## GEOMECHANICAL FEASIBILITY EVALUATION FOR THE ARANZAZU UNDERGROUND MINE

Prepared for

AURA MINERALS, INC.

By

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### TABLE OF CONTENTS

1.0	EXECUTIVE SUMMARY	1-1
1.1	LONG HOLE OPEN STOPE DIMENSIONS	1-1
Ĺ	1.1.1 Overbreak Estimates	1-2
	1.1.2 Hanging Wall Scab Pillars	1-2
1.2	PILLAR STABILITY AND GENERAL SEQUENCING	1-2
	2.1 Rock Pillars between Open Stopes	1-3
Ĺ	2.2.2 CRF Pillars between Open Stopes	1-3
	2.3 Sill Pillar Thickness	1-3
1.3	BACKFILL REQUIREMENTS	1-4
1.4	GROUND SUPPORT RECOMMENDATIONS	1-4
1.5	ESTIMATED MINE INFILTRATION	1-5
1.6	RECOMMENDATIONS AND CONCLUSIONS GOING FORWARD	1-6
2.0	INTRODUCTION	2-1
2.1	Memoranda	2-1
3.0	ENGINEERING GEOLOGY	3-1
3.1	ROCK TYPES	3-1
3.2	MAJOR STRUCTURES	3-1
4.0	GEOTECHNICAL BLOCK MODEL	4-1
4.1	DRILL HOLE DATABASE	4-1
4	4.1.1 Quality Control	4-1
4	4.1.2 Compositing	
4.2	GEOTECHNICAL DOMAIN DETERMINATION	4-2
4	4.2.1 Fault Domain	
4.3	BLOCK MODEL RQD ESTIMATIONS	4-3
4	4.3.1 Variography	
4.4	ESTIMATIONS TECHNIQUES	4-4
4	4.4.1 Nearest Neighbor Estimate	4-4
4	4.4.2 Inverse Distance Weighting Estimate	
4.5	BLOCK MODEL ESTIMATE	4-4
4	4.5.1 Estimation Discussion	
4.6	Q PRIME BLOCK MODEL CALCULATIONS	4-5
4.7	ROCK QUALITY STOPE EVALUATION – TRANSVERSE STOPING	
5.0	GEOTECHNICAL INVESTIGATION	5-1

5.1	GEOTECHNICAL CORE DRILLING PROGRAM	5-1
5.1	.1 Oriented Core Data	
5.1	.2 Geomechanical Logging and Drill Hole QA/QC	
5.1	.3 Sampling	
<b>6.0</b>	LABORATORY TESTING AND ROCK STRENGTH	6-1
6.1	SAMPLE SELECTION	6-1
6.2	INTACT ROCK SHEAR STRENGTH	
6.3	FRACTURE SHEAR STRENGTH	
6.4	ROCK-MASS SHEAR STRENGTH	
6.4	.1 CNI Rock-Mass Shear Strengths	
6.4	.2 Input Parameters	
6.4	.3 Rock-Mass Strengths	
7.0	HYDROGEOLOGY	7-1
7.1	GROUNDWATER RECHARGE	
7.1	.1 Infiltration Calculation	
7.1	.2 Recharge from Infiltration	
7.1	.3 Recharge Calculation	
7.2	REGIONAL GROUNDWATER INFLOW CALCULATION	
7.2	.1 Zone 1 Analytical Solution	
7.2	.2 Zone 2 Analytical Solution	
7.2	.3 Steady State Inflow Calculation	
7.3	PEAK INFLOW CALCULATION	7-5
8.0	PRODUCTION MINING - LONG HOLE OPEN STOPING	8-1
8.1	LONG HOLE OPEN STOPING	
8.1	.1 Criteria for Long Hole Open Stoping	
8.1	.2 Mathews Stability Graph Method	
8.1	.3 Hanging Wall Scab Pillars	
8.1	.4 Overbreak (Dilution) Estimates	
8.2	PILLAR STABILITY EVALUATIONS	
8.2	.1 Wilson's Confined Core Method	
8.2	.2 Rib Pillars between Open Stopes	
8.2	Access Pillars between Stopes and the Haulage Gallery	8-0
8.2	.4 Sul Pulars between Mining Areas	8-/
9.0	GROUND SUPPORT AND BACKFILL	9-1
9.1	GROUND SUPPORT REQUIREMENTS	9-1
9.1	.1 Access (Development) Ground Support	
9.1	.2 Stoping (Production) Ground Support	
9.1	.3 Fibercrete	
0.0		0.0
9.2	BACKFILL KEQUIREMENTS	

#### LIST OF TABLES

- 1-1 Stable Stope Dimensions at 30m Heights
- 1-2 Stable Stope Dimensions at 20m Heights
- 1-3 Overbreak & Slough Estimates
- 1-4 Access Ground Support Requirements (4.5m Width)
- 1-5 Stoping Ground Support Requirements
- 1-6 Estimated Peak Inflow Duration and Volume
- 4-1 Geotechnical Drill Plan for Glory Hole Deposit
- 4-2 Drill Hole Statistics by Geotechnical Domain
- 4-3 Block Model Extents and Rotation
- 4-4 Isotropic Variogram Model by Geotechnical Domain
- 4-5 RQD Block Model Composite Selection and Estimation Strategy
- 4-6 RQD Block Model Search Strategy
- 5-1 2017 Geotechnical Drill Plan for Glory Hole Deposit
- 6-1 Small-Scale Direct-Shear Testing Summary
- 6-2 Uniaxial Compression Testing Summary
- 6-3 Triaxial Compression Testing Summary
- 6-4 Brazilian Disk Tension Testing Summary
- 6-5 X-Ray Diffraction Results
- 6-6 Rock-Mass Strengths
- 7-1 Soil Water Balance for Monthly Average Precipitation
- 7-2 Soil Water Balance for upper 90<sup>th</sup> Percentile Conditions (1966)
- 7-3 Estimated Recharge Rates in Concepcion del Oro Watershed
- 7-4 Estimated Peak Inflow Duration and Volume
- 8-1 Geomechanical Material Types (GMT)
- 8-2 N' Stability Number Inputs
- 8-3 Stability Number and Maximum Hydraulic Radius by GMT
- 8-4 Stable Stope Dimensions at 30m Heights
- 8-5 Overbreak Estimates at Stope Widths of 10 meters
- 8-6 Stope Rib Pillar Rock Mass Strengths
- 8-7 Access Pillar Rock Mass Strengths

## LIST OF TABLES (Continued)

- 9-1 Access Ground Support Requirements (4.5m Width)
- 9-2 Stoping Ground Support Requirements

#### LIST OF FIGURES

- 1-1 General Primary / Secondary Stope Layout
- 1-2 CRF Pillar Loading Scenarios
- 1-3 Sill Pillar Thickness by GMT & Length
- 1-4 Estimated Steady State Groundwater Inflow with Depth
- 1-5 Estimated Peak Inflow by Fault Zone Width and Hydraulic Conductivity
- 3-1 Report Cross Section Locations
- 3-2 Cross Section (24) Presenting Interpreted Geology
- 3-3 Cross Section (42) Presenting Interpreted Geology
- 3-4 Plan View (1875L) Presenting Interpreted Geology
- 3-5 Fault Traces in Plan View (2040 L) Showing Cross Cutting Relationships
- 4-1 Cumulative Distribution of Drill Hole Composite Comparing CNI and Site Logged RQD Data
- 4-2 Cumulative Distribution of Drill Hole Composite Comparing CNI and Site Logged Jr/Ja Ratio Data
- 4-3 Cumulative Distribution of Drill Hole Barton Jn Parameter Logged by Site and CNI
- 4-4 Drill Hole Comparison of Logged RQD and Barton Jn Parameter for Marble Domain
- 4-5 Drill Hole Comparison of Logged RQD and Barton Jn Parameter for Hornfels Domain
- 4-6 Drill Hole Comparison of Logged RQD and Barton Jn Parameter for Skarn Domain
- 4-7 Drill Hole Comparison of Logged RQD and Barton Jn Parameter for Porphyry Domain
- 4-8 Drill Hole Comparison of Logged RQD and Barton Jn Parameter for Intrusive Domain
- 4-9 Regressions of RQD Jn Relationships by Domain
- 4-10 Cumulative Distribution of Drill Hole Composite RQD by Rock Type
- 4-11 Cumulative Distribution of Drill Hole Composite RQD by Geotechnical Domain
- 4-12 Cross Section (24) Presenting Geotechnical Domain Boundaries
- 4-13 Cross Section (42) Presenting Geotechnical Domain Boundaries
- 4-14 Plan View (1875 L) Presenting Geotechnical Domain Boundaries
- 4-15 Oblique View (Plan View) of Aranzazu Modeled Faults and Low RQD Composite Intervals
- 4-16 Oblique View (Looking Northeast) of Fault Domain Wireframes and Low RQD Composite Intervals
- 4-17 Experimental Isotropic Variogram of Marble Domain
- 4-18 Experimental Isotropic Variogram of Hornfels Domain

- 4-19 Experimental Isotropic Variogram of Skarn Domain
- 4-20 Experimental Isotropic Variogram of Porphyry Domain
- 4-21 Comparison of RQD Distributions of Drill Hole Composites and Block Model RQD Data for Marble Domain
- 4-22 Comparison of RQD Distributions of Drill Hole Composites and Block Model RQD Data for Hornfels Domain
- 4-23 Comparison of RQD Distributions of Drill Hole Composites and Block Model RQD Data for Skarn Domain
- 4-24 Comparison of RQD Distributions of Drill Hole Composites and Block Model RQD Data for Intrusive Domain
- 4-25 Comparison of RQD Distributions of Drill Hole Composites and Block Model RQD Data for Porphyry Domain
- 4-26 Cross Section (24) Presenting Estimated RQD
- 4-27 Cross Section (42) Presenting Estimated RQD
- 4-28 Plan View (1875) Presenting Estimated RQD
- 4-29 Cross Section (24) Presenting Estimated Q Prime
- 4-30 Cross Section (42) Presenting Estimated Q Prime
- 4-31 Plan View (1875 L) Presenting Estimated Q Prime
- 4-32 Cumulative Distribution of Estimated Q Prime by Domain
- 4-33 Plan View of 1905 Level Showing Stope Wireframes and WALL Model Codes
- 4-34 Oblique View of Deposit Footwall Blocks Comparing Q Prime Values (QCNI) and Q Prime Percentile Values (QPPCT)
- 4-35 Stope Q Prime Matrix for All Deposits Except Glory Hole Hanging Wall
- 4-36 Stope Q Prime Matrix of Glory Hole Hanging Wall Deposit
- 4-37 Stope Q Prime Matrix of Previously Sterilized Stopes
- 5-1 Lithology Section GHP\_GMX01 (Looking NW)
- 5-2 Lithology Section GHP\_GMX02 (Looking NW)
- 5-3 Lithology Section GHP\_GMX03 (Looking NW)
- 5-4 Lithology Section GHP\_GMX04 (Looking NW)
- 5-5 Lithology Section GHP GMX05 (Looking NW)
- 5-6 Lithology Section GHP GMX06 (Looking NW)
- 5-7 Lithology Section GHP\_GMX07 (Looking N)
- 5-8 2017 CNI Oriented Core Data Skarn
- 5-9 2017 CNI Oriented Core Data Intrusive

#### LIST OF FIGURES (Continued)

- 5-10 2017 CNI Oriented Core Data Hornfels
- 5-11 2017 CNI Oriented Core Data Limestone
- 6-1 Marble Intact Shear Strength
- 6-2 Hornfels Intact Shear Strength
- 6-3 Skarn Intact Shear Strength
- 6-4 Intrusive Intact Shear Strength
- 6-5 Intact Shear Strength Summary
- 6-6 Marble Average Fracture Shear Strength
- 6-7 Hornfels Average Fracture Shear Strength
- 6-8 Skarn Average Fracture Shear Strength
- 6-9 Intrusive Average Fracture Shear Strength
- 6-10 Fracture Shear Strength Summary
- 6-11 Marble Calculated Rock Mass Strength
- 6-12 Hornfels Calculated Rock Mass Strength
- 6-13 Skarn Calculated Rock Mass Strength
- 6-14 Intrusive Calculated Rock Mass Strength
- 7-1 Vegetative Zones and Contributing Watershed to Aranzazu Mine
- 7-2 Annual Precipitation Frequency Distribution
- 7-3 Estimated Steady State Groundwater Inflow with Depth
- 7-4 Estimated Peak Inflow by Fault Zone Width and Hydraulic Conductivity
- 8-1 2017 CNI Oriented Core Data Skarn
- 8-2A Stability Graph Results for GMT 2 (Q' = 0.6); Longitudinal Mining
- 8-2B Stability Graph Results for GMT 2 (Q' = 0.6); Transverse Mining
- 8-3A Stability Graph Results for GMT 3 (Q' = 1.0); Longitudinal Mining
- 8-3B Stability Graph Results for GMT 3 (Q' = 1.0); Transverse Mining
- 8-4A Stability Graph Results for GMT 4 (Q' = 2.0); Longitudinal Mining
- 8-4B Stability Graph Results for GMT 4 (Q' = 2.0); Transverse Mining
- 8-5A Stability Graph Results for GMT 5 (Q' = 4.0); Longitudinal Mining
- 8-5B Stability Graph Results for GMT 5 (Q' = 4.0); Transverse Mining
- 8-6A Stability Graph Results for GMT 6 (Q' = 10.0); Longitudinal Mining

#### LIST OF FIGURES (Continued)

- 8-6B Stability Graph Results for GMT 6 (Q' = 10.0); Transverse Mining
- 8-7 Stope Rib Pillar Stability Results
- 8-8 Average Stope RQD Distribution at the Glory Hole FW
- 8-9 Access Pillar Stability Results
- 8-10 RQD Distributions at the Glory Hole FW
- 8-11 Sill Pillar Thickness by GMT
- 8-12 GMT Percent Frequency in the 1840m 1850m Sill Pillar
- 9-1 Ground Support Chart
- 9-2 CRF Pillar Loading Scenarios
- 9-3 CRF Strength Criteria for 10m Wide CRF Pillar

#### **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 Long Hole Open Stope Dimensions

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 <u>not</u> 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 <u>Estimated Mine Infiltration</u>

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 99<sup>th</sup> 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 <u>Recommendations and Conclusions Going Forward</u>

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 HeightsAranzazu Mine, Aura Minerals, Inc., 2017

O Primo	СМТ	Trans	sverse	Longit	udinal
Q-TIMe	GMI	Width (m) <sup>1</sup>	Length (m) <sup>2</sup>	Width (m) <sup>1</sup>	Length (m) <sup>2</sup>
< 0.6	1	Not Stope-able (Require	es Widths Less Than 5m)	Not Stope-able (Require	s 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

<sup>1</sup> Dimension Controlled by Stability of the Hanging Wall

<sup>2</sup> Dimension Controlled by Stability of the Side Wall

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

O - Prime	GMT	Trans	sverse	Longi	tudinal
Q-TTIME	OWI	Width (m) <sup>1</sup>	Length (m) <sup>2</sup>	Width (m) <sup>1</sup>	Length (m) <sup>2</sup>
< 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		19	24	24	19
6.0 - 8.0	5	26	32	32	26
8.0 - 10.0		28	34	34	28
> 10.0	6	28	36	36	28

<sup>1</sup> Dimension Controlled by Stability of the Hanging Wall <sup>2</sup> Dimension Controlled by Stability of the Side Wall

CALL & NICHOLAS, INC.

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

		Empirical Estimation	on of Overbreak & Slough For Unsuj	oported Hangingwall	
GMT	Q - Prime	Stope Width (m)	*Equivalent Length of Estimated Overbreak (m)	<sup>++</sup> 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

<sup>++</sup> 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

		Empirical Estimation	on of Overbreak & Slough For Unsu	oported Hangingwall
GMT	Q - Prime	Stope Width (m)	*Equivalent Length of Estimated Overbreak (m)	<sup>++</sup> Equivalent Length of Additional Slough (m)
1	< 0.6	7	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

		Empirical Estimation	on of Overbreak & Slough For Unsu	oported Hangingwall		
GMT	Q - Prime	Stope Width (m)	*Equivalent Length of Estimated Overbreak (m)	<sup>++</sup> 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 RequirementsAranzazu Mine, Aura Minerals, Inc., 2017

GMT	O - Prime		Stope Ground Support Summary
Givit	Q IIIInc	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

		F	low Duration (day	vs)	<b>Total Inflow Volume (m3)</b>		
		500 m Fault Length			500 m Fault Length		
			Porosity			Porosity	
		5%	7.5%	10%	5%	7.5%	10%
Fault	2	3	4	6	1,500	2,250	3,000
Width (m)	7	6	9	12	5,250	7,875	10,500
	12	29	43	58	9,000	13,500	18,000





# MINING SEQUENCE	CALL & NICHOLAS, INC.	GENERAL PRIMARY / SECONDARY	
PRIMARY STOPE - CRF FILL			
SECONDARY STOPE - WASTE FILL		STOPE L	AYOUT
	DRAWN RWC DATE 10/17 REVISED 10/12/2017 2:29 PM	ARANZAZU	
	\2017\_REPORT\FIGURES\FIG1-1_STOPELLAYOUT.DWG	SCALE N.T.S.	FIGURE 1-1



Sill Pillar Thickness by GMT & Length



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



Estimated Steady State Groundwater Inflow with Depth

Elevation of Deepest Mine Workings (m)

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



Estimated Peak Inflow by Fault Zone Width and Hydraulic Conductivity

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

#### 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 <u>Memoranda</u>

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.
- 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 <u>Major Structures</u>

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.

#### 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 <u>Geotechnical Domain Determination</u>

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<sup>®</sup>. 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 **<u>Q Prime Block Model Calculations</u>**

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 =  $\sum$ (Length  $\ge$  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 <u>Rock Quality Stope Evaluation – Transverse Stoping</u>

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 25<sup>th</sup> 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.

