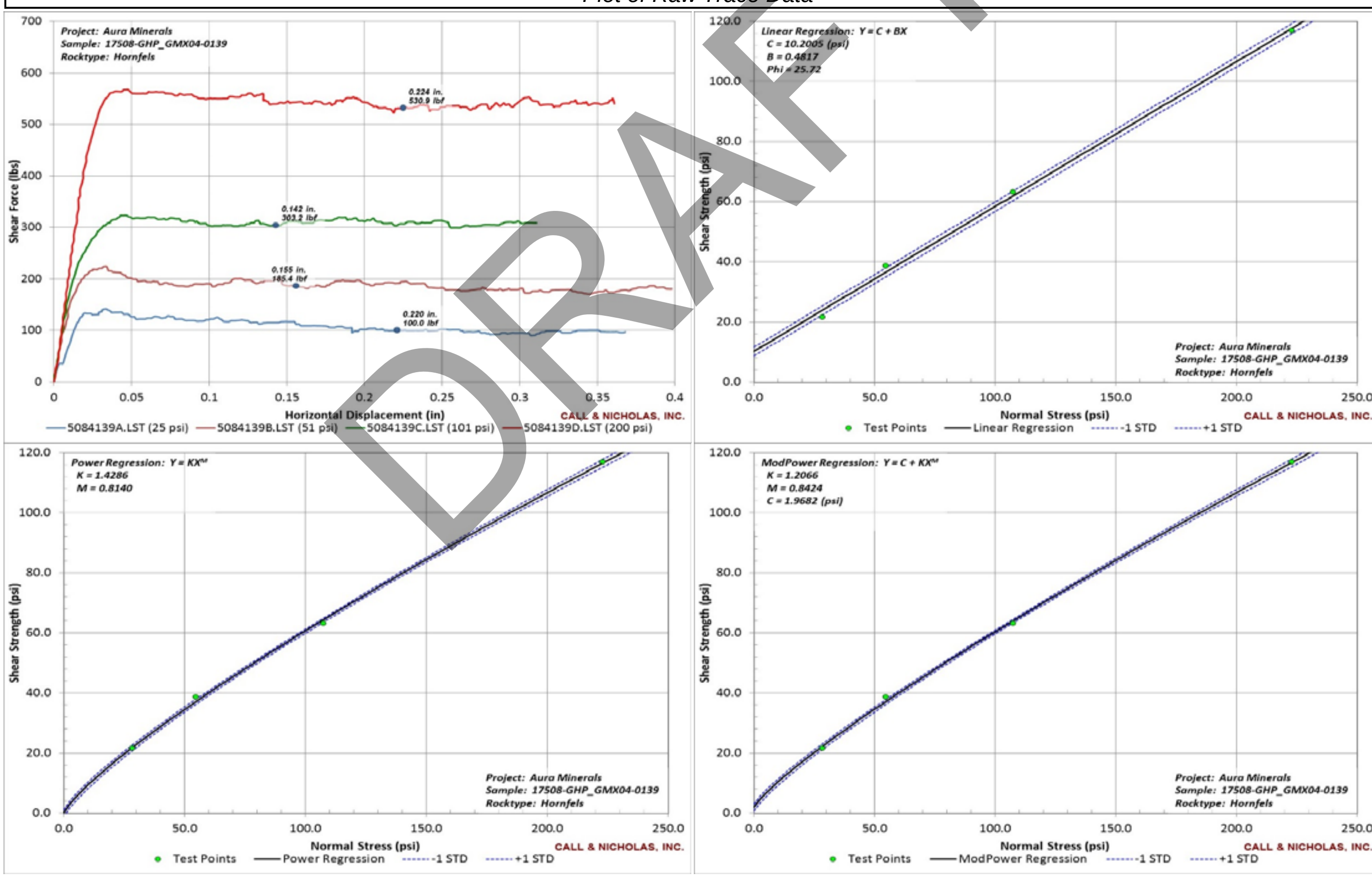
Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX04-0139**	
Rock Type	Hornfels	
Drill Hole	GHP_GMX04	
Depth	139.8 - 140.0	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	*in/min*
Area	5.49	*in*^{2}
Diameter	2.644	*in*
Radius	1.322	*in*
Tilt Correction	1.78	*deg*
Plane Filling		

Adjusted Trace Data				
Normal Load (lbs)	*Shear Load (lbs)*	*Shear Area (in^2)*	*Normal Stress (psi)*	*Shear Stress (psi)*
137.8	104.2	4.8	28.5	21.5
275.2	193.9	5.0	54.7	38.5
545.2	320.0	5.1	107.5	63.1
1076.1	564.1	4.8	223.0	116.9

Pre Test Moisture	NA	*%*
Post Test Moisture	NA	*%*
Density	NA	*pcf*

Results		
Linear: Y = BX + C		
Friction Angle	25.72	*deg*
Cohesion	10.20	*psi*
Power: Y = KX^M		
K	1.4286	*(for X in psi)*
M	0.8140	
Modified Power: Y = KX^M + C		
K	1.2066	*(for X in psi)*
M	0.8424	
C	1.9682	*psi*

Plot of Raw Trace Data



Notes :

JRC = 6-10. Very well mated and very well locked. Sample surface is a thick, hard, well-attached material that looks like re-consolidated pulverized-parent-rock.

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/07/17	Area & Load Data for SSDS	Project #	17508
Technician	ES		Client	Aura Minerals

Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX04-0154**	
Rock Type	Hornfels	
Drill Hole	GHP_GMX04	
Depth	154.1 - 154.3	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	in/min
Area	5.48	in^2
Diameter	2.642	in
Radius	1.321	in
Tilt Correction		deg
Plane Filling		

Adjusted Trace Data				
Normal Load (lbs)	Shear Load (lbs)	Shear Area (in^2)	Normal Stress (psi)	Shear Stress (psi)
143.8	101.8	5.0	28.5	20.2
279.9	170.7	5.2	53.8	32.8
552.8	274.5	4.9	113.8	56.5
1101.2	537.5	5.0	222.0	108.4

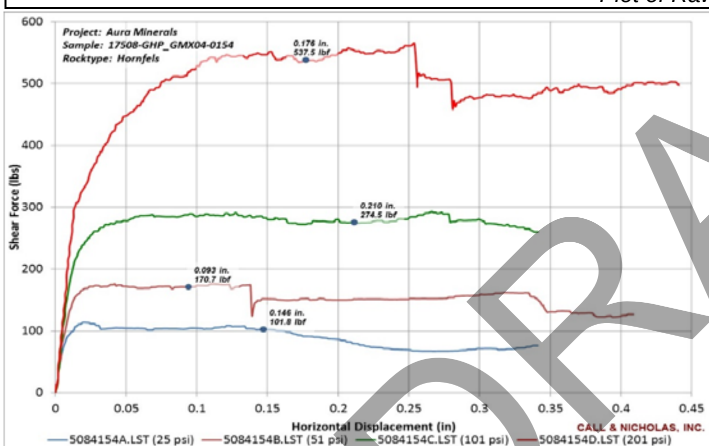
Pre Test Moisture	NA	%
Post Test Moisture	NA	%
Density	NA	pcf

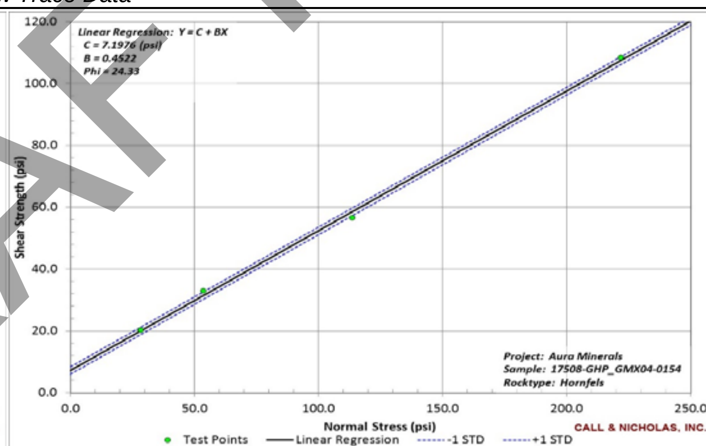
Results		
Linear: $Y = BX + C$		
Friction Angle	24.33	deg
Cohesion	7.20	psi

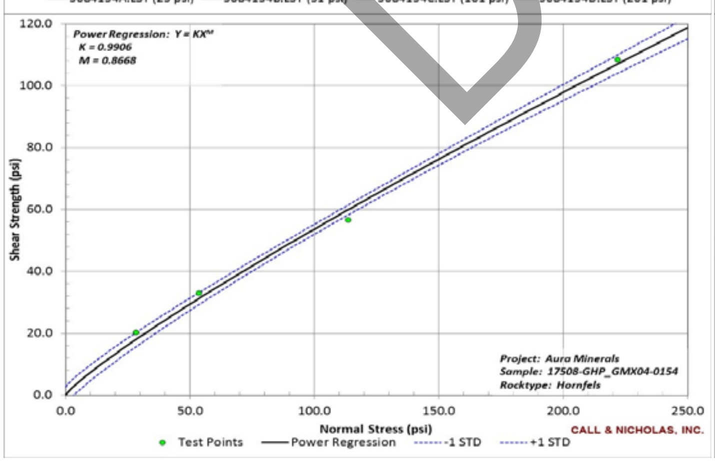
Power: $Y = KX^M$		
K	0.9906	(for X in psi)
M	0.8668	

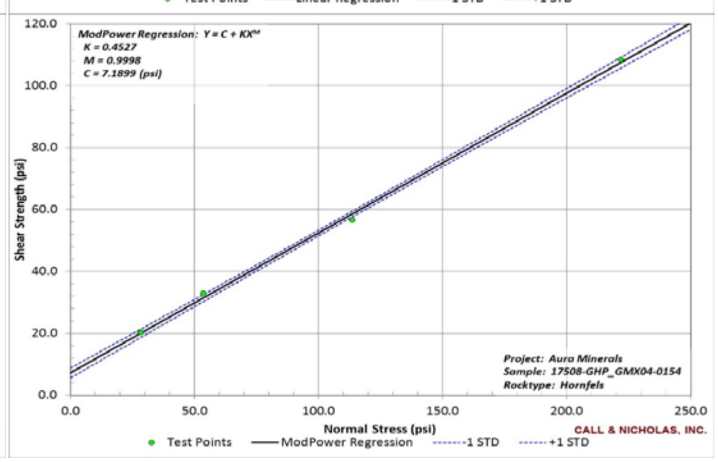
Modified Power: $Y = KX^M + C$		
K	0.4527	(for X in psi)
M	0.9998	
C	7.1899	psi

Plot of Raw Trace Data









Notes :

JRC = 6-10. Very well mated and very well locked. Sample surface filling is thin, hard, well-attached, olive-green material.

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/08/17	Area & Load Data for SSDS	Project #	17508
Technician	ES		Client	Aura Minerals

Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX06-0030**	
Rock Type	Hornfels	
Drill Hole	GHP_GMX06	
Depth	30.2 - 30.4	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	in/min
Area	5.23	in^2
Diameter	2.580	in
Radius	1.290	in
Tilt Correction	-0.32	deg
Plane Filling		

Adjusted Trace Data				
Normal Load (lbs)	Shear Load (lbs)	Shear Area (in^2)	Normal Stress (psi)	Shear Stress (psi)
139.6	77.1	4.4	32.0	17.7
267.9	144.6	4.4	61.0	32.9
532.8	252.7	4.8	111.7	53.0
1058.6	486.1	4.3	244.5	112.3

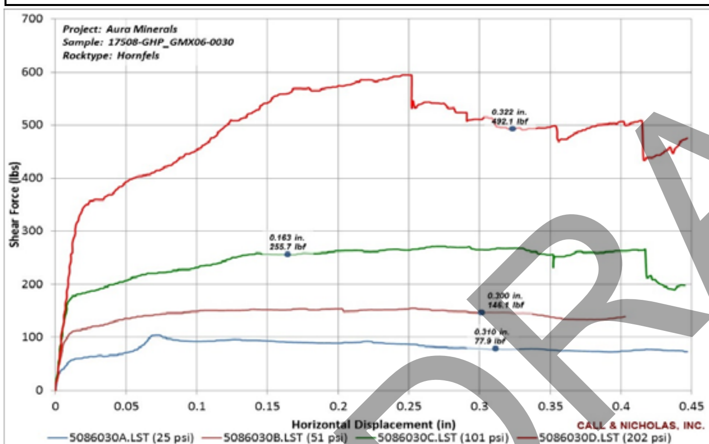
Pre Test Moisture	NA	%
Post Test Moisture	NA	%
Density	NA	pcf

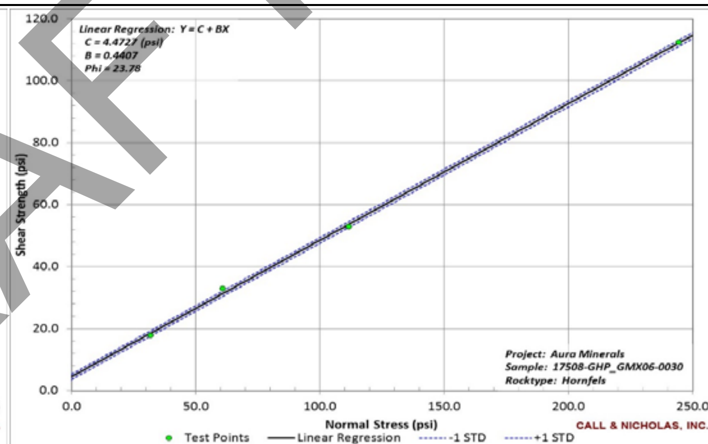
Results		
Linear: Y = BX + C		
Friction Angle	23.78	deg
Cohesion	4.47	psi

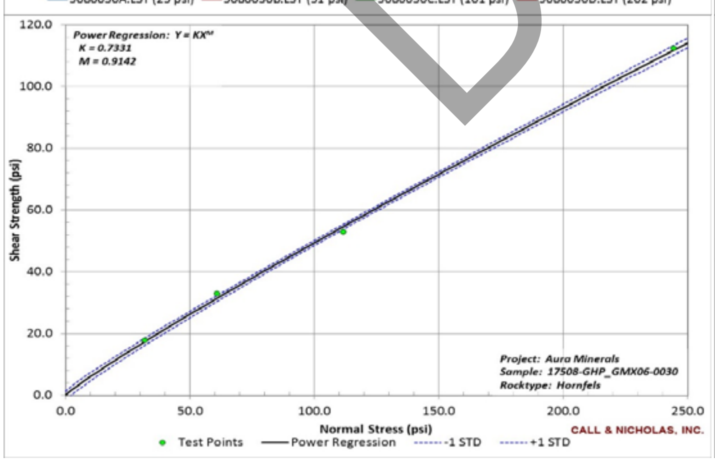
Power: $Y = KX^M$		
K	0.7331	(for X in psi)
M	0.9142	

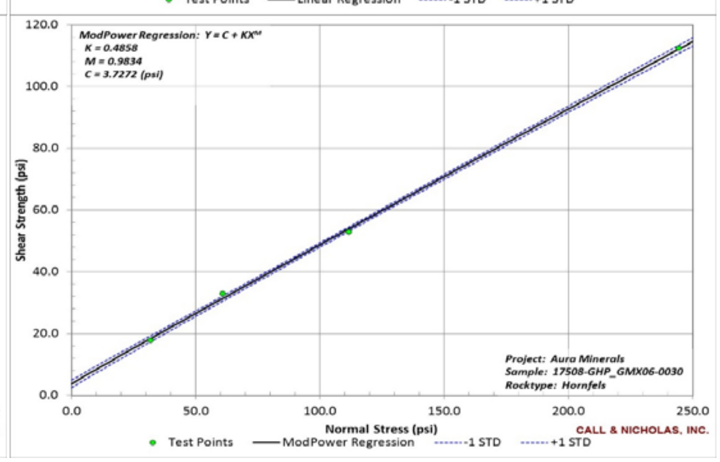
Modified Power: $Y = KX^M + C$		
K	0.4858	(for X in psi)
M	0.9834	
C	3.7272	psi

Plot of Raw Trace Data









Notes :

JRC = 8-12. Well mated and moderately locked. **Sample is U shaped.** Sample surface filling is a thin, flakey, somewhat-fragile, olive-green layer.

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/07/17	Area & Load Data for SSDS	*Project #*	17508
Technician	ES		*Client*	Aura Minerals

Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX07-0044**	
Rock Type	Hornfels	
Drill Hole	GHP_GMX07	
Depth	44.6 - 45.0	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	*in/min*
Area	6.25	*in^2*
Diameter	2.822	*in*
Radius	1.411	*in*
Tilt Correction	0.43	*deg*
Plane Filling		

Adjusted Trace Data				
Normal Load (lbs)	*Shear Load (lbs)*	*Shear Area (in^2)*	*Normal Stress (psi)*	*Shear Stress (psi)*
153.9	60.1	5.8	26.3	10.3
309.8	111.4	5.9	52.5	18.9
621.0	198.5	5.9	106.0	33.9
1249.7	327.4	5.9	212.1	55.6

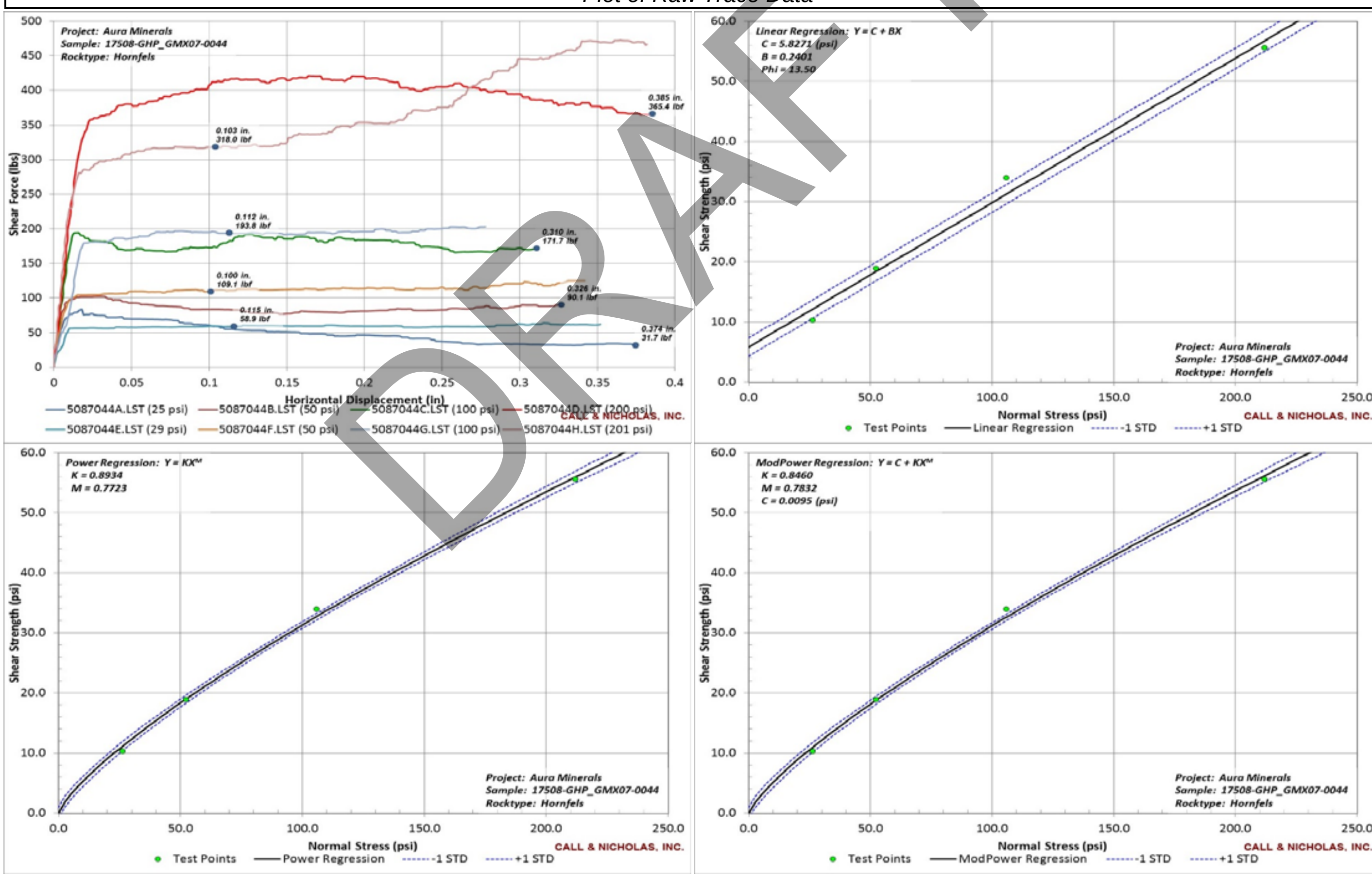
Pre Test Moisture	NA	*%*
Post Test Moisture	NA	*%*
Density	NA	*pcf*

Results		
Linear: Y = BX + C		
Friction Angle	13.50	*deg*
Cohesion	5.83	*psi*

Power: $Y = KX^M$		
K	0.8934	*(for X in psi)*
M	0.7723	

Modified Power: $Y = KX^M + C$		
K	0.8460	*(for X in psi)*
M	0.7832	
C	0.0095	*psi*

Plot of Raw Trace Data



Notes :

JRC = 0-4. Moderately mated and not locked. Sample surface is mostly clean with a partial (10%) filling of thin, white, hard, poorly-attached material. Filling detached, crumbled and was lost from shear plane over traces A & B. Reran sample at 25, 50, & 100 psi without filling (2 days after initial test).