Drill Hole ID		Collar Location	Azimuth	Dip	Longth (m)	
DIIII Hole ID	Northing	Easting	Elevation	(deg)	(deg)	Length (III)
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

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

TOTAL: 1,385

		Fault D	Domain		Non-Fault Domain								
Domain	Num. of	Mean RQD	STD. Dev.	Coeff.	Num. of	Mean RQD	STD. Dev.	Coeff.					
	Intervals	(%)	RQD (%)	Variation	Intervals	(%)	RQD (%)	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 4-2. Drill Hole Statistics by Geotechnical DomainAranzazu Mine, Aura Minerals, Inc., 2017

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

			Model Limits		
	Minimum	Maximum	Block Size	Number of	Model
	wiininuni	Maximum	(m)	Blocks	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
Х	25
Y	0
Z	0

\* GSLIB Rotation Convention

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 <sup>+</sup>				
Intrusive*				

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

<sup>+</sup> 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						
	Dragadura	Douvor	Drimory	Sacandamy	Minimum №	Maximum №	Maximum №				
	Plocedule	Power	Primary	Secondary	Comps	Comps	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

Domain	Sear	ch Distance	e (m)	Rotation*							
Domain	Х	Y	Z	Х	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					

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

\* 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 4-28. 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 4-32. 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	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
LEVEL	EL 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	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	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											13.3	16.5	14.2	8.9	10.9	10.1	8.2	7.9	7.7	11.6	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																9.0	9.6	8.1	6.1	6.9	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														19.8	13.3	8.5	10.0	11.1	16.3	24.5	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															8.8	11.0	13.7	17.8	22.8	7.7	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
																				STC	OPES		/																	
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	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	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											14.2	16.7	22.8	10.0	9.8	5.0	5.0	6.1	6.9	5.3	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																13.8	11.9	9.0	7.4	5.5	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														10.9	9.9	12.1	10.0	6.5	7,4	8.2	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															15.6	15.6	12.0	12.8	11.2	8.7	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
																				FOOT	WALL																			
2000																			1																					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	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	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											8.4	7.9	18.5	5.7	4.4	3.7	5.1	7.4	5.8	4.4	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																11.6	12.9	7.2	5.4	4.8	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													1	6.5	7.2	11.2	5.5	5.0	4.8	5.1	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															20.9	18.9	5.4	3.8	2.8	1.2	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.



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.



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 <u>Geotechnical Core Drilling Program</u>

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.

Drill Hole ID	Co	ollar Location		Azimuth	Din (deg)	Length	Section	Footwall/
Dim noie iD	Northing	Easting	Elevation	(deg)	Dip (deg)	(m)	Section	Hanging Wall
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

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

TOTAL: 1385














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	2 60 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	File Used: GHP-GMX.cnv
rue Miner	A Constrained Cons	NUMBER OF POINTS: 456 FRAC: all CONF: all ROCK DEPTH TYPE TYPE 020 all all all PLOT LEGEND a = Bedding Joint a = Bedding Joint a = Single Joint a = Single Joint a = Shear Zone v = Vein STRUCTURE CONCENTRATION: a = 00% - 10% a = 00% - 10% a = 00% - 10% a = 00% - 10% a = 00% a = 00%
	All CNI Drillholes, Skam	Date: July 24, 2017 File: GHP-ALL-030.scr
	All CNI Drillholes, Skam	Date: July 24, 2017 File: GHP-ALL-030.scr
	All CNI Drillholes, Skam	Date: July 24, 2017 File: GHP-ALL-030.scr
	All CNI Drillholes, Skam	Date: July 24, 2017 File: GHP-ALL-030.scr

	000011007	Call & Nicholas, Inc.
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Aura Min	The second secon	AUMBER OF POINTS: 206 FRAC: all CONF: all COCK DEPTH TYPE TYPE 04 all all all PLOT LEGEND PLOT LEGEND 0 = Bedding Joint 2 = Single Joint 3 = Sin
		2017 CNI ORIENTE

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		File Used: GHP-GMX.cnv
<sup>1</sup> 20 110 22 100 2 100 2 2 2 2 2 2 2 2 2 2 2 2 2		AN       NUMBER OF POINTS: 233         FRAC: all CONF: all         250         260         260         270E         PLOT LEGEND         0         280         280         290         290         200         250         270E         PLOT LEGEND         0         280
60 v v v v v v v v v v v v v v v v v v v	The raise of the second	STRUCTURE CONCENTRATION:           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% - 1,0%           1,0% - 2,0%           2,0% - 2,0%           2,0% - 2,0%           2,0% - 2,0%           2,0% - 2,0%           2,0% - 2,0%           2,0% - 2,0%           2,0% - 2,0%           2,0% - 2,0%           5,0% - 6,0%           6,0% - 1,0%           5,0% - 6,0%           6,0% - 1,0%           1,0% - 1,0%           1,0%           2,0% - 1,0%           1,0%           1,0%           1,0%           1,0%           2,0% - 1,0%           1,0%           1,0%           1,0%           1,0%           1,0%           1,0%           1,0%           1,0%           1,0%           1,0%           1,0%
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	N LOWER HEMISPHERE	[]
	20° 20° 1	Call & Nicholas, Inc.
130 130	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	File Used: GHP-GMX.cnv
120		NUMBER OF POINTS: 94
<0/2 Z	40 - 2 - 11"	FRAC: all CONF: all
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		o = Bedding Joint
80	280	? = Unknown x = Fault z = Single Joint
70 x z z	290	\$ = Shear Zone v = Vein
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50 X X X Z		
La contraction of the second s		1.0% - 2.0% 2.0% - 3.0% 3.0% - 4.0% 4.0% - 5.0%
		5.0% - 6.0% 6.60% - 7.0% 7.0% - 8.0%
	350 S	8.0% - 10.0% >10%
Aura Minerals Inc All CNI Drillholes	<ul> <li>Aranzazu Mine Oriented Core</li> <li>Limestone/Marble Rock Type</li> </ul>	Date: File: July 24, 2017 GHP-AU -010 scr
	•	
	CALL & NICHOLAS INC	2017 CNI ORIENTED
	TUCSON, ARIZONA USA	CORE DATA
		MARBLE
	URAWN SMD DATE 07/24 REVISED 10/30/2017 3:05	PM ARANZAZU

#### 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 <u>Sample Selection</u>

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 <u>Fracture Shear Strength</u>

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 <u>Rock-mass Shear Strength</u>

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 -  $\phi$  and cohesion - C), power with cohesion intercept (K, m, C), or a bilinear fit to the power with intercept curves ([ $\phi$ 1, C1], and [ $\phi$ 2, 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 ( $\phi$ ) 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:

#### 6-3

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

 $\phi_m$  = Mean Rock Mass Friction Angle

 $\phi_s$  = Intact (Rock Substance) Friction Angle

 $\phi_f$  = 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

*crf* = 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.

#### 6-4

		Donth	Dooly	Aroo	Diamatar	Li	near	Power (for	r x in kPa)
Sample #	Drill Hole	(m)	Туре	$(cm^2)$	(cm)	Phi	Cohesion	k	m
		()	-51-5	(em)	()	(deg)	(kPa)		
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 6-1. Small-Scale Direct-Shear Testing SummaryAranzazu Mine, Aura Minerals Inc., 2017

Semanle #	o # Depth Rock		Rock	Diameter	Height	Density	Failure	Failure Stress
Sample #	Drill Hole	( <b>m</b> )	Туре	( <b>cm</b> )	( <b>cm</b> )	(kg/m <sup>3</sup> )	Mode	(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

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

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

Semula #	Duill Hole	Depth	Rock	Diameter	Height	Density	Failure	Peak /	Failure	Stress (MPa)
Sample #	Dilli Hole	(m)	Туре	(cm)	(cm)	(kg/m3)	Mode	Residual	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

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

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

		Denth	Rock	Density	Failure	Tensile
Sample #	Drill Hole	(m)	Type		Load	Strength
		(111)	Tjpe	(kg/m <sup>3</sup> )	(kg)	(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
				Avera	ges	

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

	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 ( $Q' < 0.6$ )	
Aranzaz	zu 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

Intact Shear Strength				Fracture Shear Strength			Estimated Rock-Mass Shear Strength			
Rock Type	Uniaxial Compressive Strength (MPa)	Φ (deg)	C (MPa)	Φ (deg)	C (kPa)	Median RQD (%)	Crf	Uniaxial Compressive Strength (MPa)	Ф (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

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

Marble Uniaxial and Triaxial Compression Test Data

				-			
ID	Drill Hole	Depth (m)	Rock Type	Density (kg/m <sup>3</sup> )	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

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



#### Marble Intact Shear Strength - Aranzazu Mine

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 <sup>3</sup> )	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

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

## •

Hornfels Intact Shear Strength - Aranzazu Mine

Sigma 3 (MPa)

Sigma 1 (MPa)

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 <sup>3</sup> )	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
	*D (1 ' 1'	· <b>F</b> 1 O	1.1 1.1 .1	NL ID (	11 · D 1		

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



#### Skarn Intact Shear Strength - Aranzazu Mine

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 <sup>3</sup> )	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

Mohr-Coulomb				
$\Phi$ (deg)	42.8			
C (MPa)	15.1			
Density (kg/m <sup>3</sup> )	2543.8			
# Tests:	10			

Intrusive Intact Shear Strength - Aranzazu Mine



Sigma 3 (MPa)

Sigma 1 (MPa)

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

INTACT SHEAR STRENGTH							
			MOHR-COULOMB				
		UCS	С	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

Marble Direct-Shear Laboratory Test Data

					Residual Shear Strength	
Sample #	Test Date	Location	Depth (m)	Rock Type	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

	С	Φ
	(kPa)	(deg)
Average	24.2	29.3



CALL & NICHOLAS, INC.

Hornfels Direct-Shear Laboratory Test Data

					Residual Shear Strength	
Sample #	Test Date	Location	Depth (m)	Rock Type	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

	С	Φ
	(kPa)	(deg)
Average	59.4	23.5
Average	59.4	23.5





CALL & NICHOLAS, INC.

					Residual Shear Strength		
Sample #	Test Date	Location	Depth (m)	Rock Type	C (kPa)	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	

Skarn Direct-Shear Laboratory Test Data

· ·		С	φ		
		(kPa)	(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

					Residual Shear Strength		
Sample #	Test Date	Location	Depth (m)	Rock Type	C (kPa)	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	

С	Φ
(kPa)	(deg)
44.9	25.2
	C (kPa) 44.9



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

CALL & NICHOLAS, INC.

FRACTURE SHEAR STRENGTH						
		С	Φ			
Lithology	# Tests	(kPa)	(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

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



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

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



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

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



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

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



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

 $\Delta S$  = 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 90<sup>th</sup> percentile in terms of observed annual rainfall, and is summarized in Table 7-2.

An estimate of the upper 99<sup>th</sup> 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 99<sup>th</sup> 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 90<sup>th</sup> percentile of observed precipitation. A third calculation of recharge was then performed for the 99<sup>th</sup> percentile annual precipitation, by applying the same ratio of recharge to precipitation as computed for the 90<sup>th</sup> percentile estimate. A summary of estimated groundwater recharge rates are presented in Table 7-3.

## 7.2 Regional Groundwater Inflow Calculation

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.

#### 7-3

#### 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, 90<sup>th</sup> percentile, and 99<sup>th</sup> 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):

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

 $r_o$  = 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):

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

 $Q_2$  = 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<sup>th</sup> and 99<sup>th</sup> 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)

 $\phi$  = 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.

Land Cover		Average	Crop Use	Remaining	Infiltration	Potential	Adjusted	Actual	Change in	Groundwater
Location and Type	Month	Precipitation	Coefficient	Available Water	( <b>mm</b> )	Evapotranspiration	Evapotranspiration	Evapotranspiration	Soil Storage	Recharge (mm)
•••	T	(mm)	0.65	Capacity (mm)	10.1	(mm)	(mm)	(mm)	(mm)	
	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
Upper Watershed:	Jun	48.9	0.80	2.3	36.2	42.7	34.2	34.2	2.0	0.0
Confierous Pinyon	Jul	74.8	0.80	0.3	55.3	56.5	45.2	45.2	0.3	9.8
& Juniper	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 St	ored Water Balance =	0	
	Ian	25.9	0.50	0.0	18.3	15.3	77	77	0.0	10.6
	Feb	14.7	0.50	0.0	10.4	15.5	7.7	7.7	0.0	2.6
	Mar	14.7	0.50	0.0	10.4	19.7	9.9	9.0	0.0	0.5
	Apr	14.7	0.50	0.0	13.1	19.7	9.9	9.9	0.0	1.6
	May	33.1	0.00	0.0	23.4	31.3	25.0	25.0	-1.6	0.0
Lower Watershed.	Iun	48.9	0.80	1.6	34.6	42.7	34.2	34.2	0.4	0.0
Scrub Brush &	Jul	74.8	0.80	1.0	52.9	56.5	45.2	45.2	1.2	6.0
Grass	Aug	59.7	0.30	0.0	42.1	55.3	39.3	39.3	0.0	2.9
01435	Sen	61.7	0.53	0.0	43.6	49.4	26.2	26.2	0.0	17.4
	Oct	34.3	0.55	0.0	24.2	41.9	21.0	21.0	0.0	33
	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
	Dee	23.7	0.50	0.0	10.0	17.2	Annual Change in St	ored Water Balance =	0.0	7.2
							r minuar enange in st	ored Water Datanee	ů	
	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
Mino Duonoutra	Jun	48.9	0.70	0.0	40.7	42.7	29.9	29.9	0.0	10.8
Disturbed Area	Jul	74.8	0.75	0.0	62.3	56.5	42.4	42.4	0.0	19.9
Disturbed Afea	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 St	ored Water Balance =	0	

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

Land Cover	Month	Average Procipitation	Crop Use	Remaining Available Water	Infiltration	Potential Evanotranspiration	Adjusted Evapotranspiration	Actual Evapotranspiration	Change in Soil Storage	Groundwater
Location and Type	wiontin	(mm)	Coefficient	Capacity (mm)	( <b>mm</b> )	(mm)	(mm)	(mm)	(mm)	Recharge (mm)
	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
<b>Upper Watershed:</b>	Jun	128.8	0.80	0.0	68.4	42.7	34.2	34.2	0.0	34.2
<b>Confierous Pinyon</b>	Jul	119.3	0.80	0.0	63.4	56.5	45.2	45.2	0.0	18.1
& Juniper	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 St	ored Water Balance =	0	
	Ian	51.0	0.50	25	26.1	15.3	77	77	2.5	15.9
	Feb	18.0	0.50	0.0	9.2	15.5	7.8	7.8	0.0	14
	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
Lower Watershed:	Jun	128.8	0.80	0.0	65.9	42.7	34.2	34.2	0.0	31.8
Scrub, Brush &	Jul	119.3	0.80	0.0	61.1	56.5	45.2	45.2	0.0	15.9
Grass	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 St	ored Water Balance =	0	
	Ion	51.0	0.52	0.0	20.8	15.2	0 1	0 1	0.0	21.7
	Feb	18.0	0.53	0.0	29.0	15.5	0.1 8.2	0.1 8 2	0.0	21./
	Mar	125.0	0.53	0.0	73.1	19.7	10.6	10.6	0.0	62.5
	Anr	110.0	0.60	0.0	64.3	19.7	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
	Iun	128.8	0.72	0.0	75.3	42.7	30.7	30.7	0.0	44.6
Mine Property:	Jul	119.3	0.76	0.0	69.8	56.5	42.8	42.8	0.0	27.0
Disturbed Area	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 St	ored Water Balance =	0	

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

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

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

## 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 Lengtl	n		
			Porosity			Porosity		
		5%	7.5%	10%	5%	7.5%	10%	
Fault	2	3	4	6	1,500	2,250	3,000	
Width	7	6	9	12	5,250	7,875	10,500	
(m)	12	29	43	58	9,000	13,500	18,000	





## Annual Precipitation Frequency Distribution

Aranzazu Mine, Aura Minerals Inc., 2017



Estimated Steady State Groundwater Inflow with Depth

Elevation of Deepest Mine Workings (m)

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



Estimated Peak Inflow by Fault Zone Width and Hydraulic Conductivity

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

## 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 ( $\sigma_{1}(vertical) =$  $\sigma_{2/3(\text{horizontal})}$ , 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.

#### 8-2

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 support line</u>. 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

#### 8-3

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 <u>Pillar Stability Evaluations</u>

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.

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

X

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

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

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

"B" FACTOR SUMMARY							
Joint Set		Dip Di	rection	Strike		Dip	
Bedding		43		31	3	72	
X-Joint		22	23	13	3	18	
Side Release		13	33	43		90	
Side Release		3	13	223	3	90	
Ν	/lining Par	allel to Stri	ike (313 de	grees Az)			
Stope Su	rfaces		Critical	Delta	Delta		
	Strike	Dip	Joint	Strike	Dip	"B"Factor	
Back	313	0	X-Joint	0	18	0.2	
Up Dip <u>Side</u> 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	
Mir	ning Perper	ndicular to	Strike (43	degrees A	z)		
Stope Su	rfaces		Critical	Delta	Delta		
	Strike	Dip	Joint	Strike	Dip	"B"Factor	
Back	313	0	X-Joint	0	18	0.2	
Up Dip <u>End</u> 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	
Mini	ng Paral	lel to Strike (313	3 degrees Az)		
	Inc	clination of			
Stope Surfaces	Surfac	e/Critical Joint	Critical Joint	"C"Factor	
Back		0	Stope Surface	2.0	
Up Dip <u>Side</u> Wall	72		Stope Surface	6.0	
Down Dip <u>Side</u> Wall		72	Stope Surface	6.0	
43 Striking End Wall		90	43 Side	8.0	
223 Striking <u>End</u> Wall		90	223 Side	8.0	
Mining	Perpend	licular to Strike	(43 degrees Az)		
	Inc	clination of			
Stope Surface	Surfac	e/Critical Joint	Critical Joint	"C"Factor	
Back	0		Stope Surface	2.0	
Up Dip <u><b>End</b></u> 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 <u>Side</u> Wall		55	223 Side	8.0	

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			Mining Parallel t	o Strike Max	Stope Dimensions		Mining Perpendicula	ar to Strike M	Iax Stope Dimensions
GMT	Q-Prime	Figure	Surface (Wall)	N-Prime	Max Stable Hydraulic Radius (m)	Figure	Surface (Wall)	N-Prime	Max Stable Hydraulic Radius (m)
			Back	0.20	5.3		Back	0.20	5.3
			Up Dip <u>Side</u> Wall	1.08	2.5		Up Dip <u>End</u> Wall	1.08	2.5
2.00	0.6 - 1.0	8-2A	Down Dip <u>Side</u> Wall	1.08	2.5	8-2B	Down Dip <u>End</u> 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
			Back	0.33	5.6		Back	0.33	5.6
			Up Dip <u>Side</u> Wall	1.80	3.0	8-3B	Up Dip <u>End</u> Wall	1.80	3.0
3.00	1.0 - 2.0	8-3A	Down Dip <u>Side</u> Wall	1.80	3.0		Down Dip <u>End</u> 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
			Back	0.66	6.2	8-4B	Back	0.66	6.2
			Up Dip <u>Side</u> Wall	3.60	3.8		Up Dip <u>End</u> Wall	3.60	3.8
4.00	2.0 - 4.0	8-4A	Down Dip <u>Side</u> Wall	3.60	3.8		Down Dip <u>End</u> 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
			Back	1.32	6.9		Back	1.32	6.9
			Up Dip <u>Side</u> Wall	7.20	4.9		Up Dip <u>End</u> Wall	7.20	4.9
5.00	4.0 - 10.0	8-5A	Down Dip <u>Side</u> Wall	7.20	4.9	8-5B	Down Dip <u>End</u> 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
			Back	3.31	7.9		Back	3.31	7.9
			Up Dip <u>Side</u> Wall	18.00	6.9		Up Dip <u>End</u> Wall	18.00	6.9
6.00	> 10.0	8-6A	Down Dip <u>Side</u> Wall	18.00	6.9	8-6B	Down Dip <u>End</u> 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 8-3. Stability Number and Maximum Hydraulic Radius by GMTAranzazu Mine, Aura Minerals, Inc., 2017

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

O Brime	СМТ	Trans	sverse	Longitudinal		
Q - FTime	GMI	Width (m)	Length (m)	Width (m)	Length (m)	
< 0.6	1	Not Stope-able (Require	es Widths Less Than 5m)	Not Stope-able (Require	es 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

		Empirical Estimation of Overbreak & Slough For Unsupported Hangingwall					
GMT	Q - Prime	Stope Width (m) *Equivalent Length of Estimated Overbreak (m)		<sup>++</sup> 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

<sup>++</sup> 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

		Empirical Estimation of Overbreak & Slough For Unsupported Hangingwall				
GMT	Q - Prime	Stope Width (m)	*Equivalent Length of Estimated Overbreak (m)	<sup>++</sup> Equivalent Length of Additional Slough (m)		
1	< 0.6	7	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		Empirical Estimation of Overbreak & Slough For Unsupported Hangingwall			
	Q - Prime	Stope Width (m)*Equivalent Length of Estimated Overbreak (m)		<sup>++</sup> 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

Intact Shear Strength		Fracture Shear Strength		Estimated Rock-Mass Shear Strength		
Φ (deg)	C (MPa)	Φ (deg)	C (kPa)	RQD (%)	Ф (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 8-6. 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 (%)	Ф (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

Table 8-7. Access Pillar Rock Mass StrengthsAranzazu Mine, Aura Minerals, Inc., 2017





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

Stability Number N'

Stable without Support stable with support 100 Transition Zone 10 **Caving Zone** 43 Striking Side Wall 223 Striking Side Wall Down Dip End Wall 1 Back Up Dip End Wall ---Down Dip End Wall 43 Striking Side Wall 223 Striking Side Wall Back 0.1 2 5 6 7 8 9 10 12 14 15 16 0 1 3 4 11 13 17 18 19 20

Hydraulic Radius (m)

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

Stability Number N'

1000

1000 Stable without Support Stable with Support Stable with Support 100 10 223 Striking End Wall **Caving Zone** 🛟 43 Striking End Wall Down Dip Side Wall Up Dip Side Wall 1 Back ♦ Up Dip Side Wall Down Dip Side Wall •43 Striking End Wall Back 223 Striking End Wall 0.1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 20 19

Hydraulic Radius (m)

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

Stability Number N'

1000 Stable Without Support stable with support 100 Transition Zone 10 43 Striking Side Wall **Caving Zone** 223 Striking Side Wall Up Dip End Wall Down Dip End Wall 1 Back ---Down Dip End Wall 43 Striking Side Wall Back 223 Striking Side Wall 0.1 2 5 6 7 8 9 10 12 14 15 16 0 1 3 4 11 13 17 18 19 20

Hydraulic Radius (m)

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

Stability Number N



Hydraulic Radius (m)

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

Stability Number N'



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

CALL & NICHOLAS, INC.

Stability Number N



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

Stability Number N'



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

Stability Number N'



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

Stability Number N'



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

Stability Number N



Pillar Stability Summary at Pillar Width = 9.0m; Stope Width = 11.0

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


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



Pillar Width = 10.5m; Pillar Length = 15.0m

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



Intrusive RQD Distribution at the Glory Hole FW

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

Sill Pillar Thickness by GMT & Length



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



# GMT Percent Frequency In the 1840m - 1850m Sill Pillar

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

#### 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 Ground Support Requirements

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:

#### 9-1

- 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 incycle shotcrete (20 cm thickness), and spiling should be considered to pre-support the face.

#### 9.2 <u>Backfill Requirements</u>

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 <u>not</u> 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<sup>3</sup>. 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 ( $\phi$ ). 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:

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

Where:

$$\sigma_{cm}$$
 = UCS strength  
 $C_m$  = Cohesion  
 $\Phi_m$  = 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 RequirementsAranzazu Mine, Aura Minerals, Inc., 2017

GMT	O - Prime		Stope Ground Support Summary
GMI	Q IIIInc	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

Unsupported
Spot bolting, sb
Systematic bolting, B
Systematic bolting (and unreinforced shotcrete, 4-10cm, B(+S)
Fiber reinforced shotcrete and bolting, 5-9cm, Sfr+B

- Fiber reinforced shotcrete and bolting, 9 - 12cm, Sfr+B
- Fiber reinforced shotcrete and bolting, 12 - 15cm, Sfr+B
- Fiber reinforced shotcrete > 15cm, reinforced ribs of shotcrete and bolting, Sfr, RRS+B
- 9) Cast concrete lining,CCA





CRF Strength Criteria for 10m Wide CRF Pillar

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

#### APPENDIX A

CONTOURED STEREONET PLOTS OF COMBINED CNI AND SRK DATA



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	TUCSON, ARIZONA USA	

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## **APPENDIX B**

# DRILLING AND STRUCTURE DATA



## **ORIENTED CORE DATA SHEETS**

DRILL HOLE GHP\_GMX03



PROJECT LOCATION	Aranza	Aranzazu ORII INCLINATION SHP-GMX-03 NORTHING					RIENTED CORE DATA SI ation bearing ing easting					SHEET     (MET.)     PAGE       DATE     2/11/17       ELEVATION					GE	BY DIA	OF Z/ H	<u>17</u> 40 Q3
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	0,0,.,0,0	1	1					1	N	1 1 1 1 1	_	P1	O dis	630	0,5,5,0	18	2		-	1
	0,8,.,5,5	SKN	H.F.L				1_1_	1. 1.	N		-	- I - I -	0,2,	81.36	0,3,5,.	10	2	1	1	1
	10,000	HPL	1.1	1-1-1					N		-	1 1	0,35	1.00	0,3,6,•	1/1	2	-	1	1-1
	00, 3P	HPL	1 1	1 1	1		1 1	-	M	1	_		0,5,9	5,0,83	03.6.	1/	2		1	
				1			1 1	1				1 L	<u> </u>		<u> </u>	1				1
	MIŚCEL	ANFOUS	1	1. 1. N.	RC	CK	TYPE .	ABBR	EVI	ATIONS	S	TRUCT	URE TY	PE ABB	REVIATIONS	FIL	LING	ABE	REVI	ATIONS
REF ANGLE	"+" FOR TOP EN	D OF CORE.	"" FOR	BOTTOM							SJ	SINGLE	JOINT	FO FO	LIATION	N	NONE		P SER	PENTINE
Тд	TOP OR BOTTOM	END OF FRA	CTURE	Sec.	-	12.2					VN	VEIN	-	-		X	OXIDE		T CAL	CITE
N/W	N-NON ORIENTAB	LE W-WHO	LE CORE	199		and the					BD	BEDDING		4		S	SULPHI	DE		
SLIC	SLICKENSIDES -	YES OR NO	•		1		2 19				СТ	CONTAC	Г		1	L	CHLOR	E		
FRAC	1-Natural 2-Maybe	e (Natural or	Mech.) 3-M	lechanical	1						FT	FAULT	Sec. Sec. As		1	Q	QUARTZ	-		
CONF	CONFIDENCE - 1	-Poor	4-Excelle	nt	1.1						FC	FAULT C	ONTACT			C	CLAY	-		176
DIFE ANGLE	ANGULAR DIFFERE	ENCE BETWEE	N TOP LIN	NES							SZ	SHEAR	ZONE	- 11	1	A	ANHYDR	ITE		54
CALL &	NICHOLAS.	INC.		file: o	ocore_for	m_to	ro11-m.0	dwa				132					111		ARA	N7A7()

PROJECT LOCATION HOLE NO.	Aranza	zu	O INCL NOR	RIEN	ITE	<u>р</u> (		RE BE	EAR AST	DATA RING TING	-	SHE	EET	DATE ELEV		<b>F.)</b>	PA	GE	BY DIA	_ OF Z	17 A0 Q3
REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	R(	DCK TYF	PE 3	S TYPE		FURE	DIP	N/W	FILL THICKNESS (cm)		G TYPE	F	DRILL FROM	RUN COL	DEPTHS LAR (M) TO	1	, S L - 1 C	R O A N C F	DIFF. ANGLI	EINITLS
	00.00	HFL	1.4.1	1 1		1		- T -	$\mathcal{N}$	L		1 1	036	1.1	15	037.	15.0	0	_	<u>, 1</u>	
	01.35	. ).					1	100	$\sim$	1 1 <b>•</b> 1		1	0,3,6		15.	037.	151	2	_	-	-
- 1 1	00,00	, Y	1		1			1	N		in the		0,37	7 5	50	038.	,76	)			1
	01.40	HFL	6	1		1		_	N	1	1		05	7	50	0,3,8,.	176	9	1 7	1.	
-1.80	00.32				VNI	BJL	12:	56		0,2,00	) (	-15.	Ois.	8	1P	0,90,.	195	P	(-1		
	0,9.44						1		N			1 1		1.			<u>.                                    </u>			-	+
	0.4.00		1	· · · ·				1	N		4	1 1	1 1	1.	-1-2		i i	Rel	21		
- 1 8 0	0,0,0,2	- 1 1		1.1	5,5	11,	9.8	3,1;	N.	0,0,0	4	5, ,		1.1	-1-2	1 1 1.	1 1	周	~		15
5 a	0,1,.03	N.		- i				1	N		+	1-1		V.	2 0	0110	M	~		- 1-	
	01.55	HFFL	I I	il				1-2	N				0,5,0	81.01	10	040	17	EN	1.1		
- 262	0,0,.1,7		1 i	1 -1	55	BL	5,91	6,5		0.0.09		5	0,4,0	Q <sub>12</sub> . p	1,2	041	<u> </u>	ON C	21	and the P	8 1
- 262	00.18	-11	1-1-		52	10	1,8	64	AND N	0,0,00		<u>M</u>	0,9,0	0	7 <u>0</u>	0, 1, 1,	9	5	2	10	2
1 Caral	0.00.0	i r		i i i	1	- 1	1	1	N	1.		-1-1 <sup>**</sup> -	091	1.0.0	0.0 0 F	0,7,1,1	G I	-		1	
	00.90			1 1 1		0 1		12	14	1.1.1.		11	0,4,1	1.	05	AU2	E	N	25	- 1	
-194	00.28		e n		52	50,	P	4,0		0.0.1	2	0.51	0,9,	1.	1	0,7,9,	121	J N	111		1.*
	0,0,.33	1		1 1	NN	1 4	1,9	60		0.0.	1	451	1 1	1.	- ju	I E	1 1	1	1-	2 1	a l'istan
L. N.	0.0.13		1.1	1	SJ	1 8	00	22		QQ.	2	5	00	1 .	ale	042	5	DN	2	1	
-194	61,.20	2135			55	RZ	SADV.	P.A.L	-	00.01	2	21	AUS	2 1	12	AUR	6	OA	17:	2 3	
-12,40	00.35	1. 1. 2.	Step 1		KA	22	10	0.7	-	0,0,.,	2	21	211			DUE	00	SIN	2		and the second
-,2,4,0	0,0,.96	ar 100	P T	Ser.	N.N	1	10	5,0	0.1	$(O, \emptyset, \bullet)$	2	L. 1-	0.4	e . /	a par	046	5	0	~	1	1.00
Line in	00,00	11	1	- Carl			1	1	N	1 1 • 1	+	1.5515	Q.C.			W NO					1
	6.0	11	1.1	- 1	1.4	1 1	11/	1 17	10	000	1	A [	1 1	1.	201	1 1 1	•	N	21		
-302	0.0.00	V.	1 1	1 1	2-4	27	26	U I	-	0.0	0	A) .		1 • 1				N	8		
F.3.0.2	$O_1 + \bullet 0_0$	H,F,L		1 1	125	7.5	2,7	111	18	0.0	-	~ 1	N. N.	N 100				-	1.20		and a second
<u> </u>	1 1 1 • 1 · · ·	al sa Sa		1 1 1	- Carlos		1	- L	-		12	I I	100	1.1.1			Leu				ATIONIC
	MISCEL	LANEOUS	S		RO	CK TY	PE A	BBR	EVIA	ATIONS	S	TRUCT	JRE T	PE A	BBRE	VIATIONS	FIL	LING	AB	BREVI	ATIONS
REF. ANGLE	"+" FOR TOP EN	D OF CORE	, "—" For	BOTTOM	and and		L.		10.		SJ	SINGLE	JOINT	FO	FOLI	ATION	N	NONE	- Se - L	P SEI	RPENTINE
T/B	TOP OR BOTTOM	END OF FF	RACTURE			and the	Carlos and	1,82			VN	VEIN	17 The	1		and the	X	OXIDE		T CAL	
N/W	N-NON ORIENTAB	ILE W-WH	OLE CORE	Mart 1	23.00			aet.			BD	BEDDING			-	1	S	SULPH			
SLIC	SLICKENSIDES -	YES OR NO	)	1		18 200	in.				CT	CONTACT		2		4 4		CHLOR	ITE	Constant Constant	
FRAC	1-Natural 2-Maybe	e (Natural or	Mech.) 3-	Mechanical		1.45	A				FT	FAULT			1		Q	QUART	2	-	State State
CONF	CONFIDENCE - 1	-Poor	. 4-Excell	ent		Sec.	and the				FC	FAULT C	ONTACT	141	-		C	CLAY	DITT	1	E State
DIFF. ANGLE	ANGULAR DIFFERE	ENCE BETWI	EN TOP L	INES	1 Seals	e.		- 47: 	1		SZ	SHEAR 2	ZONE	1	- A.		Α	ANHYD	RIIE		NZAZU
CALL &	NICHOLAS. 1	NC.	16 3	file: or	core_for	m_toro1	1-m.dw	a					7.40	17.00	20					ARA	INTATU