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/07/17	Area & Load Data for SSDS	Project #	17508
Technician	ES		Client	Aura Minerals

Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX07-0091**	
Rock Type	Hornfels	
Drill Hole	GHP_GMX07	
Depth	91.8 - 92.0	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	in/min
Area	5.09	in^2
Diameter	2.545	in
Radius	1.272	in
Tilt Correction	0.66	deg
Plane Filling		

Adjusted Trace Data				
Normal Load (lbs)	Shear Load (lbs)	Shear Area (in^2)	Normal Stress (psi)	Shear Stress (psi)
135.2	82.2	4.4	30.5	18.5
506.6	266.0	4.7	107.5	56.5
259.2	165.0	4.7	55.0	35.0
1008.3	412.4	4.6	220.8	90.3

Pre Test Moisture	NA	%
Post Test Moisture	NA	%
Density	NA	pcf

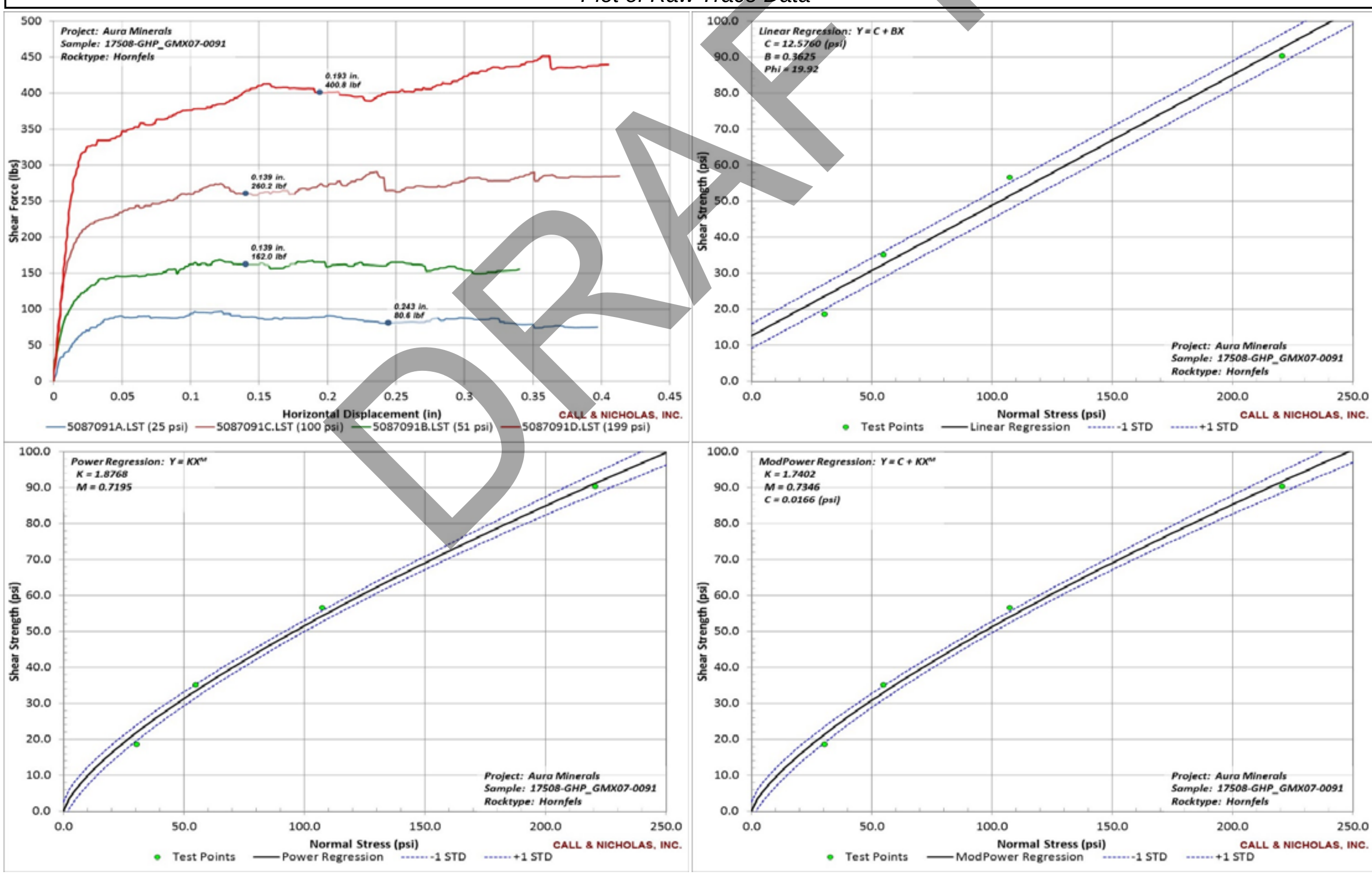
Results		
Linear: $Y = BX + C$		
Friction Angle	19.92	deg
Cohesion	12.58	psi

Power: $Y = KX^M$		
K	1.8768	(for X in psi)
M	0.7195	

Modified Power: $Y = KX^M + C$		
K	1.7402	(for X in psi)
M	0.7346	
C	0.0166	psi

DRAFT

Plot of Raw Trace Data



Notes :

JRC = 10-14. Poorly mated and not locked. **Sample does not mate at all.** Sample surface is a thick layer of very-fragile, powderized, unconsolidated material. Much was lost during shipping/prep.

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/07/17	Area & Load Data for SSDS	*Project #*	17508
Technician	ES		*Client*	Aura Minerals

Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX07-0096**	
Rock Type	Hornfels	
Drill Hole	GHP_GMX07	
Depth	96.5 - 96.7	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	*in/min*
Area	6.61	*in^2*
Diameter	2.901	*in*
Radius	1.451	*in*
Tilt Correction	0.30	*deg*
Plane Filling		

Adjusted Trace Data				
Normal Load (lbs)	*Shear Load (lbs)*	*Shear Area (in^2)*	*Normal Stress (psi)*	*Shear Stress (psi)*
170.2	119.6	5.7	30.0	21.1
336.8	233.5	5.6	59.8	41.5
664.8	430.3	5.6	118.9	76.9
1323.6	834.1	6.2	214.4	135.1

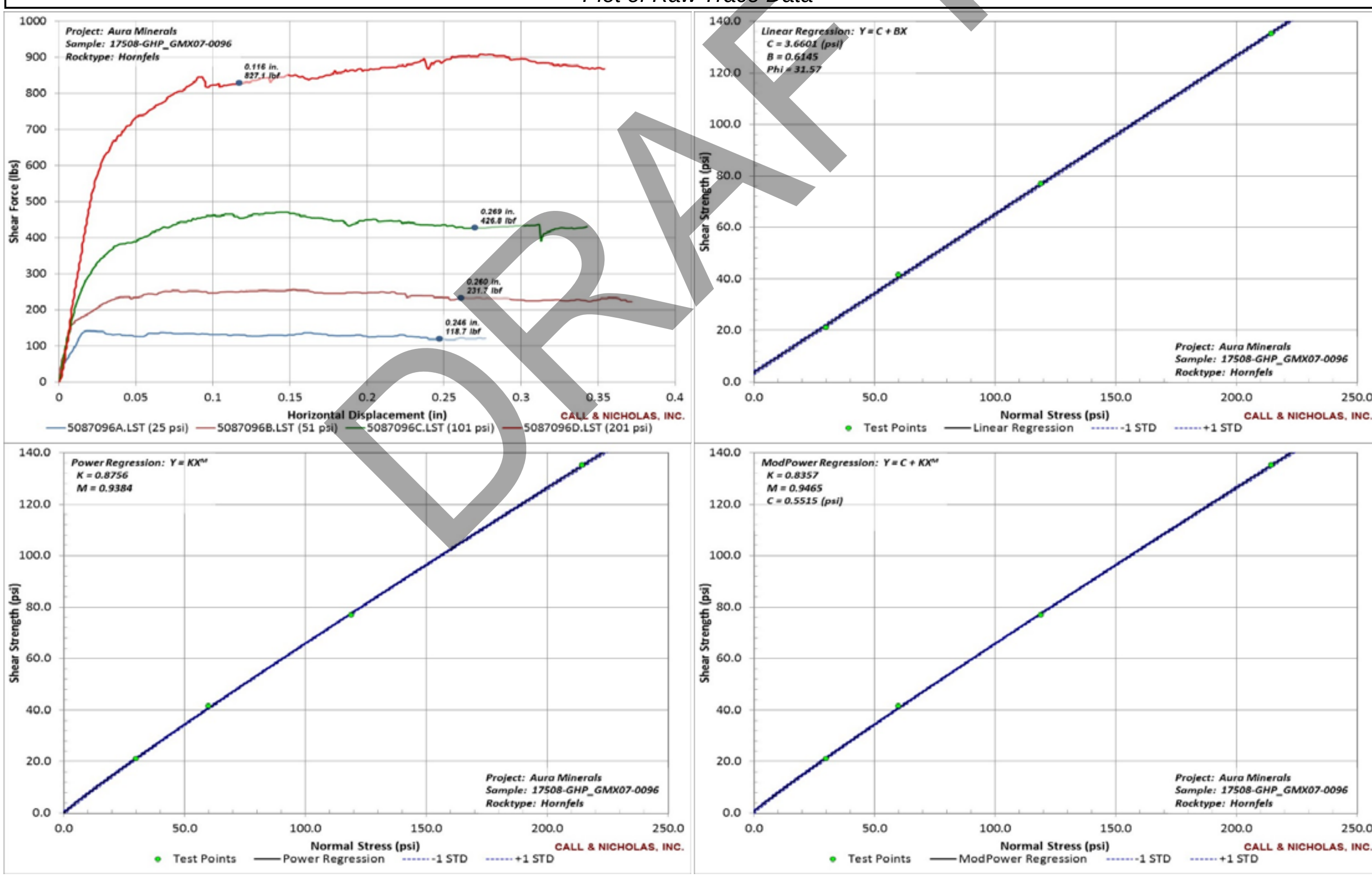
Pre Test Moisture	NA	*%*
Post Test Moisture	NA	*%*
Density	NA	*pcf*

Results		
Linear: Y = BX + C		
Friction Angle	31.57	*deg*
Cohesion	3.66	*psi*

Power: $Y = KX^M$		
K	0.8756	*(for X in psi)*
M	0.9384	

Modified Power: $Y = KX^M + C$		
K	0.8357	*(for X in psi)*
M	0.9465	
C	0.5515	*psi*

Plot of Raw Trace Data



Notes :

JRC = 16-20. Very well mated and very well locked. Sample surface has a thin, fragile, hard, moderately-attached, yellow/white filling material. Some was lost in shipping/prep.

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/03/17	Area & Load Data for SSDS	*Project #*	17508
Technician	ES		*Client*	Aura Minerals

Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX01-0055**	
Rock Type	Intrusive	
Drill Hole	GHP_GMX01	
Depth	55.0 - 55.4	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	*in/min*
Area	5.42	*in²*
Diameter	2.628	*in*
Radius	1.314	*in*
Tilt Correction	0.20	*deg*
Plane Filling		

Adjusted Trace Data				
Normal Load (lbs)	*Shear Load (lbs)*	*Shear Area (in^2)*	*Normal Stress (psi)*	*Shear Stress (psi)*
144.6	104.0	4.7	30.5	21.9
276.4	199.2	4.8	57.0	41.1
551.5	367.9	4.8	114.9	76.6
1092.4	677.7	4.7	234.7	145.6

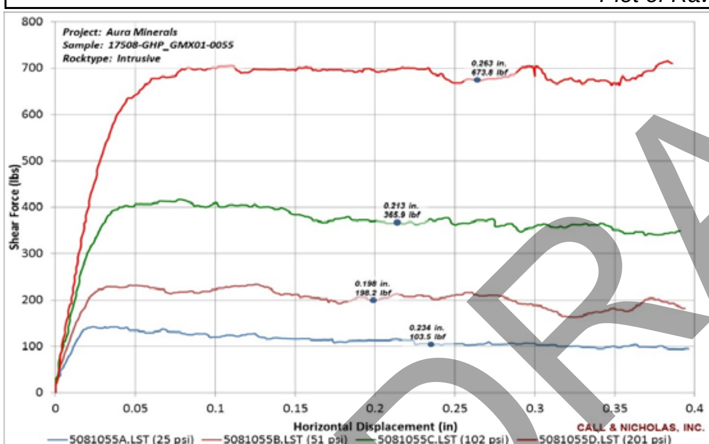
Pre Test Moisture	NA	*%*
Post Test Moisture	NA	*%*
Density	NA	*pcf*

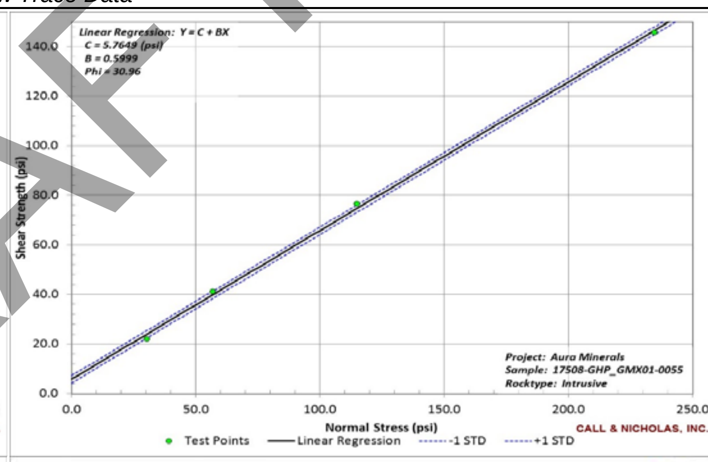
Results		
Linear: Y = BX + C		
Friction Angle	30.96	*deg*
Cohesion	5.76	*psi*

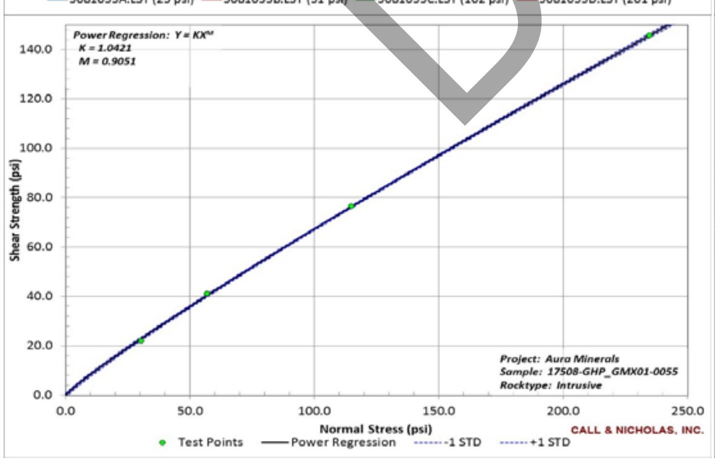
Power: $Y = KX^M$		
K	1.0421	*(for X in psi)*
M	0.9051	

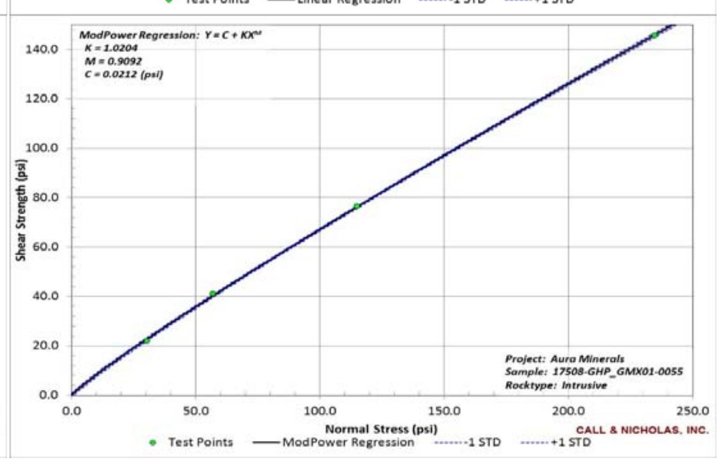
Modified Power: $Y = KX^M + C$		
K	1.0204	*(for X in psi)*
M	0.9092	
C	0.0212	*psi*

Plot of Raw Trace Data









Notes :

JRC = 4-8. Well mated and well locked. Sample surface filling is a trace of white, soft, moderately-attached powder.

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/04/17	Area & Load Data for SSDS	Project #	17508
Technician	ES		Client	Aura Minerals

Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX02-0233**	
Rock Type	Intrusive	
Drill Hole	GHP_GMX02	
Depth	233.3 - 233.9	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	*in/min*
Area	6.28	*in^2*
Diameter	2.828	*in*
Radius	1.414	*in*
Tilt Correction	0.47	*deg*
Plane Filling		

Adjusted Trace Data				
Normal Load (lbs)	*Shear Load (lbs)*	*Shear Area (in^2)*	*Normal Stress (psi)*	*Shear Stress (psi)*
163.4	105.5	5.5	29.5	19.0
319.4	191.7	5.6	57.2	34.3
634.7	351.5	5.7	111.0	61.5
1260.3	681.1	5.6	223.4	120.7

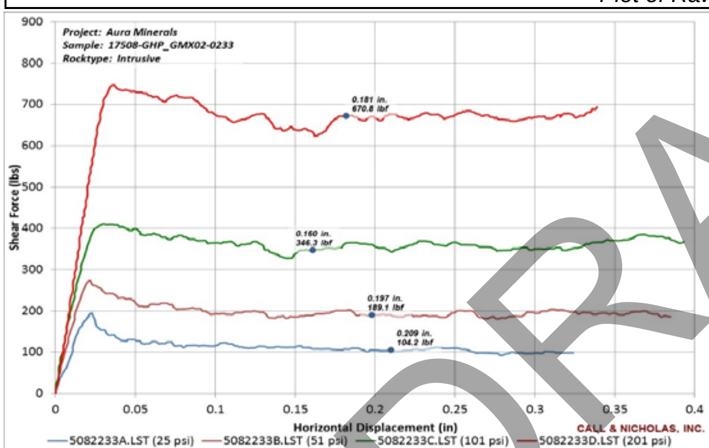
Pre Test Moisture	NA	*%*
Post Test Moisture	NA	*%*
Density	NA	*pcf*

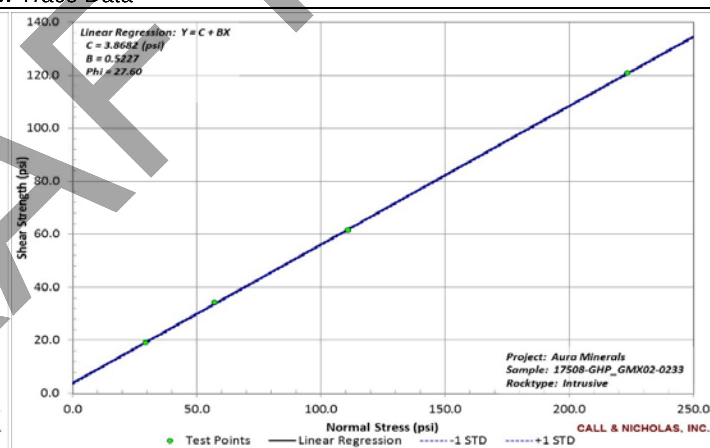
Results		
Linear: Y = BX + C		
Friction Angle	27.60	*deg*
Cohesion	3.87	*psi*

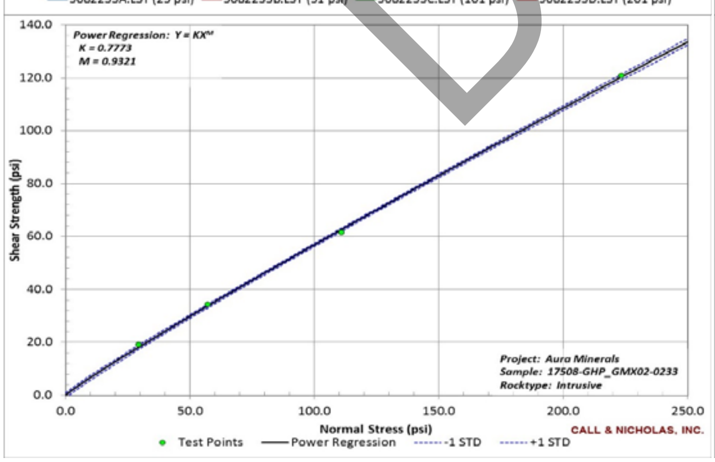
Power: $Y = KX^M$		
K	0.7773	*(for X in psi)*
M	0.9321	

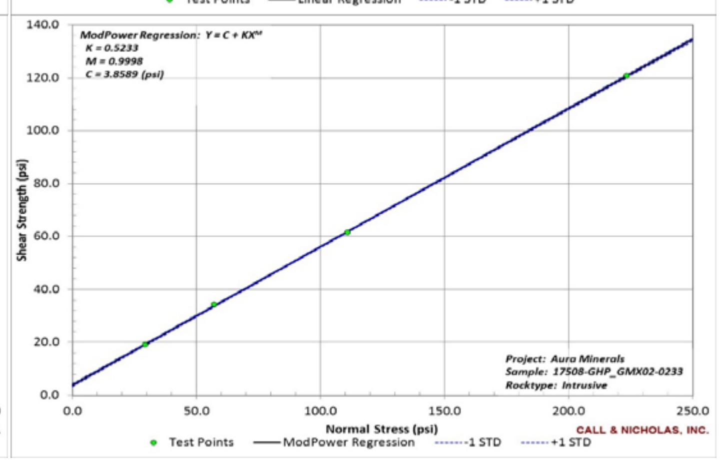
Modified Power: $Y = KX^M + C$		
K	0.5233	*(for X in psi)*
M	0.9998	
C	3.8589	*psi*

Plot of Raw Trace Data









Notes :

JRC = 4-8. Very well mated and very well locked. Sample surface filling is a trace of light-green, moderately-attached, powdery material.