PROJECT LOCATION L HOLE NO.	Aranzaz GHP-GMX-03	<u>2u</u>	0 INCLI NORT	RIEN	NTED CORE DATA SHE BEARING EASTING							LEI   (MEI.)   PAGE     DATE      ELEVATION					GE C BY DIA SIF C			<u>~</u>	
REF. ANGLE (REF. LINE TO TOP OF	DEPTH FROM START OF RUN (M)	R(	DCK TYP	РЕ З	S TYPE		TURE	DIP	N/W	FILL THICKNESS (cm)		G TYPE	ر FR	ORILL R FROM C	JN DEPTHS OLLAR (M) TO	s 	S L - I C	F C R C A N C F	) N DIF	FF. GLE INI	ITLS
	00.00	HFL	3						N		Т	1.1	0,4,6	.50	0,4,8	05	5			-	_
	01 55	HEL							N	1 1 1			0,4,6	.50	0,4,8,	05				-	1
	00.00		IX D		4		1		N	1.1.		1	0,4,8	. 05	0,4,9,	54	5				-
<u> </u>	(3) SO	HEL							N				04.8	. 05	0,4,9,	55	5		1		_
<u></u>	6.00	S.K.N	1	10000					N	1.1.			0,4,9	5	50,53,	1.80	-				-
	4 25	S.K.N				1.		1	N	1 1 .			0,9,9	. 55	0,5,3	,80					
	0.00	AFL			1		1		N	-1 1.			0,5,3	. 8	0,5,4,	115				1	-
	0.35	HEL			1				N				0,53		0,5,4	11	5			1	-
- 292	0.3.4	井もし	4		55	B 2	8,4	6,1	1	0,0,0	21	N	0,5,4		5055	,76	SN	1	3	1	1-
- 292	0.50	HFL	12ms		55	T 2	3,6	3,4		00.0	3	L		1	1. 1. 1.		N	1	2	-	-
	. O S./	. 1.						- Sect	N	•	4	2				• • • •		1000 L			1
	.065								N		821	1.1.		•	1 1 3	•			1 1 1 1 1	1000	-
-292	. 0 7.3				55	TI	78	5 2		00.1	2	G,	1 P		1 1 1	• 1 1	Y	1 -	3	1	
	.1.22				53	B 3	54	39		0,0,0		4	R. M.	. •	14-14	•	N		3	1	1
	1. 2.8	5	34.00		BD	T 2	90	5.7		0,0,0		L,	15 11		1 1 1	• • •	P.	10	~	-	
	1.35	12			B,D	BZ	18	5,8		0,0,.6	2	L	1 14	1	Si caty 1	•	N	10	2	1	1
	1.45	y	· . V		BP	B 2	14	57		0,0	0	L		· • 12 · i	A.Y.	•	> N	(	5		1
-292	4.4	HFL	LMS		55	T 2	28	53		0,0,0,0	D	N	0,5,4		5 0 5 5	.71	ON	3	3 -	1	1
	0.000	L.M.S	120						N			1	05.5	1.74	0, 3, 7,	• ,2	0		1	1	-1
	. 1.50	L.M.S							N	1 1 1 • 1		1.1	0,5,8	1.7	0,0,5,7,	• ,21	2			1	T.
-314	1.0.18	LMS			SJ.	B3	1,2	1,7	)	0,0,0	2	CL	0,57	1.26	0 0,5,8,	.,7,	51	11	5	1	1
1	6.27	Contra 1			BD	TO	50	-41	1	0,0,0	)	C.L.	L. I	i•	Friday 1	• [ • ]	N	1.	4	1	
	0.33		1000	Tailer.	55	BB	0,6	5.7	7	0,0,.,	0	LC,		1		• ,	N		3	1.	1
	0.51	V	Contraction of the second		VN	B 2	26	43		0(	D	SL	V			•	P	1.	3	1	1
-3.14	10.68	LM 3			VIN	T2	6,2	20		0.0	5	T.L.S	0,5,	1,.,2	00,5,9,	. 7	2 M	1	5		
	MICOFU		_		I PO		VDF	ABBR	FV/	ATIONS	C	TRUCT	JRE TYP	PE ABE	REVIATIONS	FIL	LING	AE	BRE	VIATIO	ONS
-	MISCELI	ANEOUS		DOTTON	RU1	CKI				Allong	5.1	SINGLE	JOINT	FO F	OLIATION	N	NONE	-	P	SERPEN	TINE
REF. ANGLE	"+" FOR TOP ENI	O OF CORE	., "-" FOR	BOLLOW			-		1		VN	VEIN	- N.			X	OXIDE		T	CALCITE	2
'/B	TOP OR BOTTOM	END OF F	ACTURE	10		No.	4				BD	BEDDING	h . th		C.	S	SULPH	IDE	2		
N/W	N-NON ORIENTAB	LE W-WH	OLE CORE			4		-		-	CT	CONTACT			and the second	L	CHLOR	ITE	185-51		the set
SLIC	SLICKENSIDES -	YES OR NO			-			1	12		FT	FAULT	38-1			Q	QUART	z		al d	- ART
FRAC	1-Natural 2-Maybe	(Natural or	Mech.) 3-1	Mechanical	1	-	-	-	-		FC	FAULT	ONTACT			С	CLAY		2		T
CONP	CONFIDENCE - 1	-Poor	. 4-Excelle			1	107.2 	1-1-1-	1	2.3	57	SHEAR 7	ONE			A	ANHYD	RITE		4-91	No. 12
DIFF. ANGLE	ANGULAR DIFFERE	NCE BETWI	LEN IOP LI	NES file: 0	core for	m toro	11-m.c	lwa		Stark .	02		1		St. X				AF	RAN7	A711

PROJECT	Aranza	zu	OF	RIEN	ITED	) CC	RE		DATA		SHE	EET	(M	ET	.)	PA	GE _	4	0	F <u>17</u> ZAO	<u> </u>
LOCATION	and formal -1	. 7	INCLIN				B	EAF	RING			L		TION	10/11			DI	A	HQ3	
HOLE NO.	- (281- GP(X - 0		NORTH												DEDTUC		S	FC			
REF. ANGLE	DEPTH FROM	RC	OCK TYPE	100	ST	RUCTURI	E ª	/	FILL		G		FROM	COLL	AR (M)		L	RC	) J DI	FF.	
TOP OF HOLE LINE)	(M)	1	2	3	TYPE B	CIRC. ANG	DIP	ŵ	(cm)	<u> </u>	TYPE	FR	ROM		T(	)	Ċ	CF	AN	GLE INIT	rls
- 3114	0,0,.,8,6	L,m,S			5,37	3,0,6	4,3		0,0,00		6,6,5	957	1.12	00	0,5,8,	• 7:	> N	1 -	2	í	4
	0,0,.,9,8			1.1.	55 T	2,6,2	23		0,0,0	1	L, C,		. • .			• 11	N	10	/		-
4 1 1	0,1,.03	V			BDE	5 28	3,5	$\square$	0.0	2	L	No c =			050	• 1	. N.	1 -			-
4314	01,.3,3	LMS		1	B,D T	<u> </u>	4,8		0.0.0	, (		05,1	7		160	• 1 T	2 10	1-1-	-	1	-
	00.00	L.M.S	SKN	111		4.1.1		N		+	1	0, 2, 8	1.1	20	3 6 0	• 1 1	5		+		-
	0,1,.50	L.M. 5	SKN	1 1		12-1-0		IV		-		0,00	1 • 1 1	20	0/1	· 10 1		1	1	-	1
- 3,3,0	Ø.B. 3.3	P.P.B	1. 1.	1 1 3	VNE	53,1,2	-5,1		00.0	2	2,5,	0,6,0	• • • •	<u>~ (</u>	0,6,1,	• 0 }	N	1	1	1	-
	0,0,.,4,2			1.1	5,10	2000	6.0			-	N		1.	-		•	N	1	4	and an an	-
	00.83	- Chief	1.1	1 1	5,31	5 2,6 0	22		0,0,0,0	2			1.01	1		• • • •	N	1	2	1	
	00.89		Va I	1 1	VNT	296	9,5		OP I ··		TI		1			•	N		2	1	-
	0,1,.,1,1	1/4	1 1	1 1	VN	1,0,6	5.1	-		>	1 4		1.	-		•	N	1.0	1		-
N.	0,1,.,2,6		1		5,00	2 1 1 1	100				5	0 ( 0	r 2	5	061		JN	2	2		-
- 3, 5,8	0,1,.;3,0	PPB			2 2 6	5 1 1 10	22		6,0,•0		5	0,6,0	9	1	063	20	2		1		
1	00,00	PPB	SKN	- le - l				NV NV		-	1	001	1.0		263	- 3(	5			1910	
	0,	P.P. 15	S, K, M	1 1	PDT	FV V Q	51	iv.	000		NI I	663	7 18	0	063	6	ON	1	3	1.0	
- 2,6,8	00.00	SKN		11			1 26	1		$\rightarrow$	N.	0.6.3	2 3	O	063	6	01	AIT	2		
- ,2,6,8	0,0,0,1,4	SKN			S,D	1,80				+	/ · · · · ·	000	2 6	0	064	- 2	5				
	0.0.00	LINS	SKN	1 1						-	1 1	06	3 :6	0	064	8	S				
	0,1,,2,5	6,11,5	SKN					N				0,0,-	6	5	066	3	5			3	
	0.000	L, m, 5				- 1 -		N			.1	0,0,1	<u> </u>	1-					1	100	
	0,0,.,4,5	11		4	28	RDED	ua	1.	00	0	N		1.1	1-20			N	1	2	Carlor Carlo	
-122	0,0,0,6,0			1 1	DA		40	-	00.	0		1 1	1.	1			٨	11	3	1	
12 million	0,0,0,6,1			1-1-	510	0 1 5 0	200		0.0.0	0	4		1.	-	1		N	1	3		
	0.0	V.	1 1	Litt	P.D.		3 5 9		0,0	0		06	4. 8	S	0.6.6	. 3.	SIN	51	3		
-1,2,0	0,0,0,1,8	1 m 3			0.01	1 1 1 1 1 1	5131		0.0.0	~		11101	H	200							INC
	MISCEL	LANEOUS	5		ROC	K TYPE	ABBR	EVI	ATIONS	1	STRUCTU	JRE TY	PE AB	BRE	VIATION		LING	AE	BRI	CERREN	TINE
REF. ANGLE	"+" FOR TOP EN	D OF CORE	, "-" FOR B	воттом		and the second				SJ	SINGLE	TNIOL	FO	FOLIAT	ΠΟΝ	N	NONE		T	SERPEN	TINE
Т/в	TOP OR BOTTOM	END OF FR	ACTURE		1. Jan 199				11.	VN	VEIN		e	-	15	X	OXIDE		1	CALCITE	1
- N/₩	N-NON ORIENTAE	BLE W-WHO	DLE CORE	1. 1. 1.			1. The 1. 1. 1.		and at	BD	BEDDING			-			SULPH			11	
SLIC	SLICKENSIDES -	YES OR NO	)	1		No.				СТ	CONTACT			-	-		CHLUR				
FRAC	1-Natural 2-Maybe	e (Natural or	Mech.) 3-Me	chanical .						FT	FAULT			***		u u	QUART	2	1	Ser.	
CONF	CONFIDENCE - 1	-Poor	. 4-Excellen	it		F			7	FC	FAULT C	ONTACT			1		ANILOT	DITE	5.4		
DIFF. ANGLE	ANGULAR DIFFERE	ENCE BETWE	EN TOP LINE	ES		12 - 21	R			SZ	SHEAR 2	ZONE		-	1	A	ANHTU	RILE	٨	PANZA	711
CALL &	NICHOLAS. I	INC.		file: or	core_form	_toro11-m.	.dwa									1		The l	A		

PROJECT LOCATION HOLE NO.	Aranzazu	ORIEN	ITED CO	)RE  eas	DATA RING	SHI	EET (ME DATE ELEVATIO	PAGE _	BY _ DIA_	OF <u>[7</u> ZAO HQ3	
REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M) 1	ROCK TYPE	STRUCTUR	E N / g. <sub>dip</sub> W	FILLII THICKNESS (cm)	NG TYPE	DRILL RU FROM CO	N DEPTHS DLLAR (M) TO	S L - C	F C R O A N C F	DIFF. ANGLE INITLS
HOLE UNE)	0,0,,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0		$\begin{array}{c} 1 \\ B \\ D \\ B \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1$				0, 6, 6, . 3, 5 0, 6, 6, . 3, 5 0, 6, 7, . 90 0, 6, 8, . 3, 5 0, 6, 8, . 3, 5 0, 7, 2, . 20 1, 1, 0, 7, 2, . 20 0, 7, 3, . 60 0, 7, 5, . 15 0, 7, 6, . 6 5 1, 1, .	0,6,9,0,0 0,6,8,0,0 0,7,2,0,0 0,7,2,0,0 0,7,2,0,0 0,7,3,0,0 0,7,3,0,0 0,7,3,0,0 0,7,3,0,0 0,7,3,0,0 0,7,5,0 0,7,6,0,0 0,7,1,0	10 10 10 10 10 10 10 10 10 10		
REF. ANGLE T/B N/W SLIC FRAC CONF DIFF. ANGLE	MISCELLANEO "+" FOR TOP END OF C TOP OR BOTTOM END OF N-NON ORIENTABLE W- SLICKENSIDES - YES OF 1-Natural 2-Maybe (Natural CONFIDENCE - 1-Poor ANGULAR DIFFERENCE BE	DUS ORE, "-" FOR BOTTOM FRACTURE WHOLE CORE NO If or Mech.) 3-Mechanical 4-Excellent TWEEN TOP LINES	ROCK TYPE	ABBREV	//ATIONS	STRUCT SINGLE N VEIN D BEDDING T CONTAC T FAULT C FAULT C FAULT C SHEAR	URE TYPE ABBI JOINT FO FO T CONTACT ZONE		FILLINC N NONE X OXIDE S SULPH L CHLOF Q QUAR C CLAY A ANHYT		REVIATIONS SERPENTINE CALCITE

PROJECT	Aranzazu	<u>.</u>		NTED CORE DATA SHI								EET (MET.) PAGE						OF YZAO		17 105Mr
HOLE NO.	GAP-G-MX-0	3	NORTHING			_ E	AST	ГING				ELEVAT	FION .				C	A.	HG	23
REF. ANGLE (REF. LINE TO	DEPTH FROM START OF RUN	ROCK	K TYPE	S	TRUCTURE	-	N /	FILL	IN(	G		DRILL F	RUN COLL	DEPTHS AR (M)			F R A	C O N	DIFF.	
TOP OF HOLE LINE)	(M)	1	2 3	TYPE	CIRC. ANG.	DIP	W	(cm)	╇	TYPE	Ff	ROM	_	TC	)			FA	NGLE	INITLS
-038	90, 144	MS		BIDT	0,3,8	57		0,0,.,6	56	C.S.	0,7,7	1.02	50	27.7.	• 181	5 1		5		20
	0,0,0,2,5			B,DF	31,54	6.5		0,0,.,0		45.		. • ; . ;	- 1	1 1 1	• 1 1			7	-1	4
1 P	0,0, . 33	ti i		BDT	F0,5,2	56	•	0,0,.0	24	5	0.77	1.1	-		•	-	11	2		SA
-038	0,0, . 4,8			5,50	32,9,2	68		1	) (		0.11	1 0	50	111	• 0	SI		2	1.	1
	0,0,0,0,0						N	1	+	1 1	0,1		70	1101	• 20	2			-	
	0,0,.57	∜,	<u> </u>			50	N	0.0.0			0.7.9		20	70	• 121	0	NIL	5	-	1
-,0,2,2	00,06 P	PB		55	10,9,2	50		0,0,0,0		Ziki-	0,10		00		• /	1	)7	7	-	1
	0,0,0,1,0 1	I'B		531	50,50	6.0		0,0,0,1		1512		1.	-		•		20	2	-	
in the second	0,0,.,,4	11	- 1- I- I-	57	1120	66		0,0,0,0		421		1.		1 1 1	•		51	2	_	
	0,0,0,2,8	× .		55	1 + 2 > 2	10	-	OP I I		FS		1.	·	10-11-1-	•		YI	3	-	
	00.68 P	PB I		20	50,26	4,5	$\vdash$	•		55	1			1-1-1-1	•	-	NI	3		
	0,0, . 1,6 H	F.L.		20	2210	26		0.0.0		05	1 1		-	1 1 1		1	VI	3	1	
	0,0,0,0,0	Fib		131	210	22		00.01		115			87		1.5	1	VI	3		V
	00.944	FIL		2.5	TO G G	7.		60	)	1 5	079	8 5	Or	79	. 7	0	NI	3	-	SD
-0.22	0,2,0,0,5 H	TIL		3.5	1001	12		00101	1		070	a . 7	101	181	9	0		F	13	
	0,0,0,0,0	22		4.5	2270	FI	1	00 -	7	()		11.1.1	0	1011		1	VI	3		
5.50	00.0.421	15		20	2 1 7 0	26		00	5	115			-				VI	3	2	
	$0_1 0_1 \bullet_1 4_1 Y$	IT IS		31		611			4	Ch12	1.4	1.1								Par a
	0.01.12.8	1					1	1 1 • 1	+											7 **
1 1 1	0,0.0,4,1	1-1-1-		5-	BICS	66	2	00-	7	165							UI	3		Sec.
	0.0	200		XP	TX30	)/L	1	00	0	CL					• •		NI	3		1.
	00.071	121		17	- 039	560	1	00.	D	LLS	,		1				NI	3		1999
	00.0.16	1114		BD	3157	67		00	0	CLS					•	(	V1	3		
1-1-1-	00 9/	1		BD	B138	5.6	+	0.0	0	CLS					•	. 1	V1	3		
N. I.	0,0,0,1,02			1 VIN	0111010	1 - 10										LUN		BBB		TIONS
	MISCELLAN	NEOUS	1	ROC	CK TYPE	ABBK	EVI/	ATIONS	3	STRUCT	JRE IT	PE AD	DREV	ATIONS		NON			SERE	PENTINE
REF. ANGLE	"+" FOR TOP END O	F CORE, "-	-" FOR BOTTOM				1	-	SJ	SINGLE	JOINT	FU	FULIAT		- N			T	CALC	
Т <u>/в</u>	TOP OR BOTTOM END	OF FRACT	URE						VN	VEIN			-			SUIL		-	UNLO	
N/W	N-NON ORIENTABLE	W-WHOLE	CORE						BD	BEDDING	-		1			СНЦ		-	1	The second
SLIC	SLICKENSIDES - YES	OR NO		14					CT	CONTACT						OLIA	RTZ			-
FRAC	1-Natural 2-Maybe (No	atural or Mea	ch.) 3—Mechanical		direction of			*	FT	FAULT	ONITACT					CLAY	1			
CONF	CONFIDENCE - 1-Po	oor 4-	-Excellent			-			FC	FAULI C				-		ANH	YDRITT	E		
DIFF. ANGLE	ANGULAR DIFFERENCE	E BETWEEN	TOP LINES				-		52	SHEAR									ARAN	J7A7U