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/04/17	Area & Load Data for SSDS	*Project #*	17508
Technician	ES		*Client*	Aura Minerals

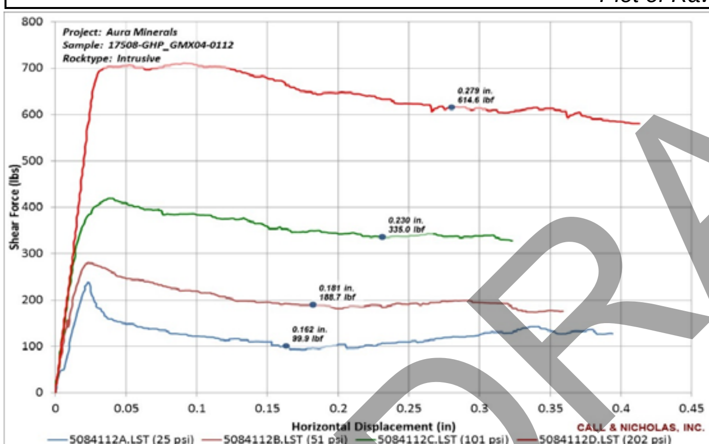
Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX04-0112**	
Rock Type	Intrusive	
Drill Hole	GHP_GMX04	
Depth	112.8 - 113.0	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	*in/min*
Area	6.83	*in^2*
Diameter	2.948	*in*
Radius	1.474	*in*
Tilt Correction	-0.06	*deg*
Plane Filling		

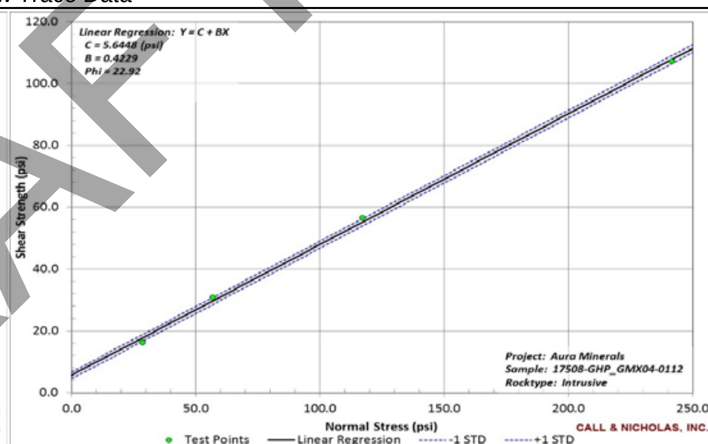
Adjusted Trace Data				
Normal Load (lbs)	*Shear Load (lbs)*	*Shear Area (in^2)*	*Normal Stress (psi)*	*Shear Stress (psi)*
177.8	99.7	6.2	28.7	16.1
348.1	188.3	6.1	57.0	30.8
693.9	334.3	5.9	117.3	56.5
1382.7	613.2	5.7	241.6	107.1

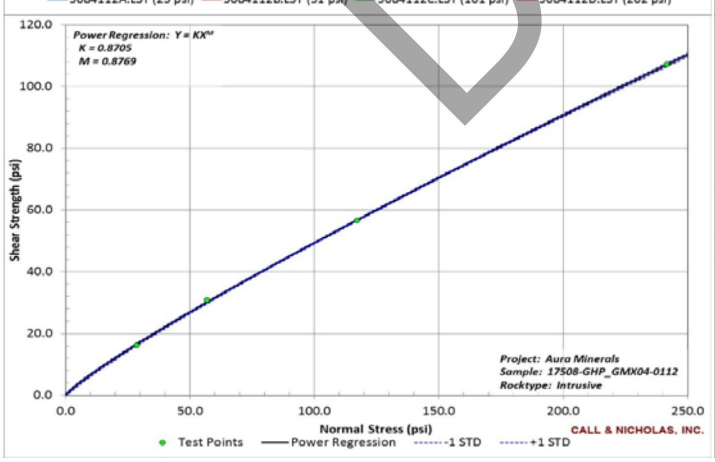
Pre Test Moisture	NA	*%*
Post Test Moisture	NA	*%*
Density	NA	*pcf*

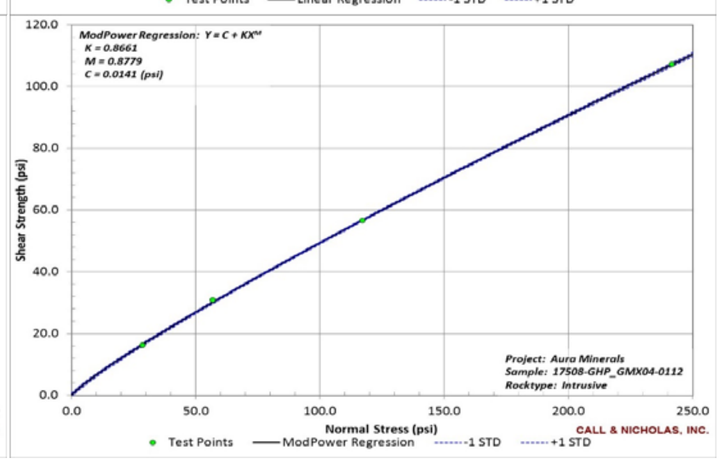
Results		
Linear: Y = BX + C		
Friction Angle	22.92	*deg*
Cohesion	5.64	*psi*
Power: Y = KX^M		
K	0.8705	*(for X in psi)*
M	0.8769	
Modified Power: Y = KX^M + C		
K	0.8661	*(for X in psi)*
M	0.8779	
C	0.0141	*psi*

Plot of Raw Trace Data









Notes :

JRC = 12-16. Very well mated and very well locked. Sample surface filling is a very-thin, well-attached, hard, white material (calcite).

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/04/17	Area & Load Data for SSDS	Project #	17508
Technician	ES		Client	Aura Minerals

Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX04-0141**	
Rock Type	Intrusive	
Drill Hole	GHP_GMX04	
Depth	141.9 - 142.1	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	in/min
Area	5.92	in^2
Diameter	2.746	in
Radius	1.373	in
Tilt Correction	1.29	deg
Plane Filling		

Adjusted Trace Data				
Normal Load (lbs)	Shear Load (lbs)	Shear Area (in^2)	Normal Stress (psi)	Shear Stress (psi)
151.8	94.9	4.9	31.2	19.5
297.7	163.3	4.8	62.2	34.1
592.4	304.6	5.0	118.9	61.1
1183.7	536.6	4.8	247.9	112.4

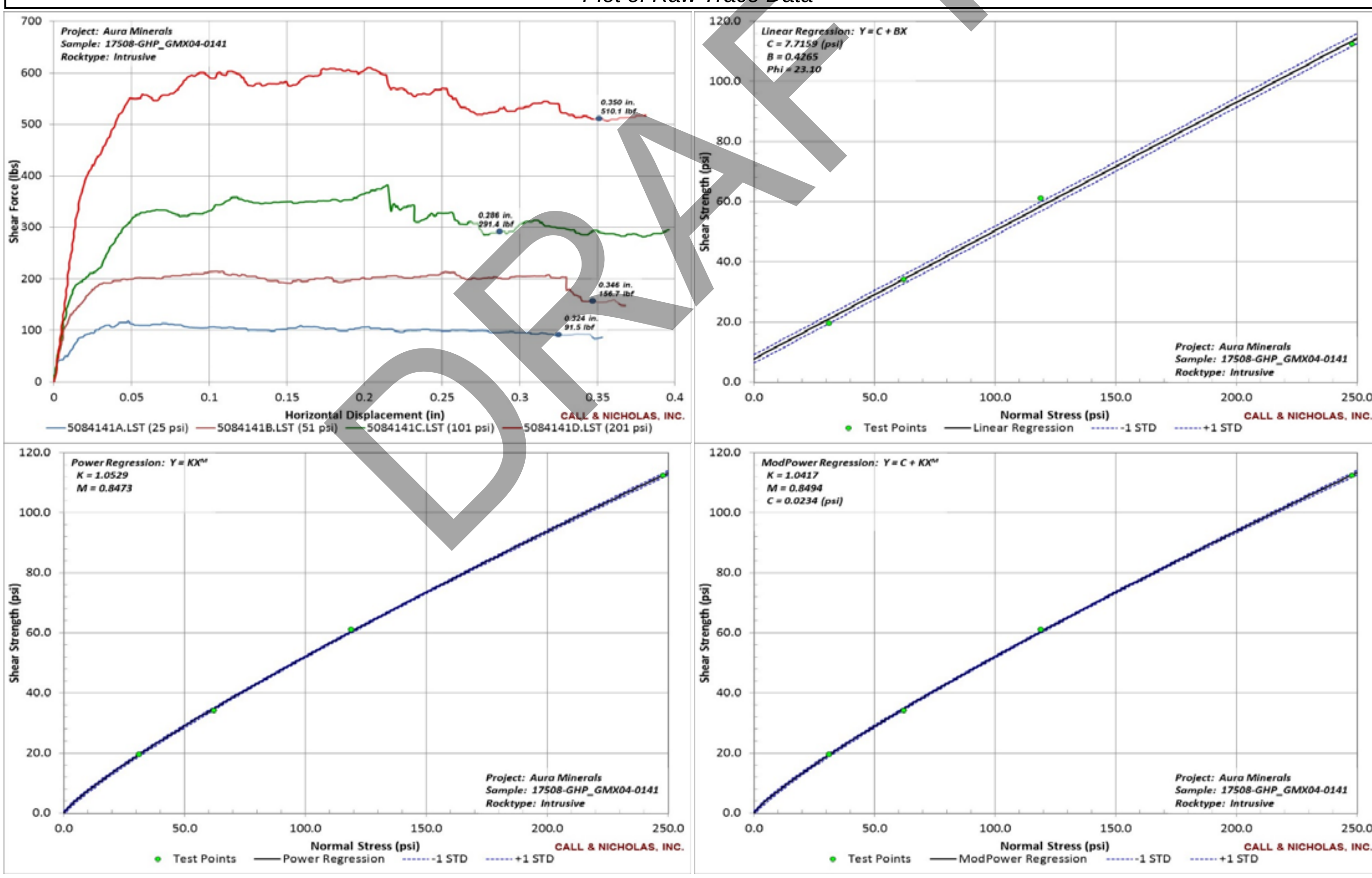
Pre Test Moisture	NA	%
Post Test Moisture	NA	%
Density	NA	pcf

Results		
Linear: Y = BX + C		
Friction Angle	23.10	deg
Cohesion	7.72	psi

Power: $Y = KX^M$		
K	1.0529	(for X in psi)
M	0.8473	

Modified Power: $Y = KX^M + C$		
K	1.0417	(for X in psi)
M	0.8494	
C	0.0234	psi

Plot of Raw Trace Data



Notes :
JRC = 10-14. Well mated and not locked. Sample surface has a partial filling of thin (0.5 mm), white, opaque, hard, well-attached material.

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/07/17	Area & Load Data for SSDS	*Project #*	17508
Technician	ES		*Client*	Aura Minerals

Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX07-0030**	
Rock Type	Intrusive	
Drill Hole	GHP_GMX07	
Depth	30.0 - 30.5	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	*in/min*
Area	6.25	*in^2*
Diameter	2.821	*in*
Radius	1.411	*in*
Tilt Correction	-0.59	*deg*
Plane Filling		

Adjusted Trace Data				
Normal Load (lbs)	*Shear Load (lbs)*	*Shear Area (in^2)*	*Normal Stress (psi)*	*Shear Stress (psi)*
162.1	118.2	5.2	31.4	22.9
636.4	389.3	5.3	120.4	73.7
322.1	207.4	5.2	61.7	39.7
1268.0	681.6	5.4	236.7	127.2

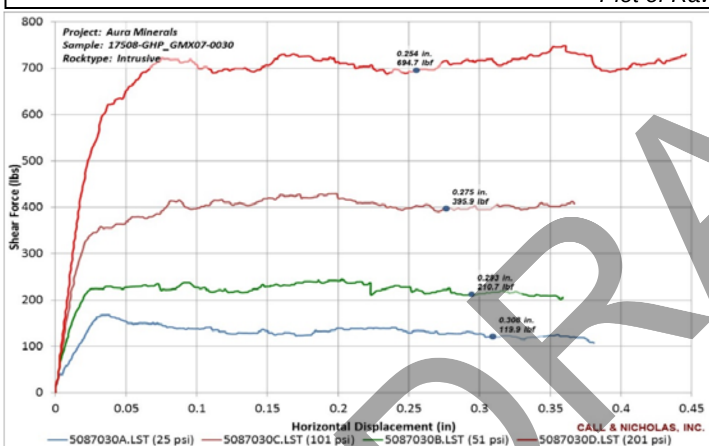
Pre Test Moisture	NA	*%*
Post Test Moisture	NA	*%*
Density	NA	*pcf*

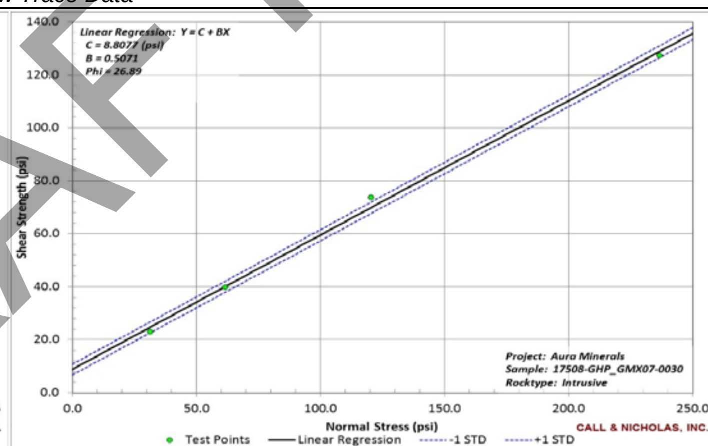
Results		
Linear: Y = BX + C		
Friction Angle	26.89	*deg*
Cohesion	8.81	*psi*

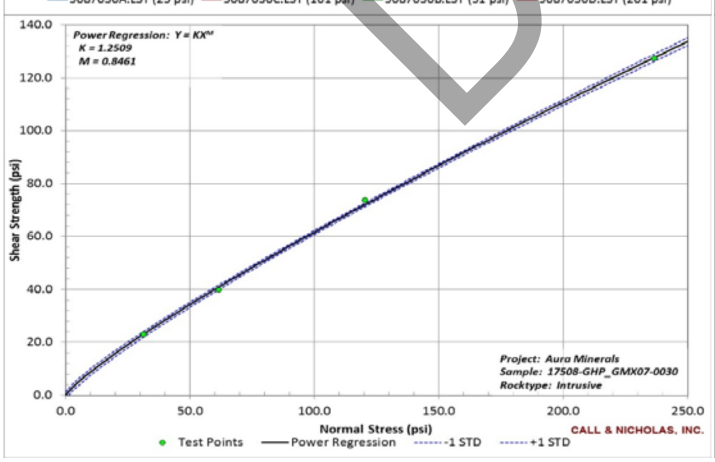
Power: $Y = KX^M$		
K	1.2509	*(for X in psi)*
M	0.8461	

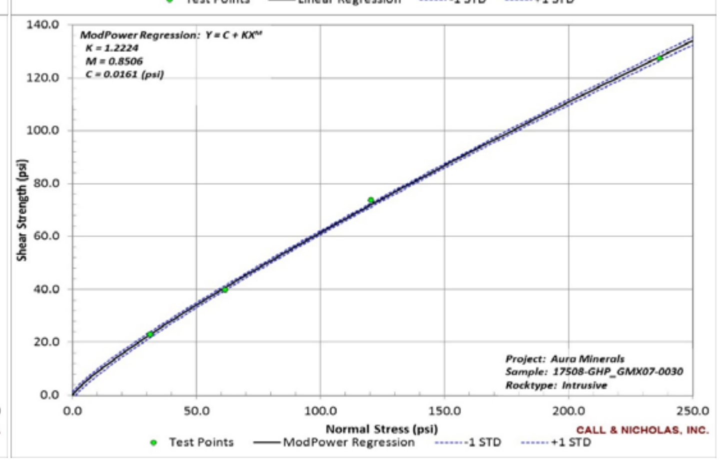
Modified Power: $Y = KX^M + C$		
K	1.2224	*(for X in psi)*
M	0.8506	
C	0.0161	*psi*

Plot of Raw Trace Data









Notes :

JRC = 10-14. Very well mated and very well locked. Sample surface filling is crumbled parent rock that is fragile and granular.