PROJECT LOCATION - HOLE NO.	Aranza GHP- G	<u>zu</u> <u>MX- 63</u>		RIEN	ITE	D C		BEAF	DATA RING		SHE			T.) 6/14	PA(	GE _	7 BY DI/	0	F_l ZAO HQ3	<u>7</u> 
REF. ANGLE	DEPTH FROM	R	OCK TYP	ΡĒ	S		IRE	N /	FILL		3		DRILL RU	N DEPTHS DLLAR (M)	12	L 1		DI	FF.	
TOP OF HOLE LINE)	(M)	1	2	3	TYPE	B CIRC. A	NG. DIP	Ŵ	(cm)		TYPE	FF	ROM		0	С	CF		GLEIN	ILS
- 3.5.0	0. 9.9	HFL			BD	B1,3	856		6,0,.0	2	LS	6,7,9		0.81	• 17.0	> N	1-	2	1 2	P
	1.02	1 t		1 1	BD	T 0,4	64.8		00.00	6	14.7	1.1			•		1 -	2		
		H,F,L	1_1_1		BD	B 1,8	060	2	0,0,.,0	2 (	221	1.1.	1 • 1 1	1 1 1	•			-		-
	1 B1	171	1.1.					N	<u>, , , , , ,</u>	+			<u>, • ,   )</u>		•	1				
it i	13.0	H,F,L	1			7 01	9.00	10	0010		115	1 1	1.			N	1	3		
V	11.0.31	PPB	111		50	B I G	67	7	00.00		5	0.7.9	. 70	0.31	90	NC	) *	5		-
-350	11.0.4.8	11,11,12		1 1	. 73					1		0.81	.90	0,8,2	73	5			1	-
	0,0,0,0,0	- I - I					1	N		t		0 81	. 90	5,8,00	. 7	5			-	_
	0,0,0,0,5	<u> </u>		1 1		S. 1 .		N			1 1	0,8,7	4.75	50,8,4	. 3	0			1	
<u> </u>	0.0.0.00	- 1 - 1						A			(	0.87		50,8,4		0		_	-	
	0 0 0 0 0					N			1 1	0.84	.30	085	8	5		-	-			
	OL HB					N				0,		10	• •		12	>	1			
-736	0.1.4.1		5,5	TZ8	069	ř.	0,0,0	2	CF.	08,4	1.30	0.85	1.10:	SIN	14	5	1			
	00.00							2	1	-		0.8 1	21.0.0	001	1. 24				1	
	91.45			1 1			1 1	N	1.1.1	+	1 1	0,8,9	7.000	001	0	2			-	
	9000	1		1				1	1 1 • 1	+	1	08	7	00000		5				
	01.55	1.1.	- I - I				1 - I	1	J. I I.	+		00	0.3	0,0,0	2.41	2				
1	00.00	apres in the	1		-		-		· · · ·	+		08	8. B	509.0	2. 4	0			and	1
	01.5	2	1 <sup>th</sup> -r					1	1	-	1	09	0.4	00.9.1	. 4	0		1		-
-	0,0,.,0,0		1			1	1	Λ		+					1		14		1	
	<u>G</u> G, • , <u>5</u> , 2	7000		- Land	67	12 21	049	2		0	C.S.		510	1	1201	1	1)	3	1	1
7951	00.4	PPA		- 1 - 1	65	T7-	77.6	7		0	C		1		V 1.•.L	N	11	3	1	-
1-1-12-	60 61		- 1 - 1	165	TZZ	226	4		Ö	C,5,	0,9,0	>, 4,	0991	[L(	OA	) (	3			
	11010101010									<	TRUCT	URF TY	PF ABB	REVIATION	IS FIL		G AE	BRI	VIAT	IONS
-	MISCEL		RU	JCK ITP	E ADDI		Anons	SI	SINGLE	JOINT	FO FO	LIATION	N	NONE		Р	SERPE	NTINE		
REF. ANGLE	"+" FOR TOP EN	BOTTOM	. *					VN	VEIN	15	a	11	X	OXIDE		т	CALCIT	IE		
'/в	TOP OR BOTTOM						-	BD	BEDDING				S	SULPH	HIDE		1			
N/W	N-NON ORIENTAL								СТ	CONTAC	т			L	CHLO	RITE				
SLIC	1 Natural 2-March	ILS UK N	-Mechanical						FT	FAULT	1		1 -	Q	QUAR	TZ				
CONE			lent				10.	1	FC	FAULT (	CONTACT	1.08		C	CLAY				-	
		ENCE BETW	INES						SZ	SHEAR	ZONE			A	ANHY	ORITE		DANIE	7 4 71 1	
CALL &	NICHOLAS.	INC.		file:	ocore_fo	rm_toro11-	-m.dwa											А	RAN	AZU

PROJECT	Aranza	zu	0	RIEN	ITE	DC	ORE		DATA	-	SHE	ET		T.)	PA	GE	B	(	DF	7 JSMI
	(-HP - Com	1-03		NATION_ THING			B	AS	TING		de la	L	ELEVATIO	N		a sta	DI	A	HQ	3
HOLL NO.								N	FILL	NIC				N DEPTHS		S	F	C	5	
REF. ANGLE (REF. LINE TO	DEPTH FROM START OF RUN	RO	CK ITP	E			JKE	1	THICKNESS	T	5		FROM CC	LLAR (M)			A	N D	IFF.	
TOP OF HOLE LINE)	(M)	1	2	3	TYPE	B CIRC.	ANG. DIP	W	(cm)	Ļ	TYPE	FR	OM	ТО		С	C	FAN	IGLE	NITLS
-034	10. 73	LMS	i i	1	55	131	270		1.0	24	15.	09,0	1.40	0.9.1.	46		7	2		24
	0, . 81	, t	1 1		55	1540	18 1.0					040	40	091	4	ON	I	3	-	
50, 9, 4	0	LMJ		- I - I -	27	101,1	,06,0	N		Ŧ		091	4.0	0.9.1.	.91	5		-		
	0.0.00		I					N		t		091	40	0.91	9	0				
	0.00							N		t		0,9,1	. 90	500	,6	Ö				1
	0.70							N				091	. 90	092	6	0			1	
	D.00		1 1	1 1			1.1	N		-		09.2	4.60	093	,6,	5		_	-	
- <b>- 1</b>	1.05		1 1					N	1.00	1		09:2	. 60	093	6	5			-	
i i i	0.00	17		-	1		1	N	L		1,12	093	1.65	09.5	12	0		-	-	
	0,2.2,2	in i	1				1 1	^			1.	, i i	· · · · ·		• <u>1 - 1</u>			2	1	
-252	01.23	ESK	1 1		SIJ	527	07:8	2	00.0	2	L-7_	<u> </u>	1. 1		<u> </u>	N	1	3	-	
141	01.47	111		1 P	5,5	510	330		02.1.		4.7.	1 1.	1. I. I.	1 1		1	1	2	-	
	0150	7	1		23	TOT	66		00.00		1	A G 3	- 1-	045	71	NN	1	3	1	
-252	01.55	B/JK			ST	100	10/11		0,0,.0	4		690	1-1015	096	7	0			1	1
	00.00	EZK		1.1.1	1			1	1 1 1 1	+		Ce lo	1 • 1 40		1 * 1	-				-
-7/1	01 1	+	··	15-1	RD	RZ'S	117		000	2	L	-	4	V		N	1	3		
7/4	01 46	EG K	11	1 1	5-	600	78	1	00.0	5	LS.	0.9.3	5. 20	096	7	ON	S	3		
- 15(	00 77				B.D	B 3	866		00.0	0	LS.	096	70	098	, l	GN	1	3	-	1
1 10 10	00 33				55	TIC	1965		0.0.0	0	45		1	- K-	• • • •	N	F	3	1	-
4	00 .60				V.N	BIC	064	ł	0,0,.3	3	L		P		• • •	Y	1	3	1	
	00.66				55	TUN	070		00.2	2	L.C.:	- 1 19			• 1	N	1	3	1	1
X	00 83	A C			55	51.9	10 67	-	00.0	2	LG		V. • 1_ 1	N.	•	Y	L	3	1	1-
-156	01,00	ESK			VA	BOZ	2063	5	60.1		L.C.	0,4,6	0, ., 1,0	0,9,8,	• , (	OY	16	2	-	1
	MISCEL	LANEOUS		-	RO	CK TYP	E ABBR	EVI	ATIONS	S	TRUCT	JRE TYP	PE ABBR	REVIATIONS	Fil	LING	A	BBR	EVIAT	TONS
REF. ANGLE	"+" FOR TOP EN	D OF CORE,	"-" FOR	BOTTOM	12	1 H			S	SJ	SINGLE	JOINT	FO FOL	LIATION	N	NONE	2	Ρ	SERPI	ENTINE
Т/в	TOP OR BOTTOM	END OF FRA	CTURE	Se	See.		10.10		V	N	VEIN	17 To		11	X	OXIDE		T	CALCI	TE
N/W	N-NON ORIENTAE					•	В	3D	BEDDING	•			S	SULPH	IDE	1				
SLIC	SLICKENSIDES -			3.		-	C	T	CONTACT				L	CHLOR	ITE -	-				
FRAC	1-Natural 2-Maybe	lechanical	- <u>-</u>				F	Т	FAULT				Q	QUART	2	-	-			
CONF	CONFIDENCE - 1-Poor 4-Excellent								F	C	FAULT C	UNTACT		-			RITE	-		-
DIFF. ANGLE	ANGULAR DIFFERE	NES			£. (8)		5	SZ	SHEAR 2	LUNE			A	ANTID	ME	۵	RAN	7471		
CALL &	NICHOLAS. I	NC.	1.20	file: oo	core_for	m_toro11-	-m.dwa	1.	and Therman	-							-			

PROJECT LOCATION HOLE NO.	Aranza G-HP- G	zu M X-03		RIEN NATION _ HING	ITE	) C		BEAF	DAT RING		SF		(M DATE _ ELEVA	ЕТ. пом_	6/15/	PAG		1 BY DIA	OF _ ZA H(	17 105m 23
REF. ANGLE (REF. LINE TO TOP OF	DEPTH FROM START OF RUN (M)	RO 1	CK TYP	E 3	S TYPE			N/W	F THICKN (crr	FILLIN NESS 1)	NG TYPE		DRILL I FROM ROM	RUN DI COLLAI	EPTHS R (M) TO			O N F	DIFF.	INITLS
HOLE LINE)	01 71	Y CV	2		VNI	003	26	7	0.0	5	L.S.	096	27	000	9,8,.	10	NI	3	8	SD
-150	0, 79	ENR	1 1		55	716	484	+	00	0	C	0.9.6	7	00	9.8.	10	NI	3		
- 1.5.6	01.01		<u></u>		0.0.	1 10	1	(A)	<u> </u>	P		0.9.8	3.1	00	99	70				
	00.00	1 1	<u> </u>		har	-	1	Ň					1		1.				1	1
-2 01	01.05	14			5-	T7L	461	R	00	6	L		1		1.		NZ	23		
13,0,6	01 77	6611	- I <u>- I</u>		STI	B72	086	<u> </u>	00	. 0	4		7		V		NZ	3	S 1 5	
201	01 42	E.J.N	<u> </u>	1_1_	SI tol	879	051	1	01	.0	LT	50.91	3. 1	00	99.	70	NI	3	10	
- <u>206</u>	00 68		<u> </u>	1 1	20	R77	12 71	7	00	.0	CX-	5099	1.7	01	01.	25	NI	3	1	
10.9.1	00.75		1 . 1 .		67-	TZS	040	5	00	5	C.L.	5	5.		4		NI	3	1	1.1
1004	00 25	111			BD	BZT	46	2	00	.0	LS	0.90	1.7	01	01	25	N	3		
FO, 9, 1	00 20	1 1	. 1 . 1		197			N				1 1 ST	4		4.	. 4			1	
	01 15							N				09	9 7	01	01	25				
<u> </u>	01.00	1 1									1	1.0.	5,1	5 6	0,2,.	7.5		1.00	1	
	01 50		1 1	1.1						•		1.0	1,2	5%	D,Z, .	75		1	1	1
<u>n 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1</u>	00 00		<u>,                                      </u>					A			1	1.0	2.7	51	04.	30		153	1	1
	01 65		<u> </u>		- 2.					•	1.1.1	10	2.7	751	0,4.	30		-		
ł ł ł	00.00	0						~		•		10	4.3	01	0.5.	80				1
	01 50	EGV		1					1	•		10	4	301	0.5.	,8,0			1	
	00.00	I MAS			N.			٨	2	•		10.9	5.8	01	07.	30		3		
<u> </u>	61 44	1						~	)	•			4		4	1			12	
-206	01 45	1 1 5	FLK		x 7	BZE	3.8 6.	5		•	CT	10	5.8	01	0.7.	30	N	13	1	1
15010	00 120		VINA					1				10	7.3	101	08.	,8,6			1	
1 1 1	01 50							in	3			10	7.3	01	08.	80	0		1	
	00 00		1						J			1.0	8.8	01	10.	35		1	1	
	01 55	V						Л				10	8.8	01	,1,0,.	35			1	
									ATIONIC		CTDI I/			BREVI	ATIONS	FILL	ING	ARR	REVIA	TIONS
	MISCEL	LANEOUS	12. 1	1	ROC	CK IYF	PE ABB	REVI	ATIONS		SIRU	F IONE			ATIONS	NN	ONE	F	SER	PENTINE
REF. ANGLE	"+" FOR TOP EN	D OF CORE,	"" FOR	BOTTOM	947	- then		1		S	J SINGL	E JOINT	FU	PULIATIO		X O			CAL	CITE
Ти	TOP OR BOTTOM	END OF FRA	CTURE		1	100		2	4		N VEIN			1				F	0, 12.	
N/W	N-NON ORIENTAE	BLE W-WHO	LE CORE						1	B	D BEDD							F		
SLIC	SLICKENSIDES -	YES OR NO								C	CONT		-				IART7	-		
FRAC	1-Natural 2-Maybe	e (Natural or	Mech.) 3-M	lechanical				_		-F	I FAUL			-			AY			19-12-12-12-12-12-12-12-12-12-12-12-12-12-
CONF	CONFIDENCE - 1						F	FAUL				ţ			TE	-				
DIFF. ANGLE	ANGULAR DIFFERE	NES				-		S	Z SHEA	K ZUNE							ARAN	VZAZU		
CALL &	NICHOLAS. I	INC.	file: o	core_form	n_toro11	-m.dwa			6											

PROJECT LOCATION HOLE NO.	Aranza GHP- GI	zu 3		RIEN NATION_ HING	ITED	CO	RE B	EAF AST	DATA RING		SHE	EET	(ME DATE ELEVATIC	T.) 6/15/	PA 17	GE	IC BI DI	2_ C Y	DF ZAC HQ	17 250 3
REF. ANGLE (REF. LINE TO TOP OF	DEPTH FROM START OF RUN (M)	R(	CK TYP	E 3		RUCTURE	DIP	N / W	FILL THICKNESS (cm)		G TYPE	F	DRILL RU FROM CO	N DEPTHS DLLAR (M) TO			R C	O N D F AN	IFF. IGLE 1	NITLS
HOLE LINE)		IMS	e e k					N		╈		1.1.0	35	1,1,0,.	9	5			1 4	
	0,0,0,0,0		51/10					N		t		1.1.0	35	110	9	5		ŗ	1	I
	0.0.000	1.1						N		T	1.	110	1.95	110.	2;	5.				1
	01 30							N		-	1	1,1,0	1.95	1,1,2.	Z	5	-			
	0000					1 1	p.	N				1,1,2	25	113.	4	0				
	61.15			1 1		1.1.1	1	N	1.1.*1			1,1,7	1.25	113.	4	6		1	<u> </u>	
	0000			1 1			1	N		4		t. L.	3.40	1.1.4.	5	5				
	01.15				122	I. I.		N		4	1 1	LLI	3 40	114.	5	5		-	1	
	00.00	T.	T					N	1.1.	_		Jul .	1.55	116	0	5	-	-	1	
	01.50	V	Y				1	N	<u> </u>			1,1,	7.05	11.6.	0	5			1	
	0,0,.0,0	ESK	1 I I	1. 1			1	N	•	-	. I.	1.1	6.05	1.1.4.	>	0			-	
	00.17	11					1	N		-			<u>. •</u>				1	7	1	
-0.75	00.18		210 10		501	3230	5,5		00.0		CD	- 1- 1-	1.	1 1 1 •			1.	2	1	
	0.0	iti			557	1,38	28		DR	20	GEIL	1 1	<u> </u>		<u> </u>	N		7	<u> </u>	
1.11.1	00.30	· · · · ·		1 1	BUT	75,2	6,5		0.0.	0	5-	1 1	10 <sup>10</sup>   1	- · · · ·		Ŷ		7		
	00.40	i a	· ·	<u> </u>	BNJT	011	60		0,0,	0	<u></u>		<u> </u>	<u> </u>	1	N)	1	7	1	
	06.54			1.1	15D 1	47.0	-0p		00.0.0		6121		1.		1		1	0	1	
	0.0 55	4 1	1.1	1 1			1	20	)	+		1 1	1 • 1	1 1 1	1				1	
	9068	1 I I	1			1 10	0.	1.0	· · · · ·	-		<u> </u>	1.		<u> </u>	N	1	2	-	
	00.61	1 1	<u> </u>		521	6.14	TO C	1	0,0,0,0	6				· · · · ·	1			-		
	0070	- I - I	1.4			1 1	- I			+		1 1	1.							
<u> </u>	91.05	1 1	<u> </u>	1 1		194	1.6	12.			/	1 1	1 • 1	1 1 1	1	4	11	7		
	01.06	2 1 1	1		100	326	70	-	00	5	6	1 1				N	i	7		1
	01.17	,	1 1	<u> </u>	GTI	2 1 5 V	E E	-	() () .	0	6	1.1	6.65	117	5	OA	12	2	1	
-0,7,0					711		1217	_												
	MISCELLANEOUS			2	ROCI	K TYPE	ABBR	EVI	ATIONS	S	RUCI	JRE IY	PE ABBR	EVIATIONS		NONE	AL		SEDDI	ENTINE
REF. ANGLE	"+" FOR TOP END OF CORE, "-" FOR BOTTOM									SJ	SINGLE	JOINT	FO FOI		N	OVIDE		T	CALCE	
Т⁄в	TOP OR BOTTOM END OF FRACTURE							а -		VN	VEIN	-			^ c		IDE	+	CALCI	
N/W	N-NON ORIENTABLE W-WHOLE CORE									BD	BEDDING	-								
SLIC	SLICKENSIDES -	11.1						CT	CONTACT					OLINDT	7					
FRAC	1-Natural 2-Maybe	lechanical						FT	FAULT	ONITACT			c	CLAY	-					
CONF	CONFIDENCE - 1	nt						FC	FAULI C					ANHYD	RITE	+	j.			
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES					h				52	SILAR							Δ	RAN	7A7U