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/07/17	Area & Load Data for SSDS	*Project #*	17508
Technician	ES		*Client*	Aura Minerals

Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX07-0197**	
Rock Type	Intrusive	
Drill Hole	GHP_GMX07	
Depth	197.1 - 197.3	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	*in/min*
Area	6.36	*in* ^{2}
Diameter	2.845	*in*
Radius	1.423	*in*
Tilt Correction	1.33	*deg*
Plane Filling		

Adjusted Trace Data				
Normal Load (lbs)	*Shear Load (lbs)*	*Shear Area (in^2)*	*Normal Stress (psi)*	*Shear Stress (psi)*
161.1	113.0	5.7	28.4	19.9
317.4	236.0	5.4	59.2	44.0
635.8	422.7	5.7	111.0	73.8
1264.5	783.1	5.6	224.9	139.3

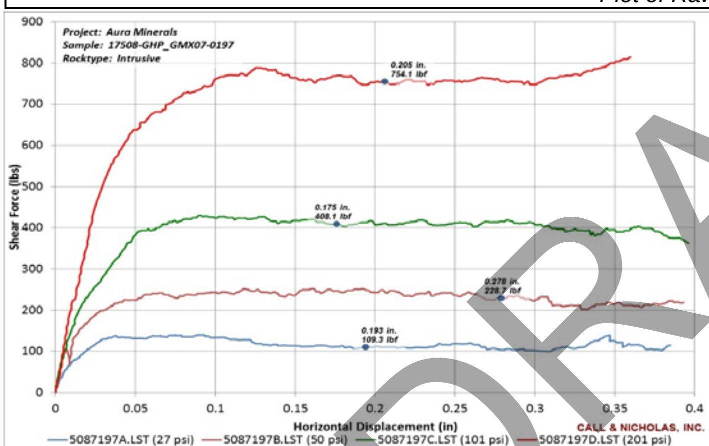
Pre Test Moisture	NA	*%*
Post Test Moisture	NA	*%*
Density	NA	*pcf*

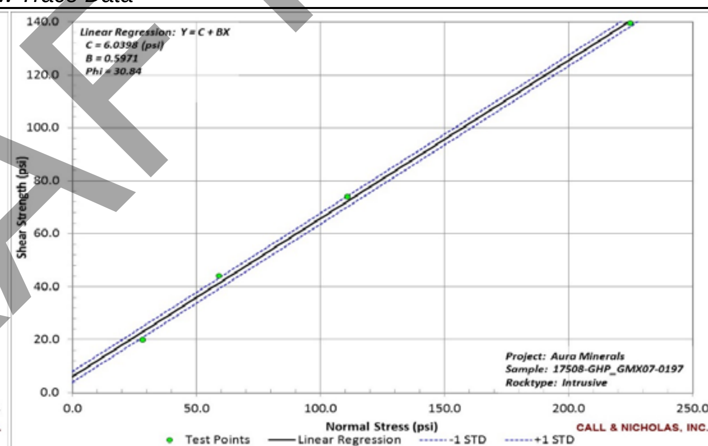
Results		
Linear: Y = BX + C		
Friction Angle	30.84	*deg*
Cohesion	6.04	*psi*

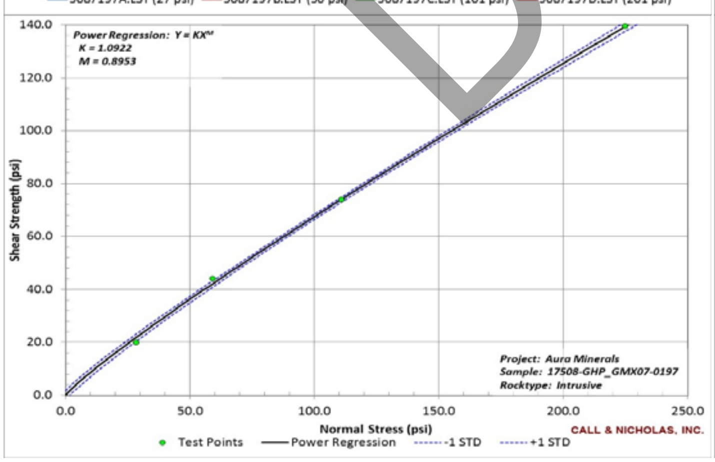
Power: $Y = KX^M$		
K	1.0922	*(for X in psi)*
M	0.8953	

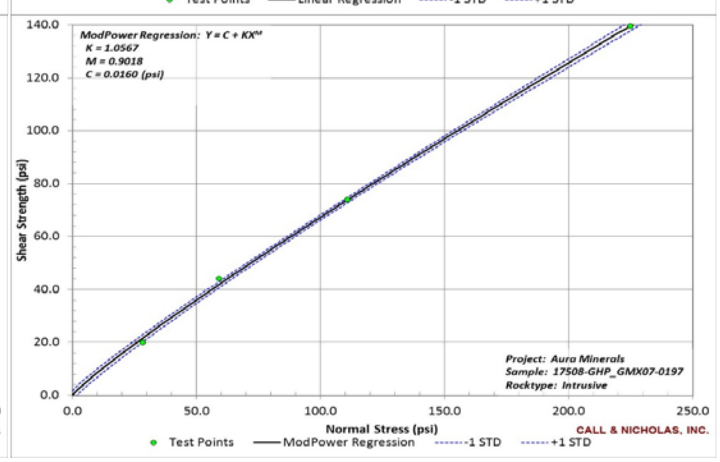
Modified Power: $Y = KX^M + C$		
K	1.0567	*(for X in psi)*
M	0.9018	
C	0.0160	*psi*

Plot of Raw Trace Data









Notes :

JRC = 8-12. Well mated and moderately locked. Sample surface filling is a fragile, crumbly, soft, olive-green material.

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/03/17	Area & Load Data for SSDS	*Project #*	17508
Technician	ES		*Client*	Aura Minerals

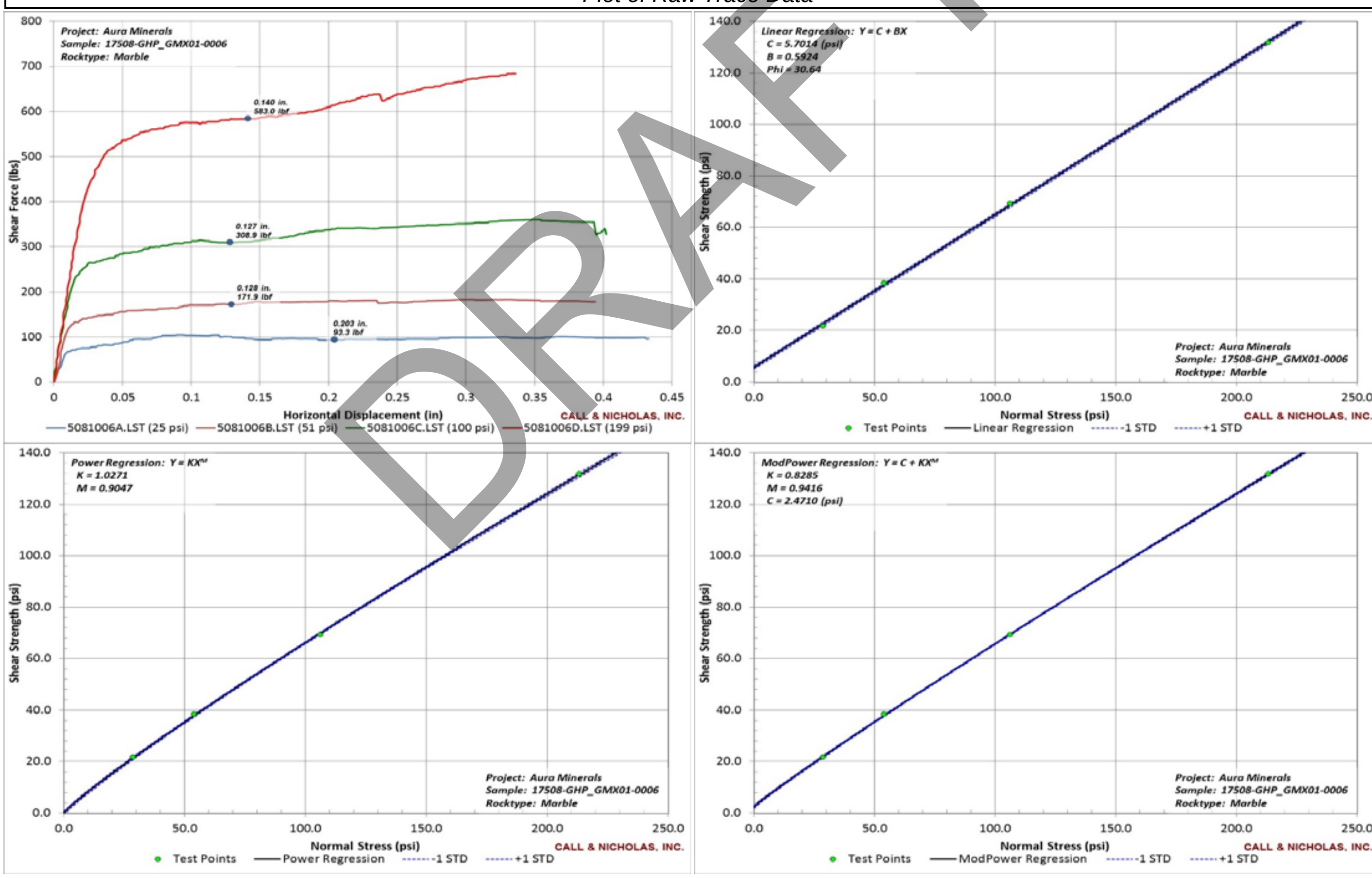
Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX01-0006**	
Rock Type	Marble	
Drill Hole	GHP_GMX01	
Depth	6.8 - 7.1	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	*in/min*
Area	4.89	*in*^{2}
Diameter	2.495	*in*
Radius	1.248	*in*
Tilt Correction	0.82	*deg*
Plane Filling		

Adjusted Trace Data				
Normal Load (lbs)	*Shear Load (lbs)*	*Shear Area (in^2)*	*Normal Stress (psi)*	*Shear Stress (psi)*
125.7	95.1	4.4	28.8	21.8
245.9	175.4	4.6	53.9	38.4
485.4	315.8	4.6	106.3	69.2
966.2	596.8	4.5	213.2	131.7

Pre Test Moisture	NA	*%*
Post Test Moisture	NA	*%*
Density	NA	*pcf*

Results		
Linear: Y = BX + C		
Friction Angle	30.64	*deg*
Cohesion	5.70	*psi*
Power: Y = KX^M		
K	1.0271	*(for X in psi)*
M	0.9047	
Modified Power: Y = KX^M *+ C*		
K	0.8285	*(for X in psi)*
M	0.9416	
C	2.4710	*psi*

Plot of Raw Trace Data



Notes :

JRC = 2-6. Well mated and not locked. Sample surface filling is a white & grey, opaque, hard, well-attached material (calcite?).

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/04/17	Area & Load Data for SSDS	*Project #*	17508
Technician	ES		*Client*	Aura Minerals

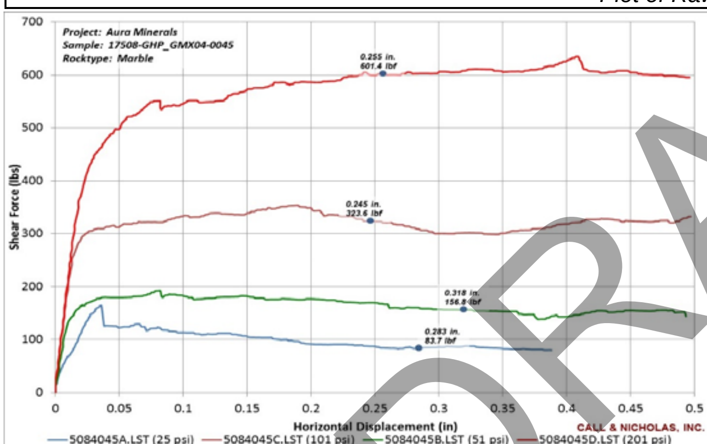
Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX04-0045**	
Rock Type	Marble	
Drill Hole	GHP_GMX04	
Depth	45.8 - 46.2	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	*in/min*
Area	5.56	*in* ^{2}
Diameter	2.660	*in*
Radius	1.330	*in*
Tilt Correction	-0.39	*deg*
Plane Filling		

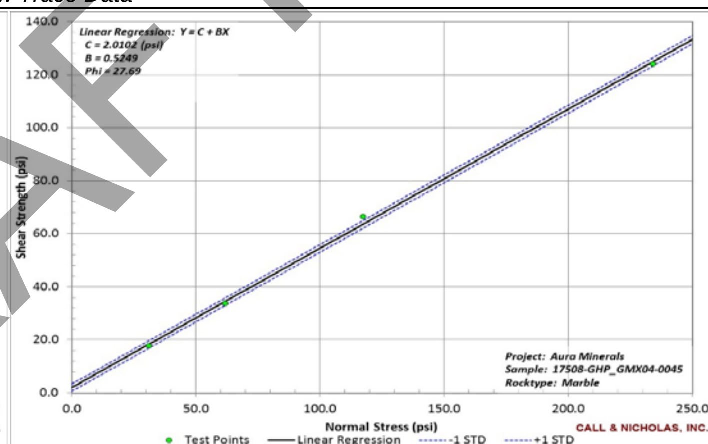
Adjusted Trace Data				
Normal Load (lbs)	*Shear Load (lbs)*	*Shear Area (in^2)*	*Normal Stress (psi)*	*Shear Stress (psi)*
146.7	82.7	4.7	31.2	17.6
566.7	319.8	4.8	117.6	66.3
284.9	154.9	4.6	61.9	33.7
1122.0	593.8	4.8	234.3	124.0

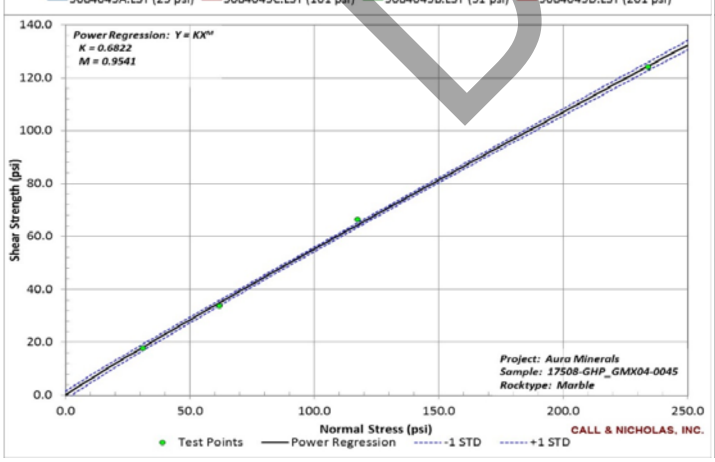
Pre Test Moisture	NA	*%*
Post Test Moisture	NA	*%*
Density	NA	*pcf*

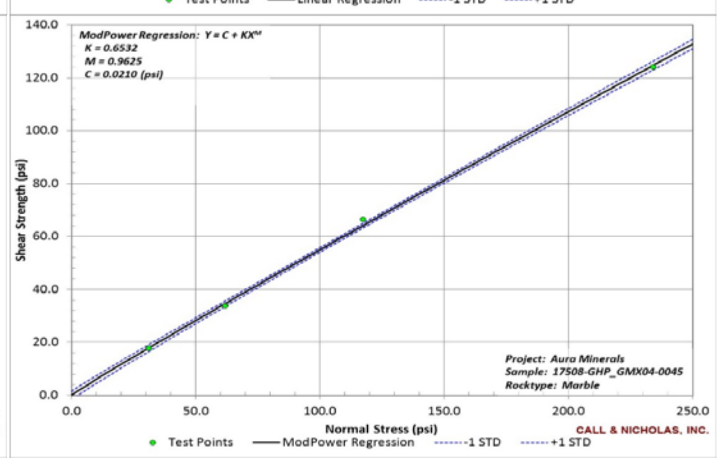
Results		
Linear: Y = BX + C		
Friction Angle	27.69	*deg*
Cohesion	2.01	*psi*
Power: Y = KX ^{M}		
K	0.6822	*(for X in psi)*
M	0.9541	
Modified Power: Y = KX ^{M} *+ C*		
K	0.6532	*(for X in psi)*
M	0.9625	
C	0.0210	*psi*

Plot of Raw Trace Data









Notes :

JRC = 8-12. Well mated and well locked. Sample surface filling is a partial, thin, well-attached, white material.

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/07/17	Area & Load Data for SSDS	*Project #*	17508
Technician	ES		*Client*	Aura Minerals

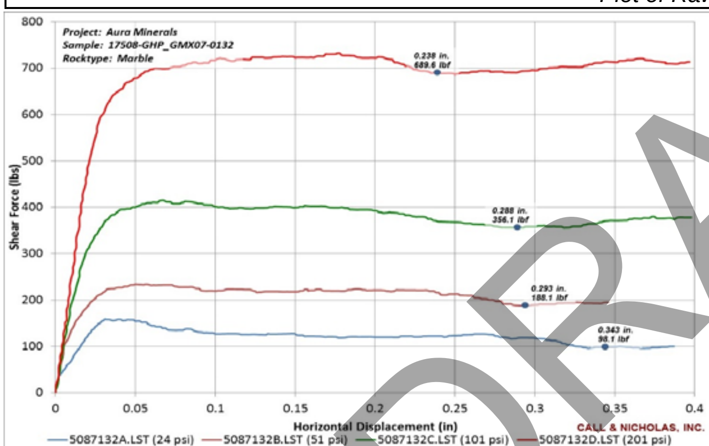
Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX07-0132**	
Rock Type	Marble	
Drill Hole	GHP_GMX07	
Depth	132.7 - 132.8	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	*in/min*
Area	6.04	*in^2*
Diameter	2.772	*in*
Radius	1.386	*in*
Tilt Correction	0.37	*deg*
Plane Filling		

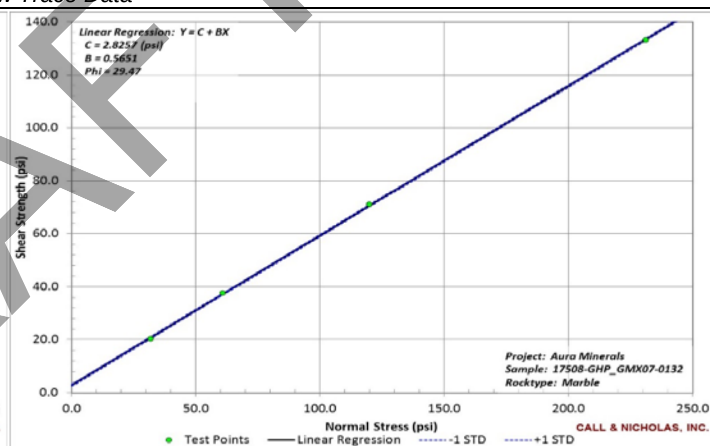
Adjusted Trace Data				
Normal Load (lbs)	*Shear Load (lbs)*	*Shear Area (in^2)*	*Normal Stress (psi)*	*Shear Stress (psi)*
155.8	99.1	4.9	31.9	20.3
308.2	190.1	5.1	61.0	37.6
607.5	360.1	5.1	119.8	71.0
1210.6	697.5	5.2	231.2	133.2

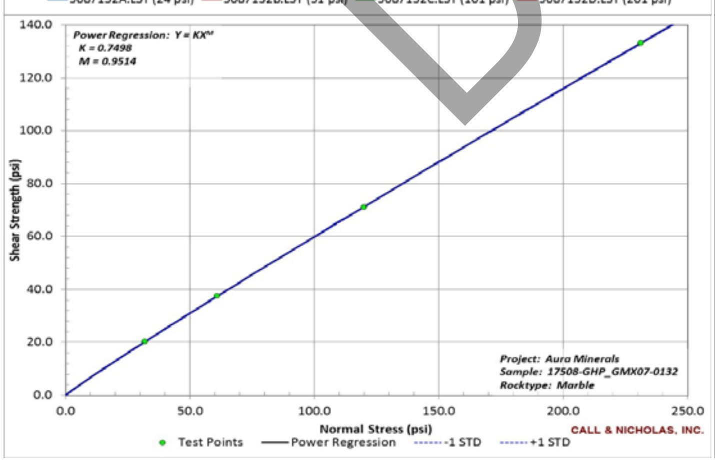
Pre Test Moisture	NA	*%*
Post Test Moisture	NA	*%*
Density	NA	*pcf*

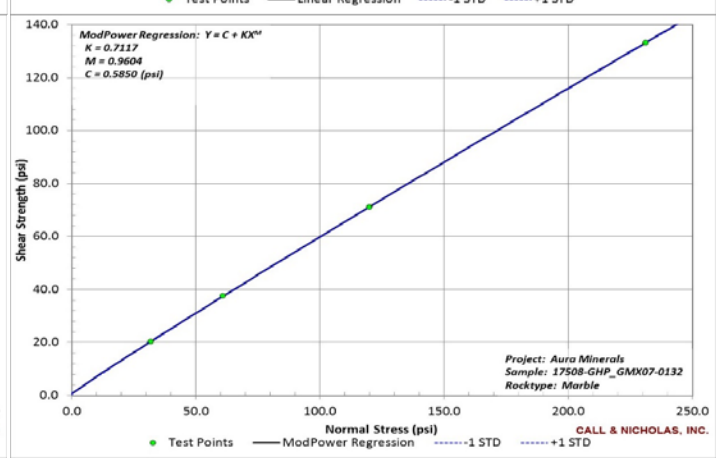
Results		
Linear: Y = BX + C		
Friction Angle	29.47	*deg*
Cohesion	2.83	*psi*
Power: $Y = KX^M$		
K	0.7498	*(for X in psi)*
M	0.9514	
Modified Power: $Y = KX^M + C$		
K	0.7117	*(for X in psi)*
M	0.9604	
C	0.5850	*psi*

Plot of Raw Trace Data









Notes :

JRC = 8-12. Well mated and well locked. Sample surface filling is thick/large (1 mm), interlocking crystals that are hard, well-attached, and white (calcite?).

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/01/17	Area & Load Data for SSDS	Project #	17508
Technician	ES		Client	Aura Minerals

Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX02-0207**	
Rock Type	Skarn	
Drill Hole	GHP_GMX02	
Depth	207.1 - 207.2	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	in/min
Area	5.14	in^2
Diameter	2.559	in
Radius	1.279	in
Tilt Correction	-0.35	deg
Plane Filling		

Adjusted Trace Data				
Normal Load (lbs)	Shear Load (lbs)	Shear Area (in^2)	Normal Stress (psi)	Shear Stress (psi)
133.2	88.2	4.9	27.0	17.8
260.9	166.5	4.9	52.9	33.8
518.2	302.6	4.9	105.3	61.5
1036.7	589.3	4.9	211.1	120.0

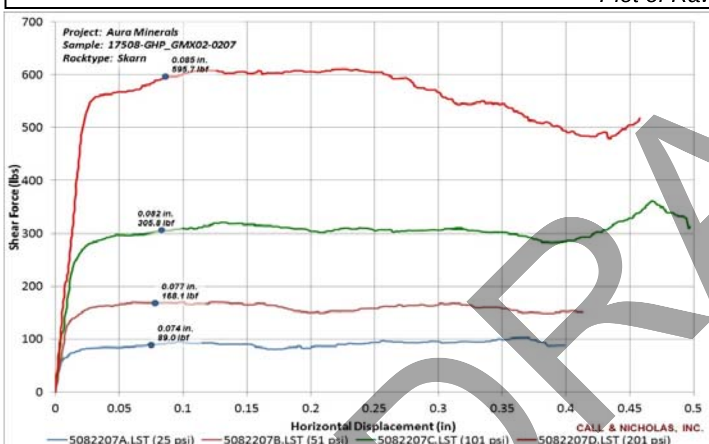
Pre Test Moisture	NA	%
Post Test Moisture	NA	%
Density	NA	pcf

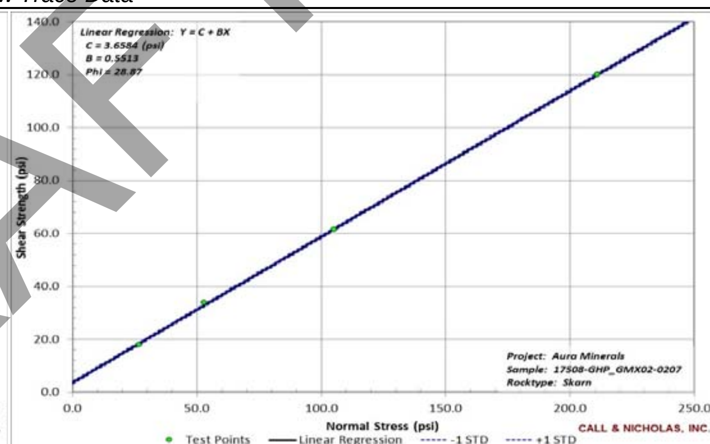
Results		
Linear: Y = BX + C		
Friction Angle	28.87	deg
Cohesion	3.66	psi

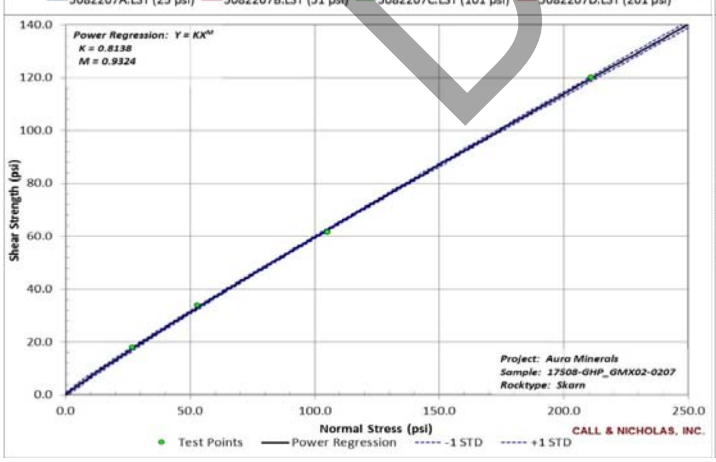
Power: $Y = KX^M$		
K	0.8138	(for X in psi)
M	0.9324	

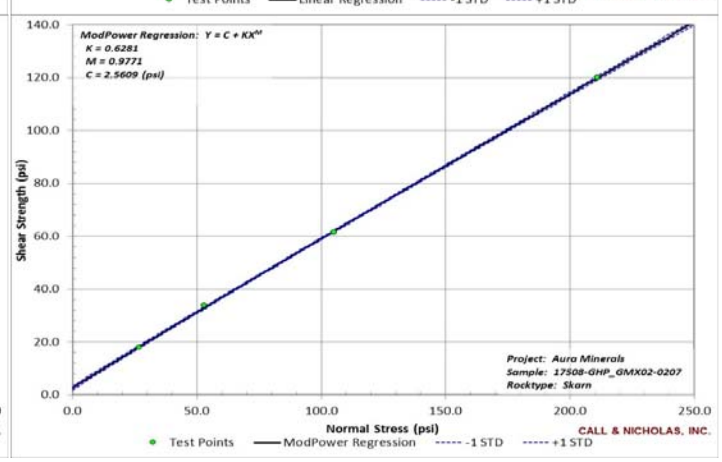
Modified Power: $Y = KX^M + C$		
K	0.6281	(for X in psi)
M	0.9771	
C	2.5609	psi

Plot of Raw Trace Data









Notes :

JRC = 10-14. Moderately mated and not locked. Sample surface has striations in the direction of shear travel. Filling is a soft, fragile, powdery material with sulfides.

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/01/17	Area & Load Data for SSDS	Project #	17508
Technician	ES		Client	Aura Minerals

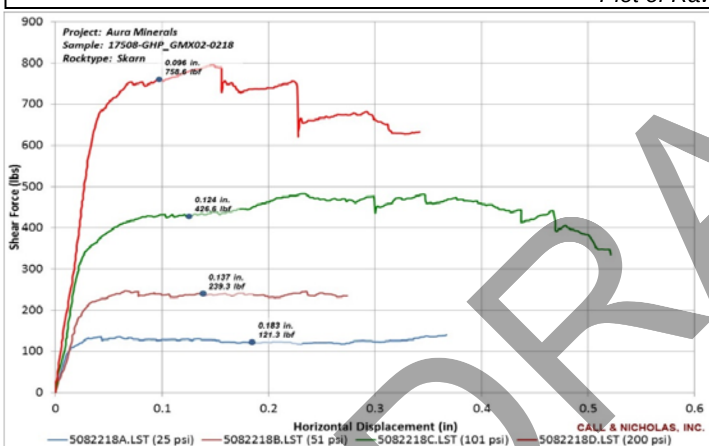
Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX02-0218**	
Rock Type	Skarn	
Drill Hole	GHP_GMX02	
Depth	218.8 - 219.4	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	in/min
Area	5.37	in^2
Diameter	2.615	in
Radius	1.308	in
Tilt Correction	-1.31	deg
Plane Filling		

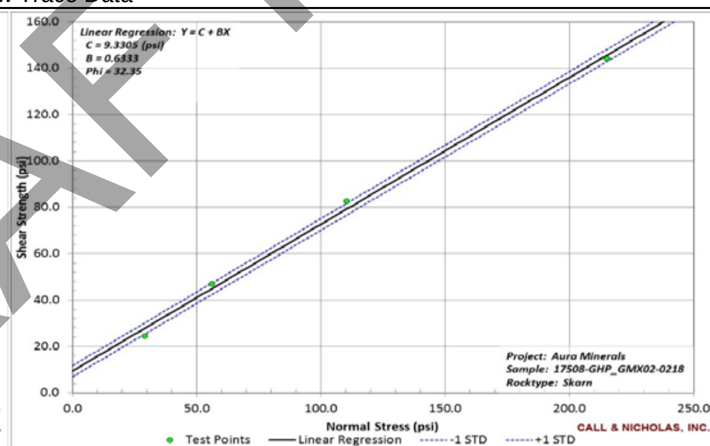
Adjusted Trace Data				
Normal Load (lbs)	Shear Load (lbs)	Shear Area (in^2)	Normal Stress (psi)	Shear Stress (psi)
141.1	118.0	4.8	29.1	24.4
280.1	232.9	5.0	56.3	46.8
553.5	413.9	5.0	110.4	82.5
1096.7	733.4	5.1	215.3	144.0

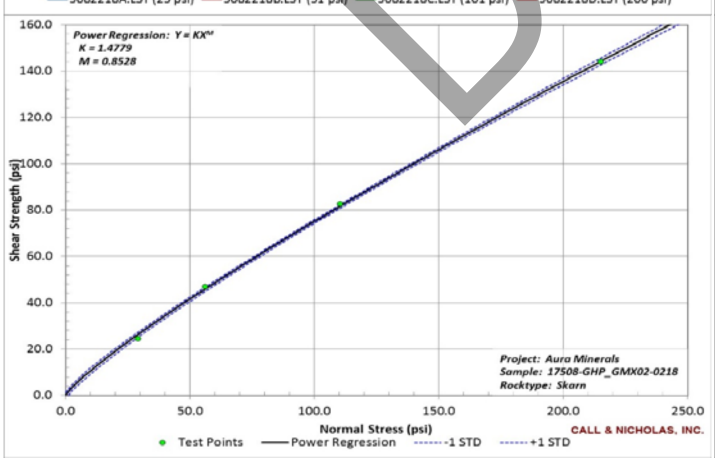
Pre Test Moisture	NA	%
Post Test Moisture	NA	%
Density	NA	pcf

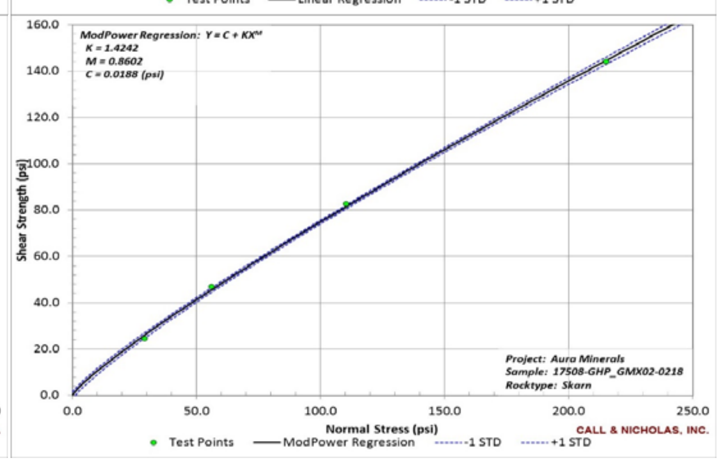
Results		
Linear: $Y = BX + C$		
Friction Angle	32.35	deg
Cohesion	9.33	psi
Power: $Y = KX^M$		
K	1.4779	(for X in psi)
M	0.8528	
Modified Power: $Y = KX^M + C$		
K	1.4242	(for X in psi)
M	0.8602	
C	0.0188	psi

Plot of Raw Trace Data









Notes :

JRC = 8-12. Poorly mated and moderately locked. Sample surface filling is a very-fragile, very-flakey, poorly-attached, yellow & grey, powdery material. Much filling was lost in shipping & prep.

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/01/17	Area & Load Data for SSDS	*Project #*	17508
Technician	ES		*Client*	Aura Minerals

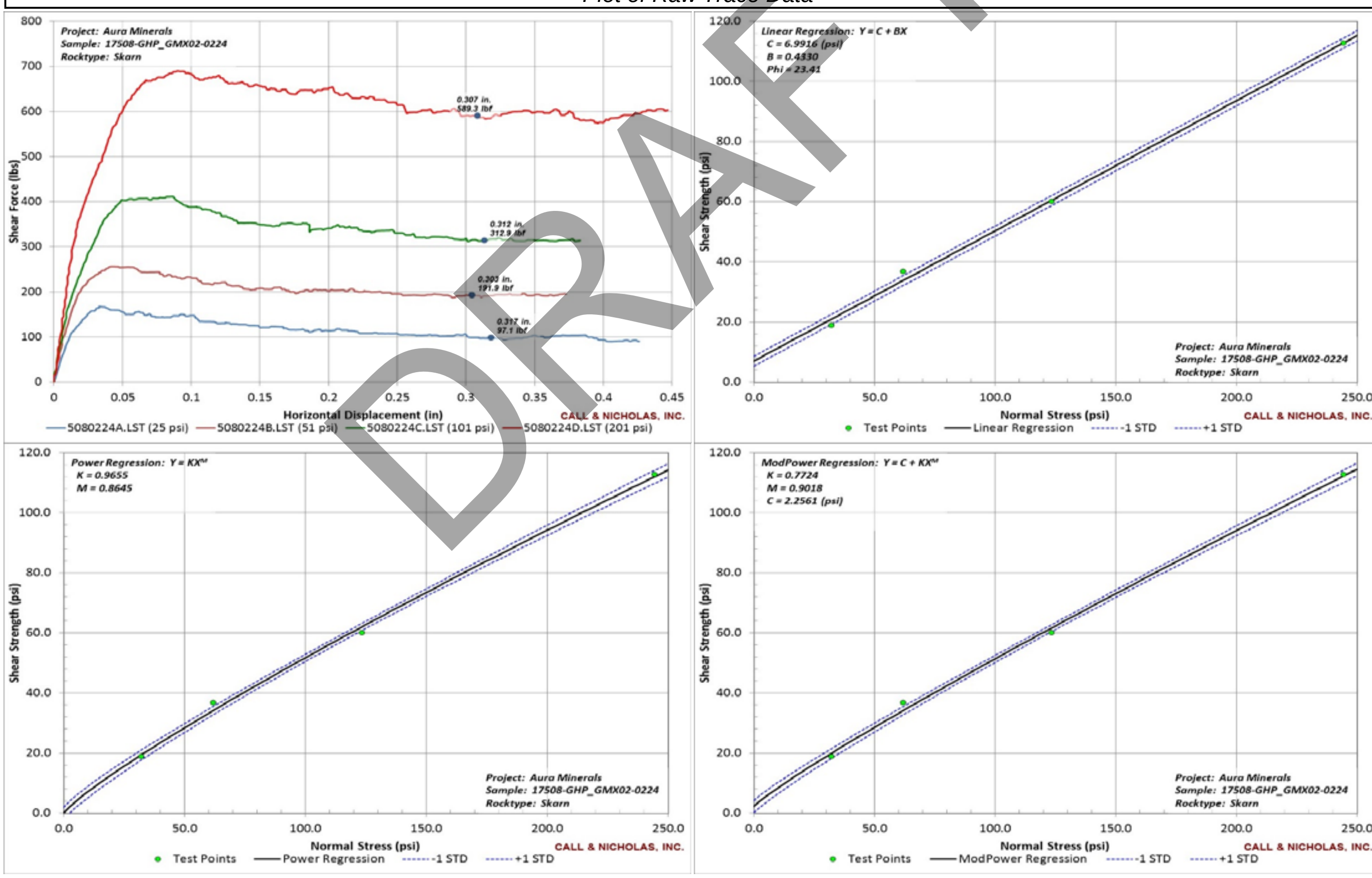
Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX02-0224**	
Rock Type	Skarn	
Drill Hole	GHP_GMX02	
Depth	224.7 - 225.0	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	*in/min*
Area	6.29	*in* ^{2}
Diameter	2.829	*in*
Radius	1.414	*in*
Tilt Correction	-0.17	*deg*
Plane Filling		

Adjusted Trace Data				
Normal Load (lbs)	*Shear Load (lbs)*	*Shear Area (in^2)*	*Normal Stress (psi)*	*Shear Stress (psi)*
166.2	96.6	5.2	32.2	18.7
322.9	190.9	5.2	62.0	36.6
638.9	311.0	5.2	123.4	60.0
1271.2	585.5	5.2	244.6	112.6

Pre Test Moisture	NA	*%*
Post Test Moisture	NA	*%*
Density	NA	*pcf*

Results		
Linear: Y = BX + C		
Friction Angle	23.41	*deg*
Cohesion	6.99	*psi*
Power: Y = KX ^{M}		
K	0.9655	*(for X in psi)*
M	0.8645	
Modified Power: Y = KX ^{M} *+ C*		
K	0.7724	*(for X in psi)*
M	0.9018	
C	2.2561	*psi*

Plot of Raw Trace Data



Notes :

JRC = 12-16. Well mated and well locked. Sample surface is a dull-yellow, opaque, fragile, moderately-soft filling with sulfides in it.

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/01/17	Area & Load Data for SSDS	Project #	17508
Technician	ES		Client	Aura Minerals

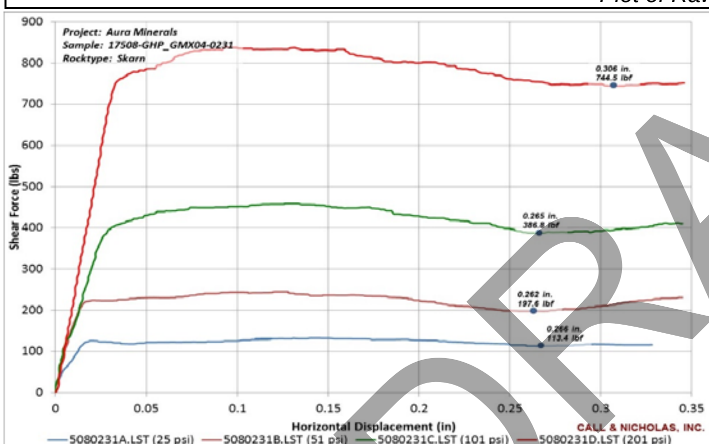
Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX04-0231**	
Rock Type	Skarn	
Drill Hole	GHP_GMX04	
Depth	231.5 - 231.8	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	in/min
Area	5.96	in^2
Diameter	2.755	in
Radius	1.378	in
Tilt Correction	0.10	deg
Plane Filling		

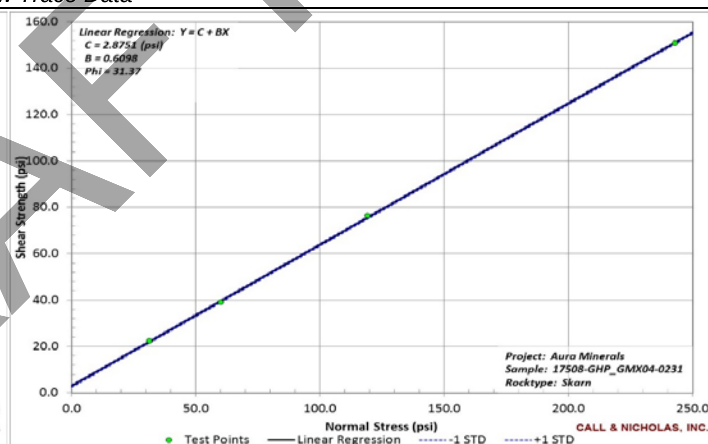
Adjusted Trace Data				
Normal Load (lbs)	Shear Load (lbs)	Shear Area (in^2)	Normal Stress (psi)	Shear Stress (psi)
160.1	113.7	5.1	31.5	22.4
307.5	198.1	5.1	60.3	38.9
606.4	387.8	5.1	119.2	76.3
1202.4	746.6	5.0	242.9	150.8

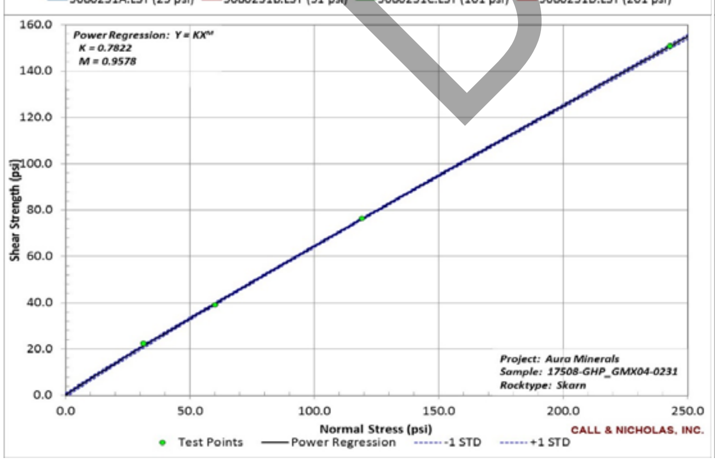
Pre Test Moisture	NA	%
Post Test Moisture	NA	%
Density	NA	pcf