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PROJECT	Aranzazu	ORIEI	NTED	CORE	EAF AST	DATA RING		SHE	ET D	(ME	T.) 6/15/ DN	Р/ 17	AGE	BY DIA	OF Z	AO 51 IQ3
REF. ANGLE (REF. LINE TO	DEPTH FROM RC	OCK TYPE	STI	RUCTURE	N /	FILL	.IN(	G	C 1	RILL RU	IN DEPTHS OLLAR (M)		S L I	FCRO AN	DIFF.	
TOP OF HOLE LINE)	(M) 1	2 3	TYPE B	CIRC. ANG. DIP	W	(cm)	4	TYPE	FR	ОМ	TO	_	С	CF	ANGLI	INITES
-,0,7,8	01.30 ESK		BDT	26260			24	21	1,1,6,	• 05	1.1.1.	51	ON	1 6	1	SP.
	00,.00 Ers.K				N		+	1 1		. 50	110.	11	5		1	
i tet	0,0,65 ESK		1		N		+	- i - i		• <u>5</u> P	1,1,0,.	1	9			
1 1 1	90.00			1 1 1	N	1 1 1	+		118	· 15	1.19.	15	0	-		
The Friday	01.35				N	10.1.•1	4		1,1,8	• <u></u>	1. 1. 7	5	0	-		+
	00.00		1		N	1.1.1	_		1,1,7	• 50	1,21,.	0	2		<u>                                      </u>	
	0,0,.70				N	1.1.1.1	4	1 1		••••		4		1 2		< n
-2.56	00 71		BDT	150 12		40.00	51	T		•	· · · · ·	1	N	12	> -	20
	0.0, 8,0		BDB	0,38 5,9		0,0,0,0	2	Tin		••••	· · · · ·	1	2	1 0		
	90,082		BDB	504460	-	00.0	2			• <u> </u>	· · · · ·	1	N	10		1
	00.86		BDR	03757		00.0	5	$\sim$ .		·		1	. N	10	- 1	
	00.88		BNT	1,80 5,7		00.0	2.	Thi	21-21	• C I	··· · · · ·	Î.	N	1 7	1	
	00 94	HEL	VNT	04017		00.0		LX.	1.1.	•	·	1	N	1 -	5	1
	00 96		BDB	05055		Deiek	2	LX	<u> </u>	•	1. · · · ·	1	, N	12	1	
	01 13		BDB	030 58		00.7	2	LT	· · · ·	•	1 1 1 1	1	M	1 3	1	
	01.1.8		BDB	39253	5	00.0	D	LT	100 m	<u>.</u>	- du	1	N	1		
₩.	01.20 Y		557	16065		49.0	S	L		Y		1	. 2	1 -	1	2.1
-25.6	01.221	V	STT	1.0474		0,0,0	0	CL	1,1,9		) , Z , ,	0	5101	1	5 1	1
	OA DOHFL				N			i l	121	. 05	122	15	S	-	1	1
	01.50 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			N	12.1.1.1		1	121	. 09	51,22.	S	S		-	
	00 55		VNR	34,870		01.0	2	QX,	LZZ	1.5	51,29	1	0 N	1 -		
	00 85		BRE	32466		0,0, .;	0	CL		1.1		1	N	1	2 1	
	0.0.93		BDI	34,370		99.	0	L	1 in	1	1	1	N	1 -	2	-
	01 05 7		557	33367	-	00	0	LX	it		T I I		.Y	1	5 1	
-9	01 25		BIDA	532457	1	00	0	LS	N.	1	T.		N	13	1	1
			POC	TYPE ABBR	FVI.	ATIONS	<	STRUCT	JRF TYP	E ABB	REVIATIONS	F	ILLING	AB	BREV	ATION
	MISCELLANEOUS		KUCI	V TIPE ADDIV		Anons	SI	SINGLE		FO FO	LIATION	N	NONE		P SEI	RPENTINI
REF. ANGLE	"+" FOR TOP END OF CORE	-, - FOR BUILOM					VN	VEIN	A 14			X	OXIDE		T CA	LCITE
'/B	TOP OR BOTTOM END OF FR	RACIURE	-				BD	BEDDING				s	SULPHI	DE	1	
N/W	N-NON ORIENTABLE W-WH	OLE CORE		19			CT	CONTACT	1000		199	L	CHLOR	TE		
SLIC	SLICKENSIDES - YES OR NO	0					FT	FAULT			2	Q	QUARTZ			
FRAC	1-Natural 2-Maybe (Natural or	Mech.) 3-Mechanical	*				FC	FALILT	ONTACT			c	CLAY			
CONF	CONFIDENCE - 1-Poor	. 4-Excellent					67	SHEAD .				A	ANHYDE	RITE		. P
DIFF. ANGLE	ANGULAR DIFFERENCE BETWE	EEN TOP LINES					52	JICAR A							ARA	N7A7

.

PROJECT	Aranza	zu	0	RIEN	ITED	COF	RE	[	DATA	1	SHE	ET	(ME	T.)	PAG	E _12		OF _	17 OSM
LOCATION			INCLI	NATION_			BE	AR	ING		8 <u></u>	L				I	בוכ_ ⊿ו⊂	HC	23
HOLE NO.	GH12-6	-MX-03	NORI	HING			EA	121								IS F		1	1. A.
REF. ANGLE	DEPTH FROM	RC	CK TYF	ΡĒ	STR	UCTURE	!	Ŋ	FILL	INC	G	I	DRILL RUN	I DEPTHS		LR	0		N and
(REF. LINE TO TOP OF	START OF RUN		2	z	$ =  \mathbf{V} $			/ w	THICKNESS		TYPE	FR					N	ANGLE	INITLS
HOLE LINE)	(M)		2	J	TYPE B	CIRC. ANG.	DIP	+		1.	-	177	55	174	t A	1 101	3		512
-7456	0.1.31	HFL		1 1	VNI	18.65	2.6	+	Q0, • 4	-	21	174	10	175	60	41	3		22
-3.4.0	0013				VND	010	2.4	+	00.0		x, L	1,0,7	•	1.9.1.	00	81	3		
	00.23		1	1 1	2315	0685	2,1	+	00.0		SV		1.1.1.	· · · · · · · · · · · · · · · · · · ·	. !	NI I	2	100	
24 124	00.49				SJI	6196			0,0,•,0	21	$\sum_{i \in I}$		· · · · · ·	<u> </u>	- 1	01	2		1
	0,0,.81	i u			SJB	0,5,0	1,7	-	00.0		-11-5		1•1 I	<u> </u>	<u> </u>		2	1	
	00.0.86	1.41	1	1	STT	07.85	2,/		<u><u>a</u>a</u>	2	A.F.		7•		. 17	A1 1	3	-	
	01.08	K	1 - 1	1 1	VNB	0 / 0 3	59	-	90,00			1 1			1		2		
- 3,40	91, 32	H.FL	1 1 1		SJT	1,1,46	6,4	_	00,00	20	43.	1.69	· 10	1. 4. 7.	6		3	- 1	
+0,00	0,0, .,0,6		1 1	1 1	553	272	5,0		0,0,.,0	1	V	1.45	60	1, 41,	1,5	NI	>	- 1	
- N - 1	00,17	4			SJT	24,24	15		DA C		S		1.1		1	NI	5	1	51
	40. ZG		1 1		STB	272	58		00.07	2	Su	11		· · · · ·	1	MI	3	1	
	00.31		1 1		SIT	2800	50		an.	) ?	S.C.	11		·	L.	N	5		1
	00 45				WNB	242	7.4		00.0	2	S.	i i	1.1.1.4	•		N	3	1	
	0.0. 5.2	1 1 1		1 1	SJT	272	5,8		00.00	2 -	STL	11			1	N	5	· · ·	1
	00 7.0			1	UNB	199	72		99.0	2	ST.	1.1	1.1.1.			N	15	1	
. 7	0.1.09	\ \ \ #			VNT	27.8	5,5		0,0.	2	ST	1 1	1.1.1		1	N	13	- 1	1
+.0.0.0	01.22	H.F.L		1 1	VNB	258	54		0,1,.,	Ó	S	1,25	5.60	127.	1,<	SN)	3	1	1
101010	00.100			1. 1. 1	FIB	2,7,61	50	N	99.0	5	51	1,2	7.1.5	1,2,8,.	70	N	13		1
	01.55							N				1,27	1.15	1,2,8.	7,0		146	1	
	00.00	>						N	1 1 1 1	-	1.1	1:2.8	1.70	1.30.	25	3		1	1
	00.19	2				3	1.0	N							- 15				
E CO C F	200.19				FTR	1.7.61	0		0:0.1	5	5.				1 1	N	3	1	
-0.00	00.57				5-12	240	25	4	0.0	0	SL.	1 1			1 1	N	3	1	1
	00 51							N			1 1	1 1	• • • •					1	1
V	00.81							N)			1 1		>,	4				1	
					DOOK			3/1/		c	TDUCT	IDE TYP	DE ABBR	EVIATIONS	FIL I	ING	ABB	REVIA	TIONS
	MISCEL	LANEOUS			RUCK	TTPE AE	BBRE	.VI <i>P</i>		5	SINCLE			ATION	NN	IONE	F	SER	PENTINE
REF. ANGLE	"+" FOR TOP EN	ID OF CORE,	BOTTOM		'				50	SINGLE J				X C	XIDE	1	CALC	CITE	
'/B	TOP OR BOTTOM	END OF FR		Kok joir						VEIN				<pre></pre>		100			
N/W	N-NON ORIENTAE	BLE W-WHC	DLE CORE					100	BD	BEDDING									
SLIC	SLICKENSIDES -	YES OR NO			1	4		_		CT	CONTACT							-	
FRAC	1-Natural 2-Maybe	e (Natural or	Mech.) 3-1	<b>dechanical</b>	1 10					FT	FAULT							-	
CONF	CONFIDENCE - 1	1-Poor	ent						FC	FAULT C	ONTACT	1				-			
DIFF. ANGLE	ANGULAR DIFFER	ENCE BETWE	NES				2		SZ	SHEAR Z		1			MHTURII	E		174711	
CALL &	NICHOLAS.	INC.		file: or	core_form_t	oro11-m.dwo	a											ARAN	17 A7 U

PROJECT	Aranza	zu	0	RIEN	ITED	COR	E	DATA	4	SHE	EET	(ME)	1.)	PAG	E <u>13</u>		OF _	05mg
LOCATION .			INCLI	NATION	S.,		BEA	RING	2		D		. 42	-	t	3Y _	HQ	03
HOLE NO.	GHP-G	MX-03	NORT	HING			EAS	TING			E	LEVATIO	N	_				
REF. ANGLE	DEPTH FROM	R	OCK TYP	ΡĒ	STR	UCTURE	N	FILL	LIN	G	[	DRILL RUN	DEPTHS		LR	0		
(REF. LINE TO	START OF RUN	1		_		1		THICKNES	s	TYPE		FROM CO	LLAR (M)			N	DIFF.	INITLS
HOLE LINE)	(M)	1-	2	3	TYPE B	CIRC. ANG. DI	IP W	(cm)			FR	UM 7 O	170	70		2	ITOLL	$\leq \Lambda$
-0,80	00.088	HFL	1 1		SJT	1,7,2 6	9	00.	1 (		1,40	• 10	120	20		2		34
-0.80	01.02	H.F.L	·	1	VNK	280,4	4	0,1,1,0	0	$\sum_{i=1}^{j}$	1,00	• 70	150.01	20	101	2		
1 1-1	00 00	11.	1.1.	- 1 - 1 -	VIIIS	4609	ZN	00.	0	2 Th	150	1. 40	1,2,1,•,	(1)	-112	2		
	01, 5,5				573	2201	SIN	0.0.			1 20	. 40	123	70	ND	3	1	_
-1,30	90.48	2945	SK N	1 1	NB	2604	2 A	00	ell	ST	1	• 12	45171-	00	17	3	-1	
	0,0, 6,9		11-	1 1	5515	22.3.1	SIN	00.0	2'			1. • 1 • 1		±	102	3	1	
	0.0. 98				553	2526	0	0.0.	4	V. 1					100	2		
	01.04	1 1		1-1-1	SIT	5201	1.	0,0,01	or	× 1 1	11	. •			1)7	2	- 1	-
	0,1,0,10	it i	1.1	L.	STI	32,66	17	00,01	0	50	1 2 1	1-1-	1 22	2	N L	2	1	
-1,30	0,1,.,1,6	HF.L			VNIS	\$324	5	201.1	0	211	151	• 13	1,20.	140	2~1	2	1	
-138	00.06	开开于	2011	1 1	1		1	1.01			1,5,5	•	131.		>	2	-!	
	00.39	11			5,5 B	1422	0	0,9.	9	211		1.1			10	2		
$\overline{\mathbf{v}}$	0,0,.,7,6	1	1 1		1.					1-	1 2 2		170	30	- 1 1	2		
-1,38	0,1,.,4,6	HFL	- Vi		KNT.	3167	10	00.	5	31	1 2 1		121	2.2		2		
-2,4,2	0,1,.,20	BKN			SJT	1,895	,4	0,0, .	0	5	1, 2, 7	1.1.1.2	176.	0		2	00	
-090	00.38			1 1	553	1,5,4 4	121	00	0	S	1,50		1210	1810		T	00	1.
- 0, 200	0113	SKN	1.1	-	VNT	0446	at -	0,0, • ,	5	S	1.56	. 25	1.3.1.	151	2NI	3	0,2	1
	00.00	1.1.1		E I			A	<u> </u>	-	1	15.1	1.80	11.5.7.	1.SC	2	-	.1	1.
1 1 - 1	00.19	1.1.1		151			IN	J			1.1.	1.1.	<u> </u>	<u>i 1</u>	A 1	2	1	1
-1.74	0,0, 27	2			VNR	24.26	0	00.	1	Sii	1 1	1.1.1.4	1 1 1 •	1 1		2	· 1	1
1.1.1.1	01.30	2	1 1		<b>NNT</b>	7765	5	00.	0	SiCi		1.1.1	1.20	1 1	N/I	3	- 1	1
-174	01.42	SKA	)		RT B	2645	56	Q. (1)	0	S.C.	1.3.7	1.80	1.5.4.	170		2	- 1	1
+000	00 29		L. L. al		VINB	2265	55	0.0.	5	SIL	1,59		1,40.	181	2 ~ 1	17		1
4	00.67	1 1			55 B	2166	25	0.0.	0	SCI	1 20	1	3.	6	2 11	17	-	1
1000	01, 40		1.1	1 1	5,5 T	3,3,06	8			L	112	1, >0	140.	, 0,		D		
	MISCEL		3	2. 1	ROCK	TYPE AB	BREV	ATIONS	S	STRUCT	URE TYP	E ABBR	EVIATIONS	FIL	LING A	ABB	REVIA	TIONS
	"+" FOR TOP END OF CORE, "-" FOR BOTTOM			BOTTOM	Roon			2. A. S.	SJ	SINGLE	JOINT	FO FOL	IATION	NN	IONE	F	SERF	PENTINE
TL	TOP OR BOTTOM END OF FRACTURE			Dorrow			1		VN	VEIN	1 e			xc	DXIDE	1	CALC	ITE
	N-NON ORIENTABLE W-WHOLE CORE					- Although			BD	BEDDING	1			S S	SULPHIDE			
N/W	SLICKENSIDES - YES OR NO							1911 S. 42	ст	CONTACT	г	1.000		LC	HLORITE			
	SLICKENSIDES — YES OR NO					1711-34		(A)	FT	FAULT		1.		Q	UARTZ			
FRAC	1-Natural 2-Maybe (Natural or Mech.) 3-Mechanical CONFIDENCE - 1-Poor 4-Excellent			ant			·		FC	FAULT C	ONTACT		and the second	CC	CLAY			
	ANGLE ANGULAR DIFFERENCE BETWEEN TOP LINES						ill.	1. 18 March	sz	SHEAR :	ZONE		19.00	A	NHYDRIT	ε		
CALL So	CLE ANGULAR DIFFERENCE BETWEEN TOP LINES				core form t	oro11-m.dwa		1.1			and the	- States	12.26				ARAN	174711
UALL & .	TATOTIOTHO. 1																	