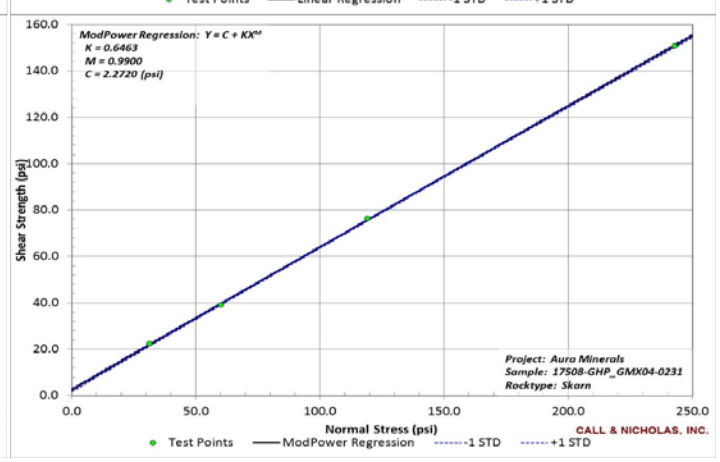
Results		
Linear: $Y = BX + C$		
Friction Angle	31.37	deg
Cohesion	2.88	psi
Power: $Y = KX^M$		
K	0.7822	(for X in psi)
M	0.9578	
Modified Power: $Y = KX^M + C$		
K	0.6463	(for X in psi)
M	0.9900	
C	2.2720	psi

Plot of Raw Trace Data









Notes :

JRC = 16-20. Moderately mated and moderately locked. Sample surface is a dark, hard, glassy, slick, well-attached filling. ***Sample is outside of normal testing parameters - surface is excessively saddle shaped.***

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/01/17	Area & Load Data for SSDS	*Project #*	17508
Technician	ES		*Client*	Aura Minerals

Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX05-0180**	
Rock Type	Skarn	
Drill Hole	GHP_GMX05	
Depth	180.8 - 181.1	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	*in/min*
Area	4.68	*in²*
Diameter	2.442	*in*
Radius	1.221	*in*
Tilt Correction	2.07	*deg*
Plane Filling		

Adjusted Trace Data				
Normal Load (lbs)	*Shear Load (lbs)*	*Shear Area (in^2)*	*Normal Stress (psi)*	*Shear Stress (psi)*
120.6	122.8	4.1	29.2	29.7
233.5	212.8	4.2	55.4	50.5
463.9	365.9	4.3	108.7	85.7
921.6	663.1	4.3	215.6	155.1

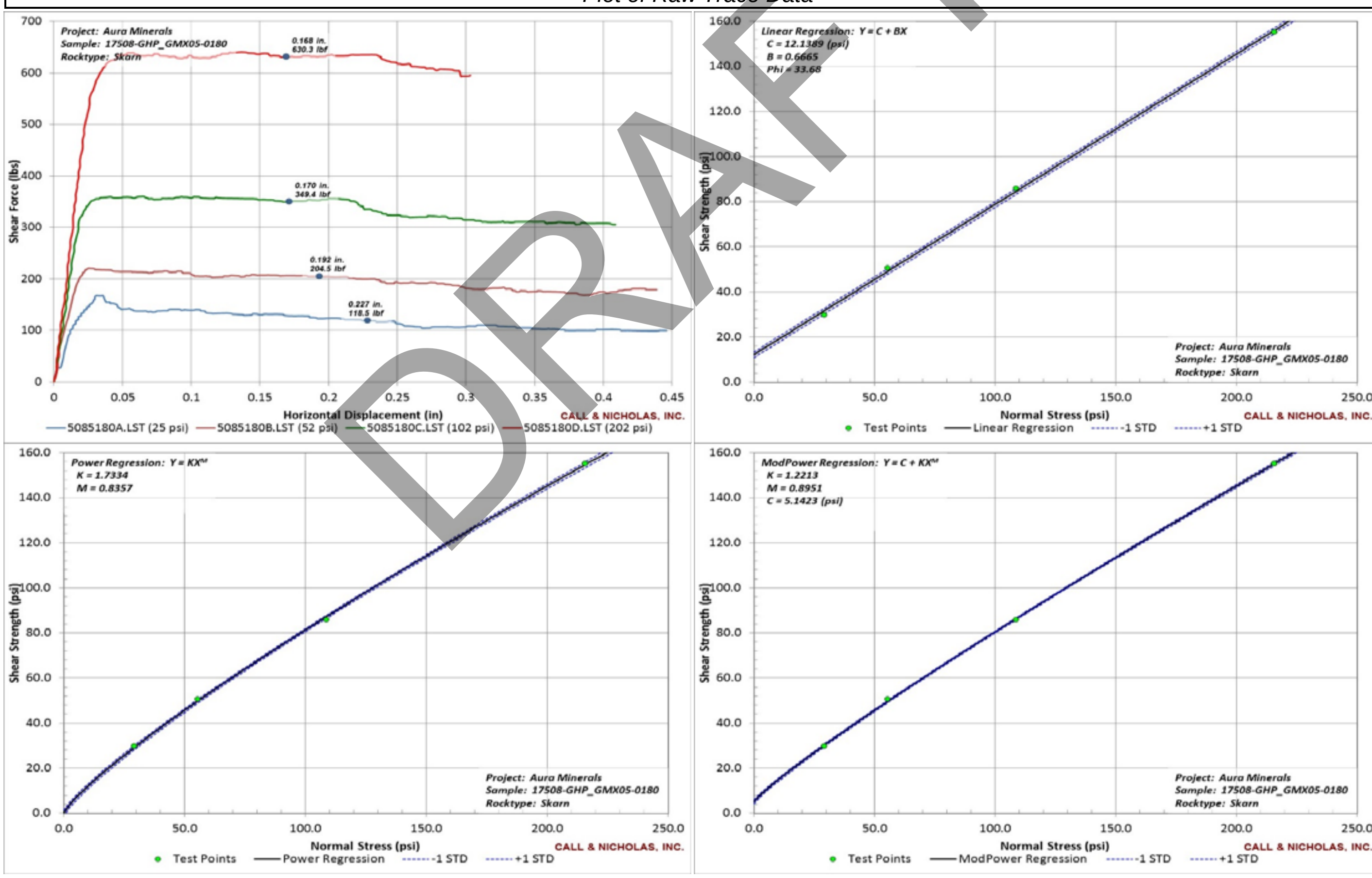
Pre Test Moisture	NA	*%*
Post Test Moisture	NA	*%*
Density	NA	*pcf*

Results		
Linear: Y = BX + C		
Friction Angle	33.68	*deg*
Cohesion	12.14	*psi*

Power: $Y = KX^M$		
K	1.7334	*(for X in psi)*
M	0.8357	

Modified Power: $Y = KX^M + C$		
K	1.2213	*(for X in psi)*
M	0.8951	
C	5.1423	*psi*

Plot of Raw Trace Data



Notes :

JRC = 14-18. Very well mated and very well locked. Sample surface has sulfides and a thin, orange-oxide, hard, well-attached filling.

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/01/17	Area & Load Data for SSDS	*Project #*	17508
Technician	ES		*Client*	Aura Minerals

Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX05-0191**	
Rock Type	Skarn	
Drill Hole	GHP_GMX05	
Depth	191.8 - 192.2	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	*in/min*
Area	5.78	*in^2*
Diameter	2.714	*in*
Radius	1.357	*in*
Tilt Correction	0.89	*deg*
Plane Filling		

Adjusted Trace Data				
Normal Load (lbs)	*Shear Load (lbs)*	*Shear Area (in^2)*	*Normal Stress (psi)*	*Shear Stress (psi)*
148.0	145.7	5.5	26.8	26.4
290.0	244.8	5.5	52.6	44.4
576.2	447.4	5.4	105.7	82.1
1155.8	772.7	5.5	211.1	141.1

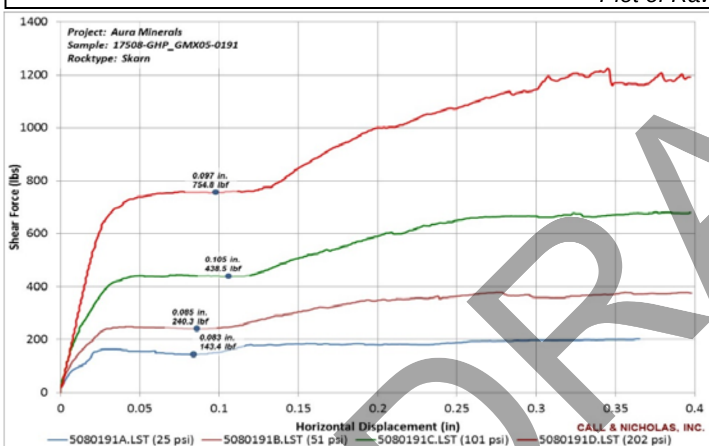
Pre Test Moisture	NA	*%*
Post Test Moisture	NA	*%*
Density	NA	*pcf*

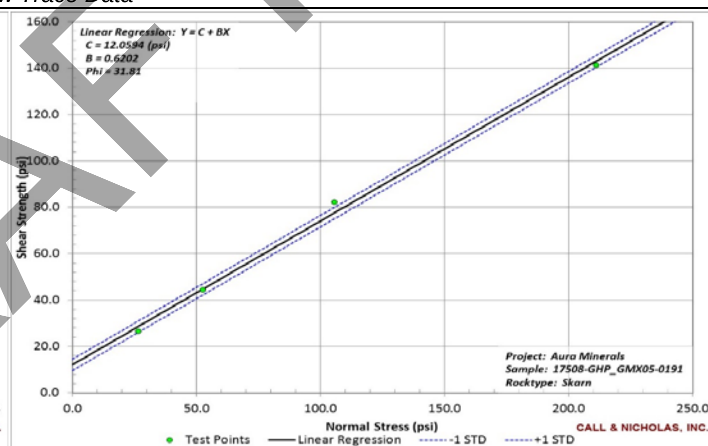
Results		
Linear: Y = BX + C		
Friction Angle	31.81	*deg*
Cohesion	12.06	*psi*

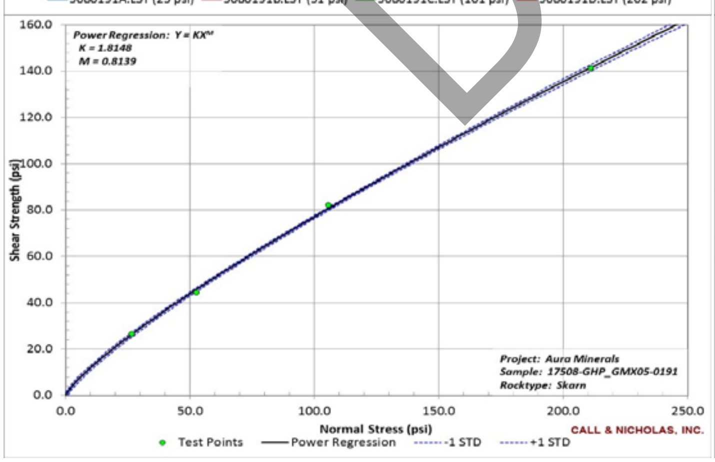
Power: $Y = KX^M$		
K	1.8148	*(for X in psi)*
M	0.8139	

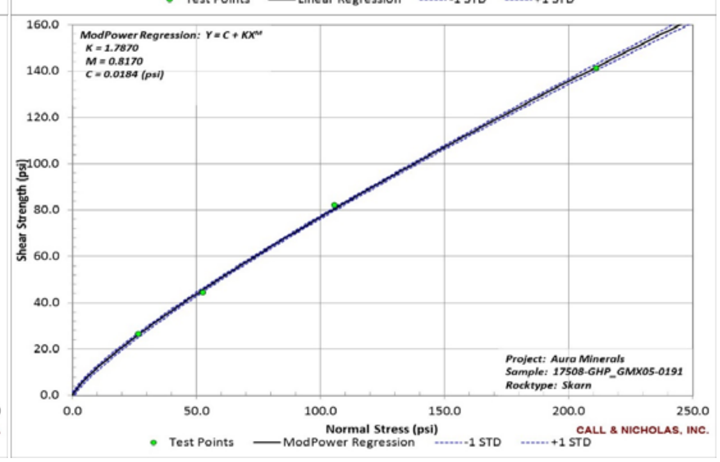
Modified Power: $Y = KX^M + C$		
K	1.7870	*(for X in psi)*
M	0.8170	
C	0.0184	*psi*

Plot of Raw Trace Data









Notes :

JRC = 20 PLUS. Very well mated and very well locked. **NOTE: Shear plane roughness is outside of normal testing parameters.** Sample surface has two fillings: 1) white, opaque, powdery, soft, fragile material and 2) sulfides.

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/02/17	Area & Load Data for SSDS	*Project #*	17508
Technician	ES		*Client*	Aura Minerals

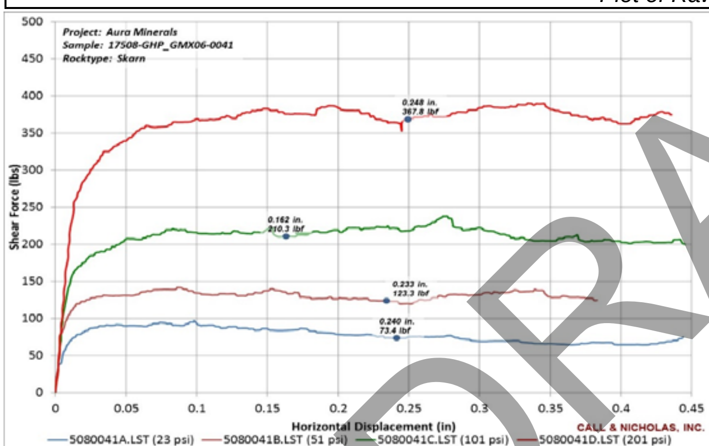
Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX06-0041**	
Rock Type	Skarn	
Drill Hole	GHP_GMX06	
Depth	41.2 - 41.3	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	*in/min*
Area	4.73	*in^2*
Diameter	2.453	*in*
Radius	1.227	*in*
Tilt Correction	1.20	*deg*
Plane Filling		

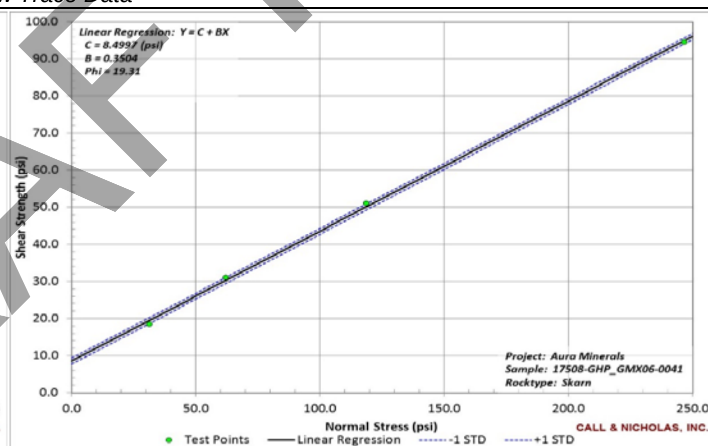
Adjusted Trace Data				
Normal Load (lbs)	*Shear Load (lbs)*	*Shear Area (in^2)*	*Normal Stress (psi)*	*Shear Stress (psi)*
130.6	76.1	4.1	31.6	18.4
258.1	128.7	4.2	62.1	31.0
513.9	221.0	4.3	118.7	51.1
1015.7	388.9	4.1	246.7	94.5

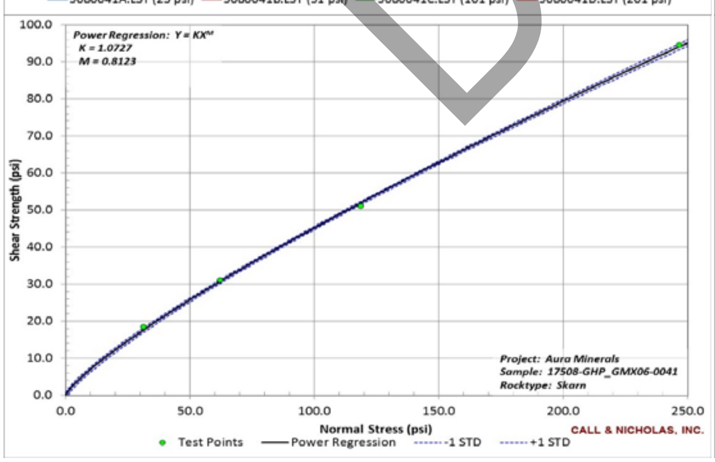
Pre Test Moisture	NA	*%*
Post Test Moisture	NA	*%*
Density	NA	*pcf*

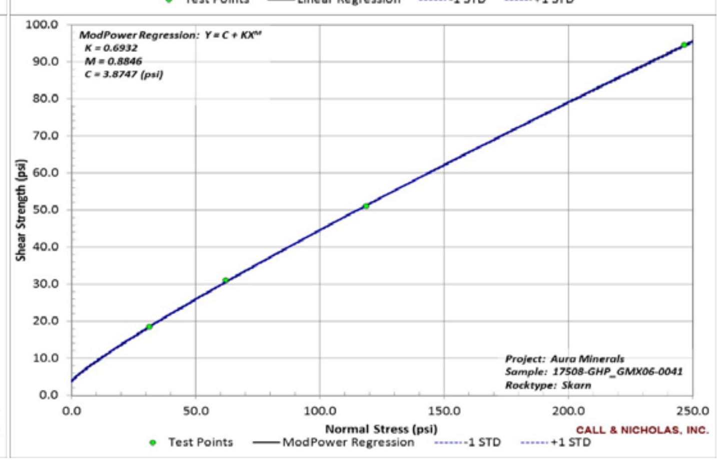
Results		
Linear: Y = BX + C		
Friction Angle	19.31	*deg*
Cohesion	8.50	*psi*
Power: $Y = KX^M$		
K	1.0727	*(for X in psi)*
M	0.8123	
Modified Power: $Y = KX^M + C$		
K	0.6932	*(for X in psi)*
M	0.8846	
C	3.8747	*psi*

Plot of Raw Trace Data









Notes :

JRC = 16-20. Well mated and well locked. Sample surface filling is a very-thick, soft, fragile, light-green, granular material.

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/02/17	Area & Load Data for SSDS	*Project #*	17508
Technician	ES		*Client*	Aura Minerals

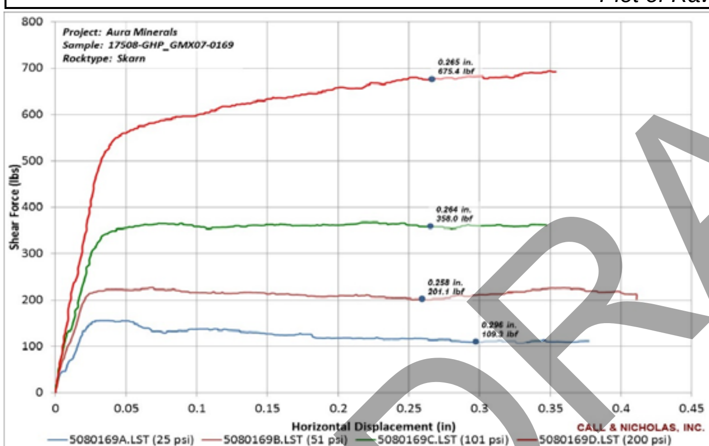
Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX07-0169**	
Rock Type	Skarn	
Drill Hole	GHP_GMX07	
Depth	169.1 - 169.4	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	*in/min*
Area	5.88	*in*^{2}
Diameter	2.737	*in*
Radius	1.368	*in*
Tilt Correction	1.84	*deg*
Plane Filling		

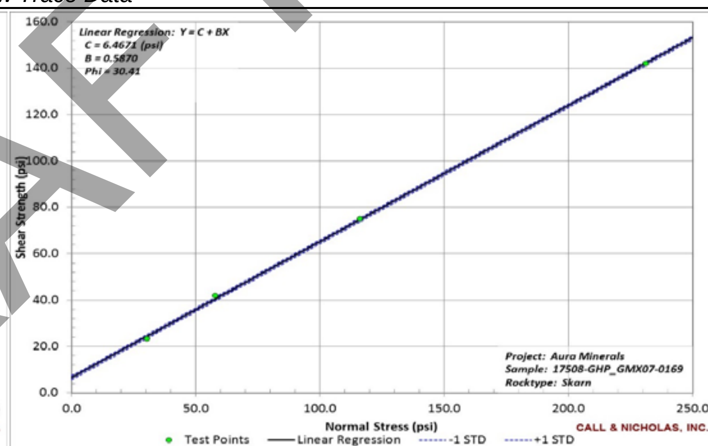
Adjusted Trace Data				
Normal Load (lbs)	*Shear Load (lbs)*	*Shear Area (in^2)*	*Normal Stress (psi)*	*Shear Stress (psi)*
150.1	114.1	4.9	30.5	23.2
292.7	210.4	5.0	58.0	41.7
583.3	376.5	5.0	116.1	74.9
1160.6	712.2	5.0	231.1	141.8

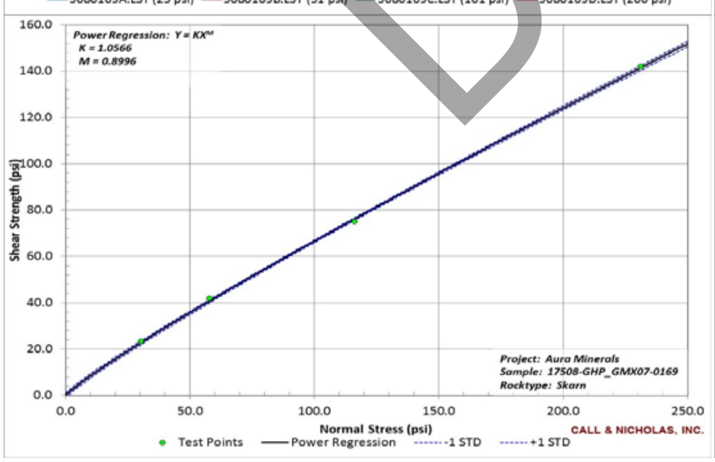
Pre Test Moisture	NA	*%*
Post Test Moisture	NA	*%*
Density	NA	*pcf*

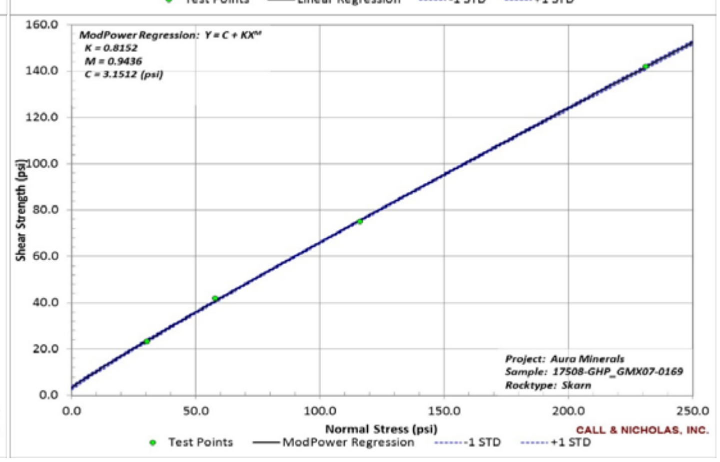
Results		
Linear: Y = BX + C		
Friction Angle	30.41	*deg*
Cohesion	6.47	*psi*
Power: Y = KX^M		
K	1.0566	*(for X in psi)*
M	0.8996	
Modified Power: Y = KX^M *+ C*		
K	0.8152	*(for X in psi)*
M	0.9436	
C	3.1512	*psi*

Plot of Raw Trace Data









Notes :

JRC = 20 PLUS. Very well mated and very well locked. **NOTE: Shear plane roughness is outside of normal testing parameters.** Sample surface has two fillings: 1) is a moderately-hard, fragile, granular material and 2) is sulfides.

Call & Nicholas, Inc.

Geomechanical Laboratory

Tucson, Arizona USA

Date	08/02/17	Area & Load Data for SSDS	*Project #*	17508
Technician	ES		*Client*	Aura Minerals

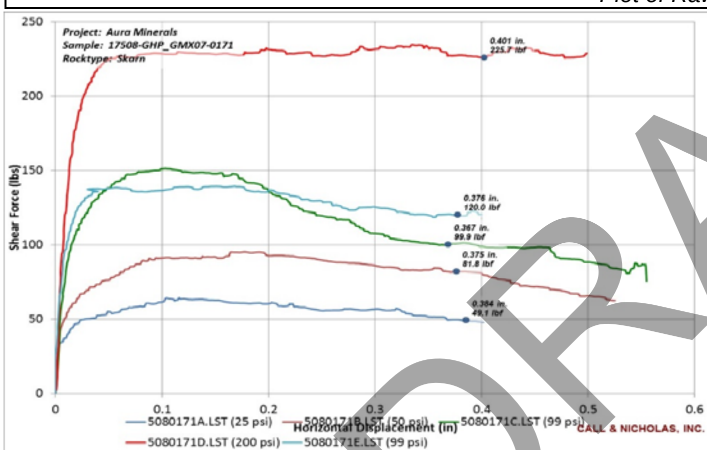
Sample Data		
Peak/Residual	Residual	
Location	Aranzazu, Zacatecas Mexico	
Sample #	**17508-GHP_GMX07-0171**	
Rock Type	Skarn	
Drill Hole	GHP_GMX07	
Depth	171.3 - 171.4	
Rock Code:		
Shear Plane	Joint	
Surface Prep	Mist	
Shape	Digitized/Circular	
Test Speed	0.025	*in/min*
Area	4.67	*in^2*
Diameter	2.438	*in*
Radius	1.219	*in*
Tilt Correction	2.00	*deg*
Plane Filling		

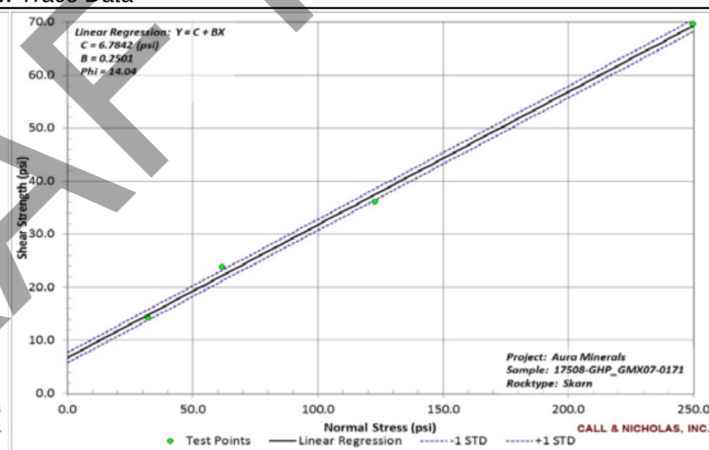
Adjusted Trace Data				
Normal Load (lbs)	*Shear Load (lbs)*	*Shear Area (in^2)*	*Normal Stress (psi)*	*Shear Stress (psi)*
120.9	53.3	3.7	32.3	14.2
232.5	89.9	3.8	61.7	23.9
925.5	257.9	3.7	249.9	69.6
462.2	136.1	3.8	122.8	36.2

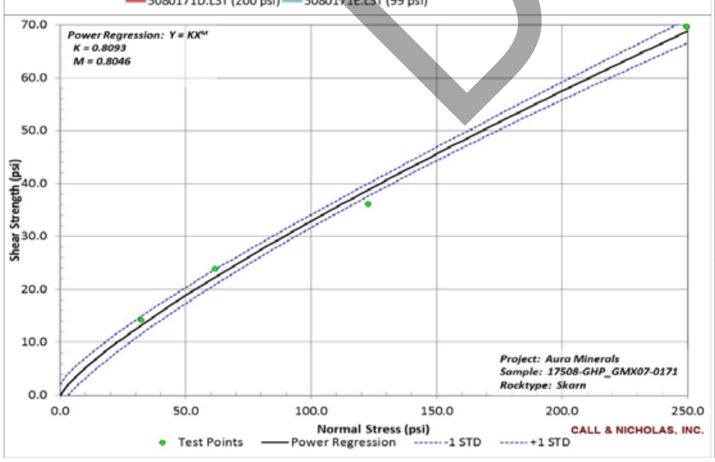
Pre Test Moisture	NA	*%*
Post Test Moisture	NA	*%*
Density	NA	*pcf*

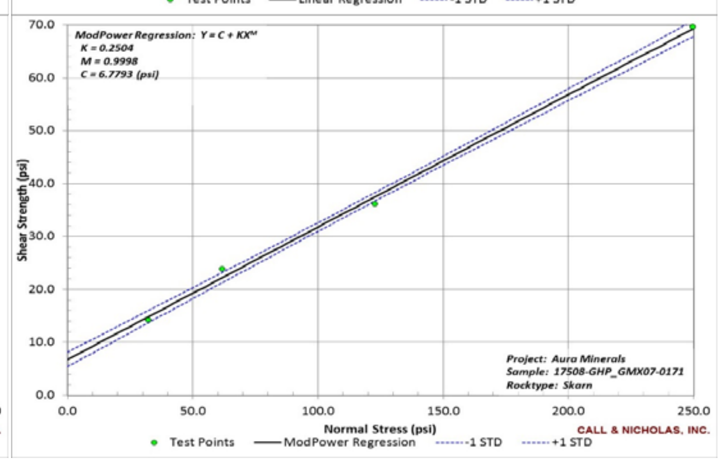
Results		
Linear: Y = BX + C		
Friction Angle	14.04	*deg*
Cohesion	6.78	*psi*
Power: $Y = KX^M$		
K	0.8093	*(for X in psi)*
M	0.8046	
Modified Power: $Y = KX^M + C$		
K	0.2504	*(for X in psi)*
M	0.9998	
C	6.7793	*psi*

Plot of Raw Trace Data









Notes :

JRC = 16-20. Poorly mated and moderately locked. Sample surface filling is a very fragile, very-soft, granular material. Much was lost in shippng & prep. Sample surface crumbled on "Trace C" at 100 psi - reran at 100 psi and used that data. Did not use Trace C for analysis.

USCS & ATTERBERG LIMITS TEST RESULTS

Sieve Analysis & Soil Classification

Sieve Size U.S.	mm	Retained Weight (Grams)	Retained % of Weight	Cumulative % Retained (Coarser)	Cumulative % Passing (Finer)
4"	100	0.00	0.00	0.00	100.00
2"	50.0	0.00	0.00	0.00	100.00
1.5"	37.5	0.00	0.00	0.00	100.00
1"	25.0	0.00	0.00	0.00	100.00
3/4"	19.0	0.00	0.00	0.00	100.00
3/8"	9.5	4.08	1.17	1.17	98.83
# 4	4.75	23.11	6.63	7.80	92.20
# 10	2.00	40.97	11.75	19.54	80.46
# 20	0.850	55.87	16.02	35.56	64.44
# 40	0.425	42.72	12.25	47.81	52.19
# 60	0.250	37.56	10.77	58.58	41.42
# 120	0.125	46.16	13.23	71.82	28.18
# 200	0.075	20.04	5.75	77.56	22.44
Pan		78.25	22.44	100	0
Total		348.75			

Coarse Gravel %	Fine Gravel %	Coarse Sand %	Medium Sand %	Fine Sand %	Silt / Clay %
0.00	7.80	11.75	28.27	29.75	22.44

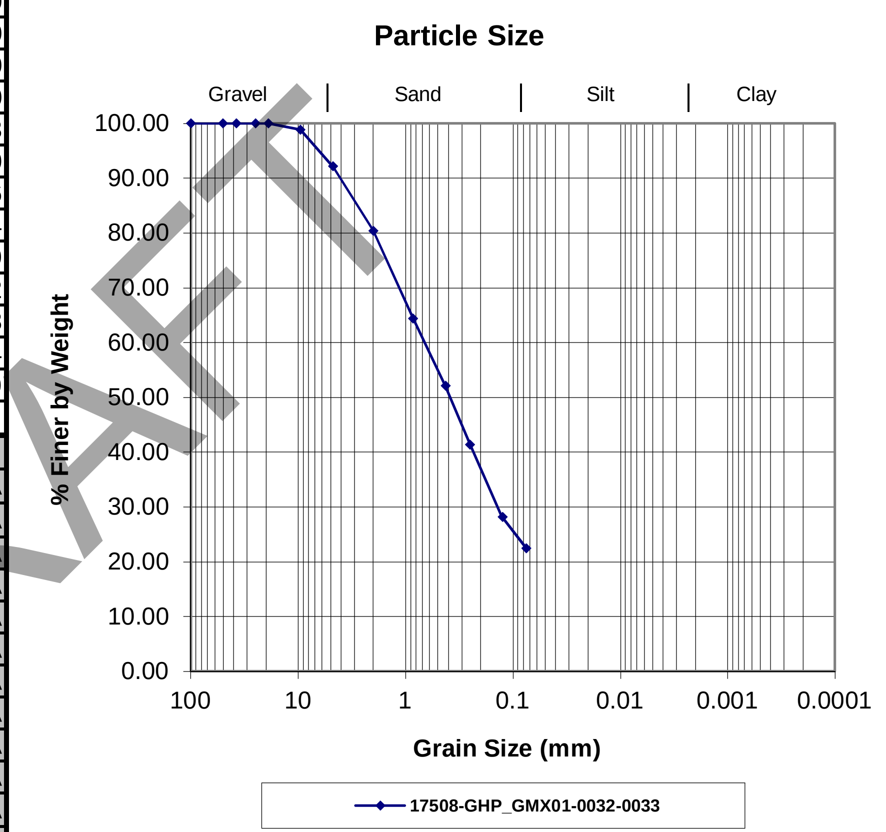
Dia (mm)	% Passing
0.04500	N/A
0.03375	N/A
0.02500	N/A
0.01875	N/A
0.01400	N/A
0.01000	N/A
0.00750	N/A
0.00500	N/A
0.00375	N/A
0.00250	N/A
0.00150	N/A

Hydrometer Data

Working Values & Coefficients

D_{10}	-
D_{30}	-
D_{60}	-
Cu	N/A
Cc	N/A
Starting Wt.	348.75
Field USCS	SC

ASTM D 422 Method



Project #	**17508**
Hole #	GHP_GMX01
Depth	32.90 - 33.12
Client	Aura Minerals
Location	Aranzazu
Date	7/28/2017
Technician	CMG/JM

Notes: **200 Wash only / No Hydrometer. Sample was a blend of GHP_GMX01 @ 32.9-33.12 Fines classify as CL**

As Received Moisture %		N/A	
LL	53	PL	14
PI	39	Flow Index	N/A
USCS	**SC**	Silt/Clay %	22.44
Description	Clayey sand		
Sample #	**17508-GHP_GMX01-0032-0033**		

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**ATTERBERG LIMITS BY CASAGRANDE ASTM D4318**	Date	8/2/2017
Hole #	GHP_GMX01		Tech	CMG
Depth	32.90 - 33.12	**17508-GHP_GMX01-0032-0033**	Client	Aura Minerals
Estimated USCS	SC		Location	Aranzazu

Liquid Limit determination by Casagrande Method (Method A)

Can #		252	666				
Weight of can (g)		30.017	31.253				
WET Sample & Can(g)		45.025	48.097				
DRY wt 1	10-Aug	39.853	42.308				
DRY wt 2							
DRY wt 3							
Weight of Moisture(g)		5.172	5.789				
Weight of Dry Sample		9.836	11.055				
Moisture Content %		**52.6%**	**52.4%**				
No. of Blows		**27**	**28**				

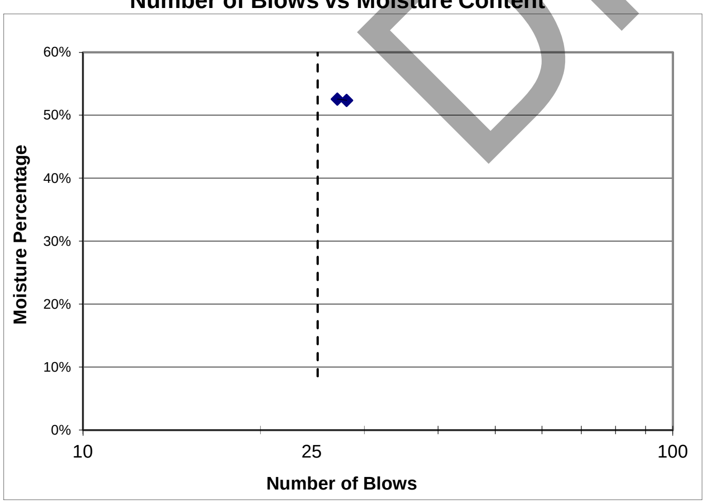
Plastic limit determination

Can #		102	332	121	101	**Average**
Weight of can (g)		11.155	11.271	11.128	11.198	
WET Sample & Can(g)		13.218	13.207	13.079	12.940	
DRY wt 1	10-Aug	12.986	12.971	12.851	12.719	
DRY wt 2						
DRY wt 3						
Weight of Moisture(g)		0.232	0.236	0.228	0.221	0.917
Weight of Dry Sample		1.831	1.700	1.723	1.521	6.775
Moisture Content %		**12.7%**	**13.9%**	**13.2%**	**14.5%**	**13.5%**

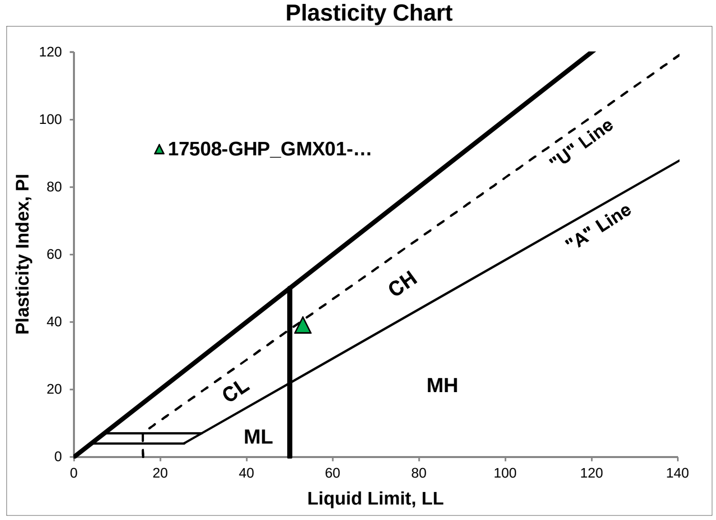
Liquid Limit determination by Single Point (Method B)

	Point 1	Point 2	Average	**Liquid Lim.**	Difference
Moisture Content %	52.582%	52.365%		**53**	0.01%
No. of Blows	27	28			
Calculated Liquid Limit	53.1%	53.1%	53.1%		

Number of Blows vs Moisture Content



Plasticity Chart



Flow Index	Liquid Limit	Plastic Limit	Plasticity Index:
N/A	53	14	39

Per ASTM 2487, Fines Classified as: **CH**

Sample #	17508-GHP_GMX01-0032-0033

As Received		
Project #	17508	
Coordinates	GHP_GMX01	
Depth	32.90 - 33.12	
USCS	**SC**	Clayey sand

Sieve Analysis & Soil Classification

Sieve Size U.S.	Sieve Size mm	Retained Weight (Grams)	Retained % of Weight	Cumulative % Retained (Coarser)	Cumulative % Passing (Finer)
4"	100	0.00	0.00	0.00	100.00
2"	50.0	0.00	0.00	0.00	100.00
1.5"	37.5	0.00	0.00	0.00	100.00
1"	25.0	0.00	0.00	0.00	100.00
3/4"	19.0	0.00	0.00	0.00	100.00
3/8"	9.5	6.65	2.76	2.76	97.24
# 4	4.75	5.29	2.20	4.96	95.04
# 10	2.00	14.07	5.84	10.80	89.20
# 20	0.850	26.46	10.98	21.78	78.22
# 40	0.425	26.59	11.04	32.82	67.18
# 60	0.250	18.46	7.66	40.48	59.52
# 120	0.125	27.45	11.39	51.87	48.13
# 200	0.075	18.34	7.61	59.49	40.51
Pan		97.60	40.51	100	0
Total		240.90			