PROJECT LOCATION	Aranza G1+P- GA	zu 1X- 03		RIEN NATION_ 'HING	ITEL	) C		EAF AS	DATA RING		SHE	EET	(ME DATE ELEVATIO	T.)	РА 117	AGE _	<u>IЧ</u> В` DI	C Y A	DF ZA HC	05mr 23
REF. ANGLE (REF. LINE TO TOP OF	DEPTH FROM START OF RUN (M)	RO(	CK TYP	E 3			IRE	N / W	FILI THICKNES (cm)	_IN(	G TYPE	FF	DRILL RU FROM CO	N DEPTHS DLLAR (M)	2	S L C	F R A C	C O N D F AN	IFF. IGLE	INITLS
+DOD	(2) 49	516 11			STR	217	670		0.0.0	21		1.3.9		140	.8	OY	1.	a		58
-266	01 01	- h			N.M	117	7 55		00.	32	S.T.	1,40	. 80	142	. 3	SIN	11	70	0	
121010	00,00	5k .)			41.33		e pr	N			1 1	142	35	143	. 9	0			1.5	
	01 37	JAN		-				$\wedge$					1.		•				1	1
	01 36							W				1 1		8	•			1	1	
	01 55	V	- <u> </u>		1.12	1 1 1 1		W			1 1 2 3	1,42	.35	143	. 9	D			1	
-224	00 97	SKA			VN-	F.1.9	8 56		00.0	0	S. I	1.4.3	5. 90	145	.4	ON	1	3		
	00 00		-			10.1.		N				445	. 40	14,6,	. 9	0			1	
	6. 56	1 1						N				145	- 40	21,4,6	. 9	0			1	1
-070	00.73	SKN			STI	320	8 31		00.	0	SL	7.40	5 . 90	0148	. 0	SIL	11	3.	1	1
101010	00 67	- 1	<u></u>					N				1.1.1	4.	4	7.				1	1
19 1 1	00.86	4. N						N			1.18 1.18	1,4,6	5.90	1,98	.0	5			1	24
-308	00 74	GA( A)			551	3 71	5 49		0.0	N	SI	1418	3,0,5	149	. 6	ON	11	3	1	
1200	00.51	1211/12			FT	TZ9	643		01.1	0	CLS	1.0	1	1.1.1	•	Y	-1	3	1	in la
	00 74	4. 1	240 9		55	131	041		06	0	L				•	1	11	3	1	
	00 88				FTF	526	9 58		01	0	LCS		1	1 1		X	1	3	1	1
	00 91			-	557	29	045		00	1				1.1		N	1	3	-	
	01 74	V			551	37.2	450	T	06.	D	CL	1.5.1.5	4.	1		Y	1	3	1	1
-308	01 35	ANN)			55	623	4 52	-	00	0	CL	1,4,8	3. 0.5	51:4,9	6	0 N	1	3	1	51
1200	00.00	1						1				1.40	1.60	1,5,1	1	5	No.		1	1
	00.54							N			1 1		h • i + i	1.1		1			1	100
-19-7	00 55			1.1.1	55	TYS	125,9	3	0.0	1	LS.		1	1.1		. ^	11	3	1	1
	00.65	-		1	55	30,3	2 5,7	Y	00	0	LS	121	1	1.1	. • .	1 1	11	3	Ŀ	
	0.0 9.9				SJI	301	062		00	2	LiCi	1 13		7.1.1		1	1	4	1	1
-1.92	01 18	V	5. j. j.		55	B0,6	,44,E	2	00	1	LS.				. • 1	. ^	11	5	-	
	MICOFIL				POC			FV/I	ATIONS	5	TRUCT	JRF TY	PE ABB	REVIATION	S FI	LLING	G A	3BR	EVIA	TIONS
	MISCEL		" " FOR	POTTON	Roc				Allond	SJ	SINGLE	JOINT	FO FO	LIATION	N	NONE		P	SERP	ENTINE
REF. ANGLE	+ FOR TOP EN	END OF CORE,		BOTTOM				10		VN	VEIN		< - 1	2.	x	OXIDE		Т	CALC	ITE
	N NON OPIENTAR		E COPE							BD	BEDDING	•	019		S	SULPH	HIDE			
N/W	N-NON ORIENTAD								· · · · · · · · · · · ·	СТ	CONTACT	- U		-	Ľ	CHLO	RITE			
	1 Network 2 Martin	Natural or	Mach ) 3- M	lechanical						FT	FAULT				Q	QUAR	TZ			all a
CONE			4-Fvcelle	ont						FC	FAULT C	ONTACT	1	- 19 - 19 - 19 - 19 - 19 - 19 - 19 - 19	С	CLAY				
		NCE RETWEE	N TOP LIN	NES		1				sz	SHEAR 2	ZONE			A	ANHY	ORITE			1.5
CALL ANGLE	THOULAN DITEN	NGULAR DIFFERENCE BETWEEN TOP LINES				1	- dung					2		11.4	1911	- Chinese		Δ	RAN	7A7U

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PROJECT LOCATION HOLE NO.	Aranza GHP-GM	zu 4-03		RIEN NATION_ THING	ITED	COF	RE BE EA	AR ST	DATA	12	SHE	ET	DATE ELEV		<b>(</b> ) () () () () () () () () () () () () ()	. PA		S BY . DIA.	OF Z	17 40 5ml Q3
REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	RO 1	CK TYF	PE 3		CIRC. ANG.	DIP	N V W	FILL THICKNESS (cm)		G TYPE	FF	DRILL FROI ROM	RUN COL	DEPTHS LAR (M) TO		S F L R I A C C	O N F	DIFF. ANGLE	INITLS
-1.97	01.43	ESK	a	17 - 31	SJB	088	5,2		00.2	- 1	44	140	1 1	6.0	1.51	1.	SMI	3	1	SD.
-187	0 70				SJB	0981	5.2		00.1	(	CLS	151	1.	15	152.	7	DNI	3	1	
-1.8.2	0. 9.6		1	- I I	55	0,3,2"	5,2		02.0	2	- 4.5	1,5,1	1 • 1	15	1,5,2.	7.	ONI	2		
	000	ESK	1 - 1				/	V	1 1.	+		1,5,2	1.	10	1,5,4,.	2	5		i	+++
	0.13	11	- 	1 1			1	N			1	1	1.1		1 1 1 •	<u> </u>	1			
-01.0	0.58		1 1	1 1	SJB	14.84	1.1	_	00.0	- (	C.L.T				1 1 1 •		NI	3	1	
	0,64		1		SJT	050	20	-	0,0,.,			1.1	1.		1,1-1•		A 11	2	- 1-	1
	0.83	1		1 1	STB	47,2	52	-	00.0		41	1.1.1	1.	1	1 1 1 •	<u> </u>	~	2	1	
. 🔹	0.94		Г. Г		SJT	350	-1,0	_	00.		459	1	1 • 1	7	1 - 11.		ZNI	2	-	
~0,10	134	V	1.1	<u> </u>	STIS	2100	11	-	00.01		113	1,5,1	4.	20	13.7.	à	SAU	2	- 1-	
-1,22	,0,0,0,6	ESK	<u> </u>	<u> </u>	SJT	006	50	_	00.	(	442	LiSil	1	65	1 21210	0	~	2	- 1	
4	10.22	t	1 1	<u> </u>	SJT	044	10	-	00.		5	1 20	V • )	70	100	0	aNI	2		
-1.22	1. 50	89K		1 1	556	25,61	14		O VION		131	150	1	20	157	10	C	P		1
	0.000	i du		<u> </u>	11 gr.	1 1		N	1 •1	+		1,5,5		00	1314.	- DI	2		1	
	1. 55			- 12 I -					•	÷	1 1	1.30	2	20	1.58	12	2		-	
1.	0.00	1 1	- light	<u> </u>	1. I	1 1	* <u>1</u>	N N	1.1.	+	<u>1. 1. </u>	1.5	/1.1	7.5	1, 10,	10				1
	010	23 1 -	- Pi-	1 1	1/2		1		1.1.1	0			1 • 1	-1		1	NI	3		
-726,6	020	× I		1 1	53 5	D. KO	국내		00.00	-	663		1.	-			N	3		
1.1.1	0		1_1_1		73	414	0;7	-	0,0,1	5	21-	14			1	1		2		
	1.03	Nº.	<u></u>		STIS	12.0.4	SIC			1	1.6	1 70	1 • 1	-		· ·	J.	3		No.
- V .	1. P.1	ESK.				12.7	7.4	-	00.	1	5	15.	7	20	158	9	NO	5		
-12,00	1.1.7.1	K MB	1 1	1 - 1	321	1 5 2	26	•	000	5	Fe	150	2	80	160	.3	GN	Z	2.8	3
-182	0.0.01	PIPB	19		274	050	517	1	n()	1	5	1.5	6	:0.0	1.50.	- 3	ON	12	2,8	3
- 186	1.1.40	5	1_1_		515	210	40		60	0	15	1.6	0	36	161	8	5NI	3		
1.76	10,	1 31 31	1 1	1 1	4 311/	010	L.V.	_	0.01					DDD						ATIONS
1. St. 1.	MISCEL	LANEOUS			ROCK	TYPE A	BBRE	VIA	ATIONS	S	TRUCIL	JRE IY	PE A	ABBKE	VIATIONS	FI	LLING	ADD		ATIONS
REF. ANGLE	"+" FOR TOP EN	D OF CORE,	"" FOR	BOTTOM			_	_		SJ	SINGLE J	IOINT	FO	FOLIA	ATION	N	NUNE			
т∕в	TOP OR BOTTOM	END OF FR	ACTURE							VN	VEIN					X		-		
N/W	N-NON ORIENTAE	BLE W-WHO	LE CORE							BD	BEDDING					5		-	-	
SLIC	SLICKENSIDES -					_		СТ	CONTACT	-	+ +				CHLORITZ	-	-			
FRAC	1-Natural 2-Maybe	e (Natural or	Nechanical			~	_	1	FT	FAULT		-			Q	QUARIZ		-	1.5	
CONF	CONFIDENCE - 1	Poor	ent		5		-	214	FC	FAULT C	UNTACT	++	1			ANHYDE	F	-		
DIFF. ANGLE	ANGULAR DIFFERE	ENCE BETWE	NES				-	100	SZ	SHEAR 2	UNE					ANTIDA	-	ARA	N7A711	
CALL &	NICHULAS. I	IVC.		tile: o	core_torm_t	toroii—m.dw	u u													

PROJECT	Aranza	zu	0	RIEN	ITED	CO	RE		DATA	A	SHE	EL,	(ME	.   . )	1.71	PAG	E		OF_ ZA	10-541	
LOCATION .	GHP-UM	X-03'	INCLI NORT	NATION _ HING			BE EA	AR AST	RING TING			L	ELEVATION	DN		· /		DIA.	H	23	
REF. ANGLE	DEPTH FROM	RO	CK TYP	E	STR	UCTURE		Ŋ	FILL	LIN	G		DRILL RU	IN DEPT	THS		S F L R	С 0			
(REF. LINE TO TOP OF HOLE LINE)	START OF RUN (M)	1	2	3	TYPE B	CIRC. ANG.	DIP	w	THICKNESS (cm)	s	TYPE	FR	ROM C		TO	_	I A C C	N F	DIFF. ANGLE	INITLS	
-1.56	0.77	PPB	1.1	-	SJT	25.41	6.4		0,0, (	01	LS	1,6,0		1.6	1	85	M	3	1	SIL	
	1.00			1	VNB	2321	1.3		00	1	S				1.91	1	NI	5	1		
V.	11.23	0			VINB	3,5,2	5,2	_	00	15	2	V	·•	14		1	NI	3	I		
-1.56	1.34	PPB	1		5.5T	30,6	40		00	01	C.S.	1,6,0	. 50	1,6	1	85	NI	3	1		
	0.18	1.1.1	1 1		SJT	246	2,8		60.0	2	C.S.	1,6,1	8.5	1.6	3	30	NI	0	1		
	0.71		1		STT	2,6,0%	2.6		0,0,.0	1	45				<u>, i i • i</u>	1	MI	2	1		
1.1.1.1	0 86			1 1 5	SJB	1,58	5:3		QP1.9	2	NI	1 1	1.		1.1		N	P	1		
	1.1.3		1 1	1 1	SJB	208	5,7		001	V.	Ci	1 1				1	NI	3	1		
	1. 27	J.			553	1,7,6	34		0,0,0,0	0	ALL						NI	3			
4	1.76	N.			SJT	1,30	GS		00.06	2	5						NI	3	1	1	
-156	1.49	PPB			55B	204	4.8		0,0,0	6	N. I.	1,6,1	815	1,6	3	3,0	Ni	25	1	1	
-1.8.8	1.09	PPB			55B	0.8.4	31		0.0.	0	54	1.6.3		1,6	9	8,0	NI	3	08		
	0.00			1.1		-1 1		N			1 1	1.6.4	1	>1.6	6	35				1	
	1 55							N	1			1,6,-	1 80	1.6	6	3,5		8	- i	1	
80.00	0.85				STT	0.66	66		0,0, .	0	N,	1,6,6	1.35	16	7.	85	NZ	.3	1	1	
	0.00							N	1 1 • 1		1 1	166	7. 85	-16	n.	35			1		
	56	1						N	14.1		1 1	1167	7 8-	51,6	9	35			1		
toop	0.73				VNB	NY 6	57		00.	0	5	160	1.33	517	0.	85	NI	P	30	1	
-177	n. 67				UNT	176	1.9		0.0.	2	L.S.	1,70	1.83	51,7	2	3,5	NI	Z	2,0	17.1	
1100	1 69	V			STT	2.20	52		00 (	0	NII	1.1.	1		1.4.		NI	2	20	1	
177	1.18	POR			VNB	0.7.9	59		0.0.	1	5	1 1	7.		V.	1	N	2	2,0	4	
-171	1 27	PPR			55 -	160	80		0.0	0	N	1.00	8	51.7	.2.	高马	NE	22	20	1	
1000	0 74	1113	1	199	N/ Nin	6.06	5.3		0.0.	0	LS	177	1.30	517	3.	8,5	5N	13	14	1	
T1010.10	0 50		L. H		VNB	06.8	44		00	1	69		1.	1.	1		N	3	1,4	1	
Y d G CI	0 80		1 1		STB	0.7.8	4.6		60	0	5		1.1		1 1.4		N	43	11,0		
1,0,0,0	.0.0				- DOOL			7/1/	ATIONS							EII I	ING	ABB	REVIA	TIONS	
	MISCEL	LANEOUS			ROCK	ITPE A	BBKF	.VI/	ATIONS	2	STRUCTU	JRE III							SFR	PENTINE	
REF. ANGLE	"+" FOR TOP END OF CORE, "-" FOR BOTTOM			BOTTOM		*		-		SJ	SINGLE		FU FU	LIATION	-	V O			CAL		
T/B	TOP OR BOTTOM END OF FRACTURE									VN	VEIN				-	C CI		-			
N/W	N-NON ORIENTAE					10		BD	BEDDING				-	5 50		-					
SLIC	SLICKENSIDES -						a los	СТ	CONTACT	<u></u>											
FRAC	1-Natural 2-Maybe	lechanical		1. 1. 1. 1. 1.	Vine 2	15		FT	FAULT							Tu-1					
CONF	CONFIDENCE - 1-Poor 4-Excellent					in the second	1.5			FC	FAULT C	ONTACT			-	C Cl		T	-		
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES						45. C.			SZ	SHEAR Z	ZONE	a construction	-	-	AA	NHTURI			174711	
CALL &	NICHOLAS	INC		file: or	core form_t	toro11-m.dw	a												ARAN	U/A/U	
PROJECT	Aranza	zu	0	RIEN	ITED	CO	RE		DATA	2	SHE	EET		1E	F.)	PA	GE	17 B'		JF _( ZA	2
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LOCATION .	LUP-CM	1.02	INCLI				BE FA	AR ST	RING	- F.		L			DIVINI			D	IA.	HQ	13
HULE NO.	BHI GM	x-07_	NURI		14						0			DUN	OFOTHS		S	F	C	T	
REF. ANGLE	DEPTH FROM	RO	CK TYP	E	STI	RUCTURE		/	FILL		5	R.	FROM	COL	LAR (M)		L.	R		NFF.	1
TOP OF	(M)	1	2	3	TYPE B	CIRC. ANG.	DIP	ŵ	(cm)	ì	TYPE	FR	NOS		TO		Ċ	ĉ	FA	NGLE	INITLS
=0.72	0.29	PPB	i i		55 B	236	4,8		00.00	> 1	-5	17.3	8	5	175.	36	5N	/	41	26	SID
-0.7.2	1.46	PP B			SJT	97,80	54		0,0,00	/	V, i	173	1.0	35	175.	4	ON	2	40	0,6	
10.00	0.944				VNT	306	5,9	_	0.0 7	Ell		1,1,5	<u>.</u>	10	1.7.6.	16	NC	1	90	P A	
1	1.30	V	1		55 B	0,5,84	-1,1		00.0	> N	J	1	V.	1	17/10	a	N	1	40	10	
20,00	11.34	PPB	1 1	1 1	SJT	13.81	6.6		0,0,.0	2	N	1.7.5		01	1,16,0	1	0 0		TIC	010	
-030	0.16	11	r in	1.1.	SJT	2901	12	_	0,2,.,0	20		1.46	1:1	0	1,10,0	4	SN	1	1	Pt	1.5
	. 9. 23		1 1		VINB	0,60	1.1		90				1.	1	1 1/1.		Y	1	1	-	
	0.38	1 1	- 1 - 1	1 1	SJT	250	50	_	90,00	20	<u> </u>	1 2 4	1.		1 7 10	1	N	1	1	-	1
+030	0.73	11	1	1. 1	5,5B	309,41	68	1	40.		6	176		10	1.1.6.	Ti	5114	1	1		
	0.1.		L. L.	1 7	1			A)	L 1 • 1		<u> </u>	1.7.8	····	19	1.1.2.	719	2	-		_	1
	•	T					1	Ν	•		~	1.1.8		15	1.1.9.	7	2		-	1	
-1,00	0.49PPB 0.86 0.64PPB				55T	350	73		00.	1	6	1, 1,9	1.0	15	1.81.	26	N	1	2	1	
-1,00	a 86	0.49 P.P.B 0.86 0.64 P.P.B				3,5,2	5,4		00.0	2	N	17.9	( • · ·	7,5	1.8.1.	5	ON	1	6	1	1.
S. Barriel	10.64	0.64PPB				0.78	5.9		00.00	3	N	1.8,1	1.1	50	1,8,5,.	9	ON	1	51	1	
S. C. Star	1.01	11			555	3124	39		00	0	N	1.8.1	1.1	5,0	103.	0	GN	1	2	1	1
-288	9.66		1.1		5,53	273	54		09.	1	9	18	5.1	00	1, 8, 4, .	5	SN		2	-1	1
1	6.71			1 1	551	288	17		00 0	2	C.		1.				N	1	2	<u> </u>	1
	0.83		1 1		SIR	3220	32		00.	0	N	1	1 1	-		<u> </u>	N	1	2	-	1
	0-89		1 1	1	55 7	250	2,2		90.1		C	134	1	1.1			Y	1	3	<u></u>	1
7	0 9 8	3	1 1		SJR	3342	4,5	1	0,0, . 1	2	C	J. F.	1		1 1 1 •	1	N	1	3	<u> </u>	1
-288	1. 11	4	1 1		SJR	5772	.4,8		0,0,.	0	C		1.	-	1 1 1 •	-	N	1	3		1
	.1 .1.2	A	- i - i	1.54			1	N			1.1	1	4.	1		1	_	-	10	1	1
	1 55	PPB	3.1					N	1	_	1 1	183	3	0,0	1,8,4,.	,5.	5				1
TD	0 00	PPB	125					N	1.1.1.	1	1 1	18,4	1.0	2.5	1861.	0	S	1		31	1
-10	1.50	PPB		1 1		1	1	2			1 1	13	1.	5,5	18.6.	0	2				1 .
and a the second	MISCEL				ROCH	K TYPE A	BBRE	VIA	ATIONS	S	TRUCT	JRE TYP	PE A	BBRE	VIATIONS	FIL	LING	A	BBR	EVIA	TIONS
	"+" FOR TOP EN	D OF CORE	"" FOR	BOTTOM						SJ	SINGLE	JOINT	FO	FOLIA	ATION	N	NONE		P	SERP	ENTINE
T/6	"+" FOR TOP END OF CORE, "-" FOR BOTTO TOP OR BOTTOM END OF FRACTURE				·		200			VN	VEIN					x	OXIDE		Т	CALC	
N/W	N-NON ORIENTABLE W-WHOLE CORE				0					BD	BEDDING			1		S	SULPH	IDE			
SLIC	SLICKENSIDES -	YES OR NO							ĊT	CONTACT					L	CHLOR	ΠE				
FRAC	I-Natural 2-Maybe (Natural or Mech.) 3-Mechanic									FT	FAULT				1.1.1	Q	QUART	Ζ			
CONF	CONFIDENCE - 1-Poor 4-Excellent									FC	FAULT C	ONTACT				С	CLAY	1	-		100
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES								-	SZ	SHEAR 2	ZONE				A	ANHYD	RITE			
CALL &	GLE ANGULAR DIFFERENCE BETWEEN TOP LINES & NICHOLAS. INC. file:				core_form_	toro11-m.dw	D													ARAN	7471

## **ORIENTED CORE DATA SHEETS**

DRILL HOLE GHP\_GMX04



CALL & NICHOLAS, INC.