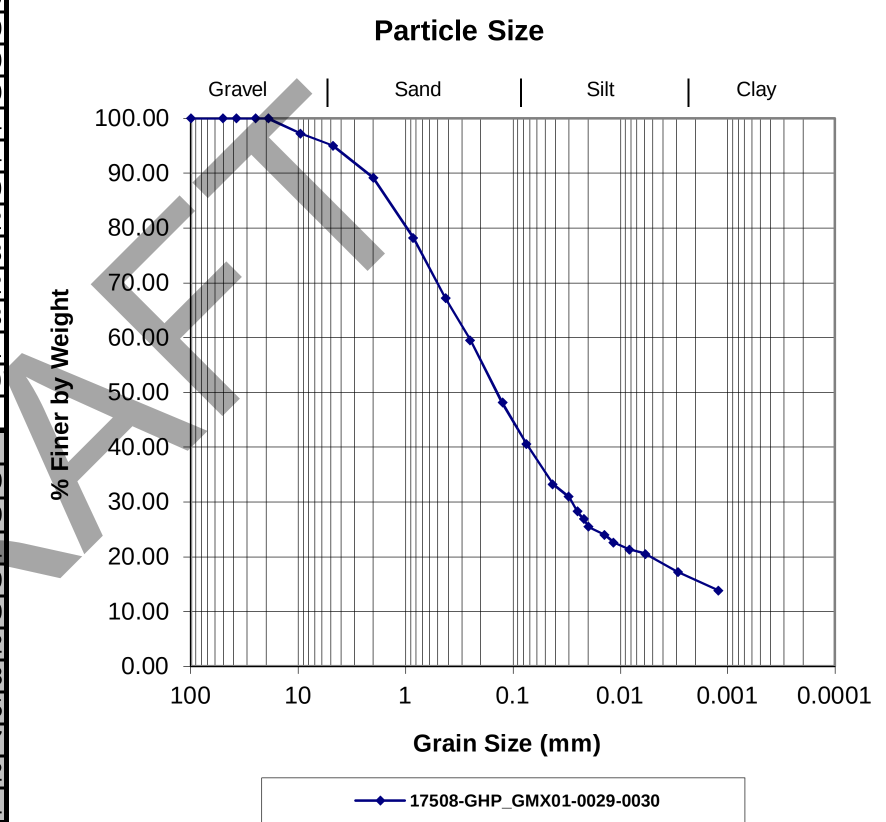
Coarse Gravel %	Fine Gravel %	Coarse Sand %	Medium Sand %	Fine Sand %	Silt / Clay %
0.00	4.96	5.84	22.02	26.67	40.51

Dia (mm)	% Passing
0.04500	33.79
0.03375	31.59
0.02500	28.21
0.01875	25.19
0.01400	23.99
0.01000	22.02
0.00750	21.08
0.00500	19.55
0.00375	18.17
0.00250	16.42
0.00150	14.41

Hydrometer Data

Working Values & Coefficients

D_{10}	N/A
D_{30}	0.0296
D_{60}	0.261
Cu	N/A
Cc	N/A
Starting Wt.	240.90
Field USCS	SC
ASTM D 422 Method	



Project #	**17508**
Hole #	GHP_GMX01
Depth	29.0 - 30.07
Client	Aura Minerals
Location	Aranzazu
Date	8/18/2017
Technician	JM/CMG

Notes: **Sample was a blend of GHP_GMX01 @ 29.45-29.6; 29.73-29.80; 30.0-30.07. Fines classify as CL**

As Received Moisture %		N/A	
LL	40	PL	20
PI	20	Flow Index	N/A
USCS	**SC**	Silt/Clay %	40.51
Description	Clayey sand		
Sample #	**17508-GHP_GMX01-0029-0030**		

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

17508-GHP-GMX01-0029-0030-USCS.xlsm

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	**ATTERBERG LIMITS BY CASAGRANDE ASTM D4318**	Date	8/1/2017
Hole #	GHP_GMX01		Tech	CMG
Depth	29.0 - 30.07	**17508-GHP_GMX01-0029-0030**	Client	Aura Minerals
Estimated USCS	SC		Location	Aranzazu

Liquid Limit determination by Casagrande Method (Method A)

Can #		64	212				
Weight of can (g)		30.853	30.988				
WET Sample & Can(g)		46.705	46.650				
DRY wt 1	2-Aug	42.082	42.031				
DRY wt 2	3-Aug	42.090	42.047				
DRY wt 3							
Weight of Moisture(g)		4.623	4.619				
Weight of Dry Sample		11.229	11.043				
Moisture Content %		**41.2%**	**41.8%**				
No. of Blows		**19**	**19**				

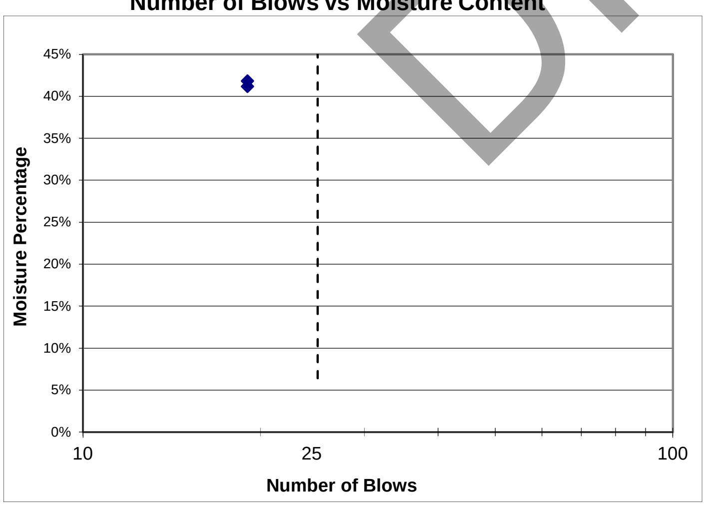
Plastic limit determination

Can #		330	308	105	127	**Average**
Weight of can (g)		11.260	11.303	11.029	11.473	
WET Sample & Can(g)		14.316	14.109	14.427	15.782	
DRY wt 1	2-Aug	13.813	13.660	13.892	15.048	
DRY wt 2	3-Aug	13.819	13.664	13.893	15.055	
DRY wt 3						
Weight of Moisture(g)		0.503	0.449	0.535	0.734	2.221
Weight of Dry Sample		2.553	2.357	2.863	3.575	11.348
Moisture Content %		**19.7%**	**19.0%**	**18.7%**	**20.5%**	**19.6%**

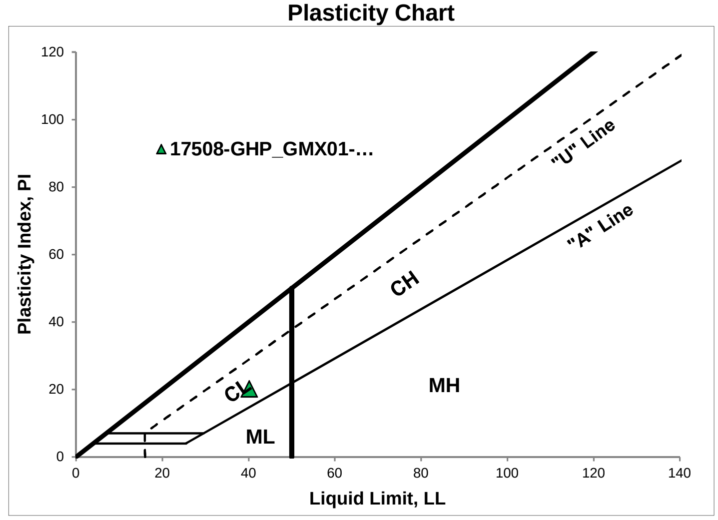
Liquid Limit determination by Single Point (Method B)

	Point 1	Point 2	Average	**Liquid Lim.**	Difference
Moisture Content %	41.170%	41.827%			
No. of Blows	19	19		**40**	0.64%
Calculated Liquid Limit	39.8%	40.5%	40.1%		

Number of Blows vs Moisture Content



Plasticity Chart



Flow Index	Liquid Limit	Plastic Limit	Plasticity Index:
N/A	40	20	20

Per ASTM 2487, Fines Classified as: **CL**

Sample #	17508-GHP_GMX01-0029-0030

As Received		
Project #	17508	
Coordinates	GHP_GMX01	
Depth	29.0 - 30.07	
USCS	**SC**	Clayey sand

Sieve Analysis & Soil Classification

Sieve Size U.S.	Sieve Size mm	Retained Weight (Grams)	Retained % of Weight	Cumulative % Retained (Coarser)	Cumulative % Passing (Finer)
4"	100	0.00	0.00	0.00	100.00
2"	50.0	0.00	0.00	0.00	100.00
1.5"	37.5	0.00	0.00	0.00	100.00
1"	25.0	0.00	0.00	0.00	100.00
3/4"	19.0	0.00	0.00	0.00	100.00
3/8"	9.5	4.51	1.68	1.68	98.32
# 4	4.75	3.40	1.27	2.94	97.06
# 10	2.00	8.01	2.98	5.92	94.08
# 20	0.850	21.49	7.99	13.92	86.08
# 40	0.425	27.86	10.36	24.28	75.72
# 60	0.250	18.92	7.04	31.31	68.69
# 120	0.125	28.85	10.73	42.04	57.96
# 200	0.075	19.03	7.08	49.12	50.88
Pan		136.77	50.88	100	0
Total		268.83			

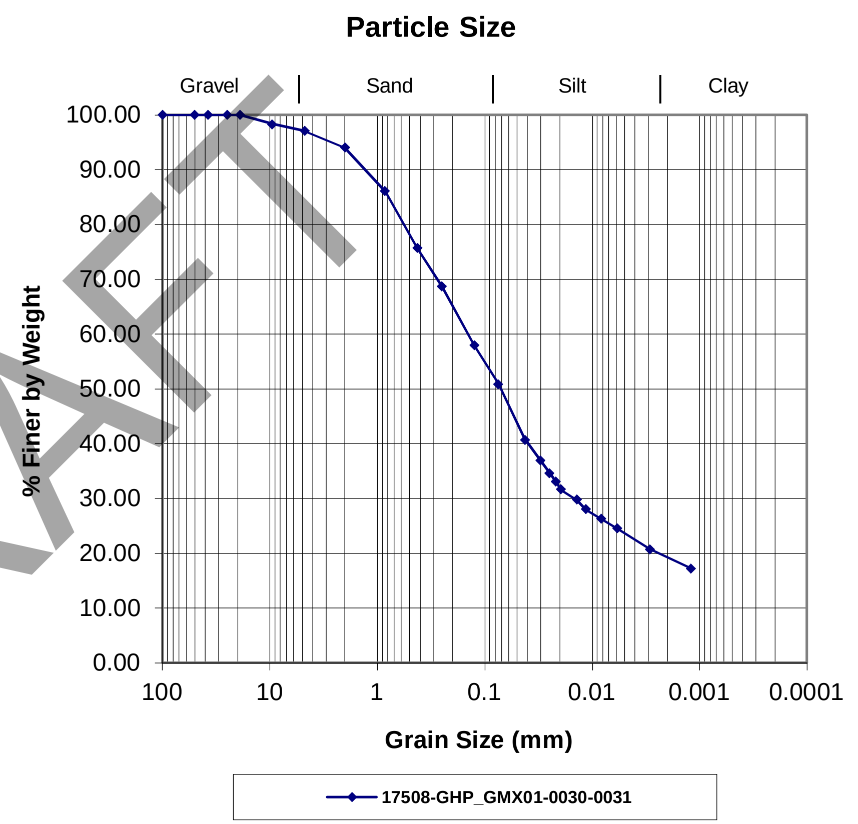
Coarse Gravel %	Fine Gravel %	Coarse Sand %	Medium Sand %	Fine Sand %	Silt / Clay %
0.00	2.94	2.98	18.35	24.85	50.88

Hydrometer Data

Dia (mm)	% Passing
0.04500	41.63
0.03375	38.02
0.02500	34.65
0.01875	31.39
0.01400	29.79
0.01000	27.24
0.00750	25.78
0.00500	23.46
0.00375	21.82
0.00250	19.89
0.00150	17.83

Working Values & Coefficients

D_{10}	N/A
D_{30}	0.0146
D_{60}	0.1488
Cu	N/A
Cc	N/A
Starting Wt.	268.83
Field USCS	SC
ASTM D 422 Method	



Project #	**17508**
Hole #	GHP_GMX01
Depth	30.45 - 30.99
Client	Aura Minerals
Location	Aranzazu
Date	7/28/2017
Technician	CMG/JM

Notes: **Sample was a blend of GHP_GMX01 @ 30.45-30.60; 30.9-30.99. Fines classify as CL**

CALL & NICHOLAS, INC.
GEOMECHANICAL LABORATORY
TUCSON, ARIZONA USA

As Received Moisture %		N/A	
LL	36	PL	18
PI	18	Flow Index	N/A
USCS	**CL**	Silt/Clay %	50.88
Description	Sandy lean clay		
Sample #	**17508-GHP_GMX01-0030-0031**		

17508-GHP-GMX01-0030-0031-USCS.xlsm

CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	ATTERBERG LIMITS BY CASAGRANDE ASTM D4318	Date	8/1/2017
Hole #	GHP_GMX01		Tech	CMG
Depth	30.45 - 30.99	17508-GHP_GMX01-0030-0031	Client	Aura Minerals
Estimated USCS	SC		Location	Aranzazu

Liquid Limit determination by Casagrande Method (Method A)

Can #		213	28				
Weight of can (g)		30.881	29.505				
WET Sample & Can(g)		44.432	49.218				
DRY wt 1	2-Aug	40.771	44.044				
DRY wt 2	Aug-17	40.781	43.996				
DRY wt 3							
Weight of Moisture(g)		3.661	5.222				
Weight of Dry Sample		9.890	14.491				
Moisture Content %		**37.0%**	**36.0%**				
No. of Blows		**23**	**23**				

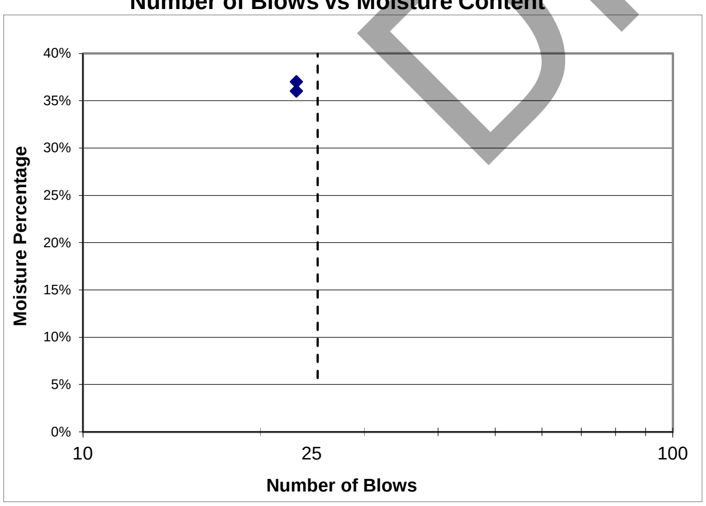
Plastic limit determination

Can #		113	111	119	420	**Average**
Weight of can (g)		11.103	11.194	11.152	11.496	
WET Sample & Can(g)		14.529	13.788	14.491	14.974	
DRY wt 1	2-Aug	14.014	13.421	13.985	14.428	
DRY wt 2	3-Aug	14.020	13.422	13.988	14.438	
DRY wt 3						
Weight of Moisture(g)		0.515	0.367	0.506	0.546	1.934
Weight of Dry Sample		2.911	2.227	2.833	2.932	10.903
Moisture Content %		**17.7%**	**16.5%**	**17.9%**	**18.6%**	**17.7%**

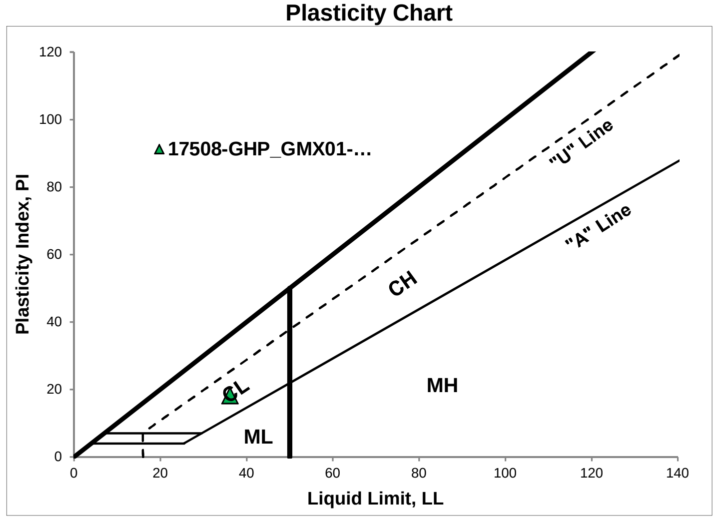
Liquid Limit determination by Single Point (Method B)

	Point 1	Point 2	Average	**Liquid Lim.**	Difference
Moisture Content %	37.017%	36.036%		**36**	0.97%
No. of Blows	23	23			
Calculated Liquid Limit	36.6%	35.7%	36.2%		

Number of Blows vs Moisture Content



Plasticity Chart



Flow Index	**Liquid Limit**	**Plastic Limit**	**Plasticity Index:**
N/A	36	18	18

Per ASTM 2487, Fines Classified as: **CL**

Sample #	17508-GHP_GMX01-0030-0031

As Received		
Project #	17508	
Coordinates	GHP_GMX01	
Depth	30.45 - 30.99	
USCS	**CL**	Sandy lean clay

X-RAY DIFFRACTION

CALL & NICHOLAS, INC.

12421 W. 49th Avenue, Unit #6
Wheat Ridge, CO 80033 (303) 463-8270

Semi-Quantitative X-Ray Diffraction Analysis

Client:	Analysis Date: 8-9-17
Call & Nicholas, Inc.	Reporting Date: 8-10-17
2475 N. Coyote Drive	Receipt Date: 8-7-17
Tucson, AZ 85745	Client Job No.: None Given
	Project Title: 17508
	DCMSL Project: CN24

Client Sample No.:	**17508-GHP_ GMX01-0030**	**17508-GHP_ GMX01-0032**
<u>Bulk Sample</u>		
Quartz	8	3
Tazheranite	11	2
Chalcopyrite	1	1
Arsenopyrite	4	4
Sphalerite	2	3
Pyrite	22	24
Siderite	-	5
Goethite	2	-
Total Clay	50	58
Smectite	49	57
Kaolinite	1	1

The bulk samples were prepared for x-ray diffraction analysis and scanned over a range of 4º to 60 º 2θ Cu Kα radiation, 40kV, 35mA. Mineral phases were identified with the aid of computer-assisted programs accessing a powder diffraction database. Estimates of mineral concentrations are based on relative peak heights and reference intensity ratios (RIR) measured in-house.

12421 W. 49th Avenue, Unit #6
Wheat Ridge, CO 80033 (303) 463-8270

Semi-Quantitative X-Ray Diffraction Analysis

Client:
Call & Nicholas, Inc.
2475 N. Coyote Drive
Tucson, AZ 85745

Analysis Date:	8-9-17
Reporting Date:	8-10-17
Receipt Date:	8-7-17
Client Job No.:	None Given
Project Title:	17508
DCMSL Project:	CN24

Client Sample No.:	**17508-GHP_ GMX01-0030**	**17508-GHP_ GMX01-0032**
Clay Fraction <2µm		
Smectite	97	98
Kaolin	3	2

An oriented clay mount (<2µm) was prepared for x-ray diffraction analysis and scanned over a range of 3° to 40° 2Θ Cu Ka radiation, 40kV, 25mA. The mount was analyzed air-dried (RH ~25%) and glycolated. Clay concentrations are based on peak areas and intensity factors measured in-house on known standards or computer calculated.

Ron Schott

Ron Schott, Analyst

2678
CN24

CALL & NICHOLAS, INC.

2475 N. Coyote Drive
Tucson, Arizona 85745 U.S.A.

Tel: (520) 670-9774
Fax: (520) 670-9251
E-Mail: cni@cnitucson.com

Principals
P. F. Cicchini, P.E.
T. M. Ryan, P.E.
R. C. Barkley, P.E.
R. Pratt, P.E.

TO:	**DCM Science Laboratories**
FROM:	**Mr. Chris Grubb / Call & Nicholas, Inc.**
DATE:	**Aug 02, 2017**
SUBJECT:	**XRD Testing Request**

Please find enclosed 2 samples for Bulk and Clay Fraction XRD analysis.

The sample set includes the following:

CNI Project #17508:

- 17508-GHP_GMX01-0030
- 17508-GHP_GMX01-0032

We have very limited material, I hope there is enough to conduct the requested testing.

If there are any questions or issues with this request, please contact myself by telephone at 520-884-7554 or via email at cgrubb@cnitucson.com.

Sincerely,

Chris Grubb
Lab Manager

Rec'd D Harvey 8/7/17 11:15