PROJECT LOCATION HOLE NO	Aranza	<u>w X- 0</u> -		RIEN	ITE	D	CC		EAF	DAT	A	SHI			T.) 6/19/	P/	AGE _	1 B D	C Y IA	DF <u>3</u> ZAO HQ3	1
REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	RO 1	CK TYF	PE 3	TYPE		CTURE	DIP	×/×	Fil THICKNE (cm)	LLII SS	NG TYPE	ا FR	DRILL RU FROM CC	N DEPTHS DLLAR (M) TO	in the	S L C	F R A C	C O DI DI AN	FF. GLE INI	ITLS
	.0.0.0.0	MB. L	1.1					1	2			1 1	0.0.0	.0.0	901	0	0		1. 72	5	D
	1.00	·		1		-		1	2				0.0.0	· ; 00	0,01,0	.01	0		12 13	125	
min i,	.0.0.0	1	1				1	1	N		_		OIG	•,0,0	0,0,2,	5.	5		2145		
<u>.                                    </u>	. 1 5.5			1.1			<u> </u>	1	2	· . · . • .	12	1	0,0,1	.00	0,0,2,	.3.	2			1 1 1 1	1
	0.00				1	1	-	·	N		_		002	.35	0,0,5,	. /	2		-	-	
	1, 40		L MA				1	1	N	1.1.1.	-		00,2	. 35	003	• 11	5		-	-	1
<u>in the second s</u>	00.00	2		1.1	1	-	1	i	NN	•			0,0,5	• 1.15	0,0,5	131	0				-
202	00.07	ha IZ d	_		STO	2 0	1/	ue		00	1			•	- · · · ·		1.1	1 2	2	-	-
-16,70	00.00	01072			23	72	10	00	12100		7	A L		•		<u> </u>	N	1	2	-	-
1	010193		1		5	17	10	00			1		1 1 1	•		1.1	N	7	>	-	1
	01.10	1 1 	100	25-	TO	98	16	-	00.	1	X		• • • •			N	1	> .	-	-	
V	01.19			1 1	11	TI	78	47		001.	1	X	J	• 1 1	4	1 1	1	1 -	2	400	
-298	01 52				STI	BO	89	77	-	40.	n	N	003	. 75	005	21	2 11	2	2	2	1000
	0.0 0.0	MED				201		110	N		1.5		005	30	006	81	2	1	2		-
· · · · ·	00. 48		-					No.	N		-	Concernent of the second	0.0.5	.3.0	0.0.6.	.8.	0	-			Anton
-0.0.8	0.0.52	5	1		S.T.	13	2.4	6.3		6.0	0	N	4	,	1	101	N	2	3	5	
-0.08	01.85	11	1. I.	1 1 San	SITI	B	74	3.1	-	0.0.	1	S.L.	005	.30	006	8.	ON	1:1	3		
+1/1771	00.00			1-1				-	N				0,6,6	.80	0.0.7.	.40	2			1.2	
in the second	09,60	1							N	1 . 1 • 1		1. 1	0,0,6,	.80	0.0.7.	40	>				
+,0,0,0	00 49	MBC	1		551	30	3,8	7,6	~	00	0	N,	0,0,7	. 40	00 8.	93	5 N	2	3	~ ~	Carl E
-064	00.00		E					1	N	1.1.			0,0,8	. 9,5	0,1,0,.	0	12	1			12
-064	01.16	911	1 .1	1 1 -		1 1	5	1	n			i. I	00,8,	.95	010	,0,9	5				21
	00.00	10	17.1	1 1		1	1	1	N		-	1.11.15	91,0,	.05	011	5	5		×		1.
Same 2	01.26	V	1.1		-	- 1	24	W			1 1	010	. 05	011	,5,	5		- 1-1-10	1	-	
	MISCELL	ANEOUS			ROC	KTY	PE A	BBRE	VIA	TIONS	S	TRUCTU	RE TYPE	ABBRE	VIATIONS	FILI	ING	AB	BRFV	IATIO	NS
REF. ANGLE	"+" FOR TOP END	BOTTOM		Ange S	Sec. 12		-	-1.54	SJ	SINGLE JO	INT	O FOLIA	TION	NN	ONE	1	P SE	RPENTI	NE		
Т⁄в	TOP OR BOTTOM E	4		3		No.		Sec. 1	VN	VEIN	1		1201248	x o	XIDE		TC	LCITE			
N/W	N-NON ORIENTABLE	E W-WHOLE				1				BD	BEDDING		1	i.	S S	ULPHIC	Œ				
S⊔C	SLICKENSIDES - Y	- 49-4-	-						СТ	CONTACT				LC	HLORIT	Έ		-	1		
FRAC	1-Natural 2-Maybe	chanical			~			- Standard	FT	FAULT				QQ	UARTZ	-	-				
CONF	CONFIDENCE - 1-	t ·				1			FC	FAULT CON	TACT		1	сс	LAY		1				
DIFF. ANGLE	ANGLE ANGULAR DIFFERENCE BETWEEN TOP LINES					1		Ne	N.V.		SZ	SHEAR ZO	NE			AA	NHYDR	TE		and and	ihr.
CALL & I	VICHOLAS. IN	file: ocor	e form	toro11	-m dw	-				ALL STATES	and the second	The second	The second		1.1.1.1	1992	AD	NIZAZ	711		

PROJECT LOCATION HOLE NO	Aranza:	zu 1-04		RIEN	ITE	0 00	)RE _ <sup>B</sup>	EAF AS1	DATA	4	SHI	EET	( DAT ELE	ME E VATIO	T.) N	F / 5	PAGE	- E	Z BY DIA.	OF <del>Z</del>	31 10-571 23
REF. ANGLE (REF. LINE TO TOP OF	DEPTH FROM START OF RUN (M)	RC	CK TYP	°E 3	ST			N/W	FIL THICKNES (cm)	LII SS	NG TYPE	F	DRIL FRC	L RUN M CO	N DEPTHS LLAR (M) TO	)		SF LR IA CC	CONF	DIFF. ANGLE	INITLS
HOLE LINE)	101 -7 7	NA R. I	11-11					11			1.0	OL	7.	0.5	0.1.1.	5	5			-	SIN
<u> </u>	01.50	1	1 1					N		2				0.5	011		-5-		- 14		
-064	00.05	MBI			STT	324	36		0.0	Ζ	C	01		55	01.3	.0	5.5	NI	3		
- 064	00.70				STR	007	4.7		00.	0	N	cal.	1	5.5	01.3	. 0	55	VZ	3		
-064	01 31	V			VNT	1.87	39		0.0.	1	T	01	1	5.5	01.3	• .C	5	NT	3		
	0.000	WAL.	*			11010		N				ali	3	0,5	11.10	. 5	55	-			
1. S	0.0.65					1 1		N					+	1	4	•				13	
-0.25	01.05		6	AC	SJT	0,30	49		0,0,0	0	N	011	3	95	014	• 1 ve	35	NZ	3	1	
-3.2.4	01.06	1.24	4 4		STB	1,0,5	58		00.	0	NI	01	4	55	6,1,6,	. 1	6	SV	3	1	
-276	00.77	MBL			SJR	0,8,9	62	1	00.05	0	$\mathcal{N}_{1}$	61	6.,	10	Q1,7,	.6	0	VZ	2	3,0	1
1	0.0	MARL	-		SJE	5,1,1,2	49	1. Carl	00.	υ	N	0	6.	01	0.17	· .6	0	N3	2	3,0	
	00.00	111	1.1		Con The P	9 30	d-	2	-Conton	0	N	0,1,	7.	60	019	. 1	,5	大市	3	1	-
in all and and	00.63		1	1 1	53-7	106	44	N	मराग	T	N,		1.	1 30	in le	• .		t+	3	1	
	0.0.64		1.1	1 1	442	515	Lip any	لمك	and the	-	C.		0	1				4-	[PAR	10	1
	01.55	1 bill	1.1.		STAT		29	n	000	0	al,	01	7 :	60	01.9	. 1	5		and and	1.0	
-083	00.34	11 13	1-13	1.1	5,58	50,30	40		0.0.	0	CIT	0,1,	9	15	0,2,0,	• 7	0	NI	3	1	10
	0,0,.3,9		121		557	11.8.0	44		00.	0	N,	1 1	1	1.5	- ili	•	1	NI	3	-	1
A AN	0,0,.,5,6	111	1.1.	1.1	SIL	EL C	44		0.9.	5	C, .	1 1	1	1	1 10	•	1	VI	3	-	
1 de la	0,0,.,6,2	Billi-	1.1.1	L. C	551	1.9.4	2.9	3	0.0.4	>	N		4	1	4.	• 1	1	NI	3	- L	1
- il il	0,0,.,10	1	1.1		P.T R	31,6,0	39		0,0,1,	5	C.T.					• .		VII	3		31
Y	0.0	N/	T	*	SJB	1.4.0	4,3		0.0	1	6.	C'I''	1	15	0,2,0,	• 1	0	YL	3	1	1
-0.83	0,1,.40	MBL			STI	55.0	10	1	Qci.	0	N.	01	7	1,5	940	• . !	0	VE	5	1	1
+,200	00.10	il i			FAL	106	58		00	1	N	CAC	0101	10	242	• ; •	40	V I			1
	0,0,.,0,0	- WI				1 1	1	N				0,4	4.	20	023	• , (	0	-			1
LI IN	0020		- line line					10				0,4	4	20	0,0,0,1	• . (	10	1900			لنب
	MISCELL	ANEOUS		11	ROCK	K TYPE A	BBRE	VIA	TIONS	\$	STRUCTU	RE TY	PE A	BBRE	VIATIONS	FI	ILLIN	G AE	BBR	EVIAT	IONS
REF. ANGLE	"+" FOR TOP END	OF CORE,	- FOR E	MOTTOM						SJ	SINGLE JO	DINT	FO	FOLIA	TION	N	NON		P	SERPE	INTINE
Т⁄в	TOP OR BOTTOM E	END OF FRACTURE								VN	VEIN		1			X	OXID	E	Т	CALCI	IE .
N/W	N-NON ORIENTABLE	E W-WHOL	E CORE			A				BD	BEDDING					S	SULF	HIDE			200
S⊔C	SLICKENSIDES - YE	ES OR NO					hand	10		СТ	CONTACT	1.27.20		-		L	CHLC	RITE			
FRAC	1—Natural 2—Maybe (	(Natural or M	lech.) 3-Me	chanical			and the second			FT	FAULT					Q	QUA	TZ			
CONF	CONFIDENCE - 1-	Poor	4-Excellen	t		NAL.				FC	FAULT CO	NTACT				C	CLAY			1.1.1.1	
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES						Call ?			SZ	SHEAR ZO	DNE				A	ANH	DRITE			1997
CALL & I	NICHOLAS. IN	file: oco	re_form_	toro11-m.d	wa												1	RANZ	7A7U		

PROJECT LOCATION HOLE NO	Aranza GHP- GM	x-04		RIEN	ITE			EAF	DAT RING	A	SH	EET	(ME DATE ELEVATIO	T.) 6/19	· P	PAGE	E	S BY . DIA.	OF ZA HC	31
REF. ANGLE (REF. LINE TO	DEPTH FROM START OF RUN	RO	CK TYP	Ϋ́Ε	SI		E	N /	FI THIÇKNE	LLII :ss	NG		DRILL RU FROM CO	N DEPTHS DLLAR (M)		S I	F R A	C O N	DIFF.	
HOLE LINE)	(M)	a d <u>asa</u> a	2	5	TYPE É	CIRC. AND	G. DIP	W	(cm)		ITPE	F	ROM	TO		C	C	F	ANGLE	INITLS
-,2,7.0	00.84	MBL	1		BDT	0,8,8	32		Q1.	0	N,	022	05.	023	5	,O N	1	5		512
-0.65	12100	MBL	1		5,5	F24,0	193		00.	0	N	023	560	024.	17	SN	1	3		
-232	00.28	du	1.13	-1.1	521	1,2,8	60		00.	15	C	0,2,0	1.75	0,26,	13	01	1	5		
	00.40		1-1-1		SJE	31.4.6	6.9		00.	0	N. I	1 1	1. ·			1 1	)[	3		
	001.45	J.	1		SJ1	0,5,4	17,5		0,0,.	0	N	1 1	E.T.	i al 4	<u> </u>	1 1	12	3		-1-
4	0,0,.,8,6	V	1 12.		EJ	3266	40		0,0,.	0	N				1		1	3	1	
-232	0.1.08	MBL			SJE	30,6,5	7.7		00.	0	N.	0,2,4		0,2,6,	3	SA	15	3	1	
-303	00.11	NU.			FT-	13,46	30		0,0,0	3	C,S,	0,26	530	0.27.	18	SM	11	Z	1	
	00.14				551	27,8	\$ 5,3		00.	,0	NI		1	Ci li	1	1	1	Z		_
14	00.31		1 A L		5.51	3048	3 73		00	0	NI				1	1 1	12	3		-
ALC: Y	00.41		122	E F	FTE	3252	21	140	00.	1	C				1	. ^	11	Z	1	1
V	60.45		1 September 1	Sec. 1	SJ1	13,0,0	18		00.	4	C,	I		4			11	2		-
- 30.8	0.0.56	V	1	1 1	SJB	30,8,4	67		0.0.	0	N	0,26	5.30	0,2,7,	.8	SA	12	2		1
-3.08	01.16	MBL	1		5,57	117.0	165		00.	Ø	NII	0,2,6		0, 27.	,E	351	11	2	1	
-3.20	0.02.4	121	-		VNE	063	27		611.	0	4,6,	0,21	1.85	0,29,	.4	10h	11	2		1
11	00.69	4			SJE	32,2,8	7.5		0,0,2	0	C, ,	1.1.	\$			. ^	11	2		
-320	01.31	MBL			SJA	327	7.7		00.	5	N,	0,7	7.8,5	0,29.	4	10 A	11	2		in the
- A She	00.00		1				1	N	1 1 .	1	15 1	0,27	1.40	029.	,8	0				
1 1 1 1 1 1	00.40		1 1					N	· · · ·	1		0,29	1.40	0,29.	, 8	20		15	- Li	
1	00.000		1.2		15.16			N		-	k I	0,2,9	0,8,0	0,31,.	,3	5				
	01.55							N		-		029	1.80	031.	,3	,5				
	00.00							N	1.1.		1 . 1.	0,31	1.35	032.	9	0	12		1	1.1
1. 1. 1. 1. 1.	00.10							N		1		0, 1						0	9	1
	00.11	2					125	W		-		1 1	*	4.		1.17		1.50		
	61.55	00.11. 5.1						n		1		0,3,1	. 35	6,3,2,.	9	0				
	MISCELL	MISCELLANEOUS				TYPE			ZIONS		STRUCTU	RE TYP		ZIATIONS	FI				EV/IAT	IONS
	IVIJULL	ANLOUS	* 500 5		ROOF	V TIFE A	ADDILL		10145	ei	SINCLE				N	NONE			SEDDE	NTINE
T/	TOP OP BOTTOM 5	ND OF EBAC		DOTTOM						50	VEIN		FU FUL			OVIDE		T	CALOT	T
N/W	N-NON OPIENTABL	-NON ORIENTABLE W-WHOLE CORE									REDDING				^ c		IDE	-	CALCII	-
SUC	SLICKENSIDES - YES OR NO							-		CT	CONTACT								19	
FRAC	-Natural 2-Maybe (Natural or Mech.) 3-Mechanic						-	-			FALIT	* <u>*</u>	1946 1920 19	and the second s		OLIADT	7	1.4		
CONE	<b>1-Natural 2-Maybe (Natural or Mech.) 3-Mechanic</b> CONFIDENCE - 1-Poor 4-Excellent									50	FAULT CO	NTACT			C	CLAV	-			
	CONFIDENCE - 1-Poor 4-Excellent								- A	67	SUEAD 7				L.		DITE	-		
CALL & I	ANGULAR DIFFERENCE BETWEEN TOP LINES				re form	toro11-m d	wa			132	JILAR Z			75	12		MIE	1	PAN7	A711

PROJECT LOCATION HOLE NO	Aranza	NX-04	O INCLI NORT	RIEN NATION -	ITE	) ((	)RE	EAF AST	DAT RING	A	SHI	EET	(ME DATE ELEVATIO	T.) 6/19/17	F	PAGE	4	BY DIA.	OF  H(	3 1-
REF. ANGLE (REF. LINE TO	DEPTH FROM START OF RUN	RO	CK TYP	Έ	ST		E	N /	FI THIÇKNE	LLI	NG		DRILL RU FROM CC	N DEPTHS DLLAR (M)		S L I	F R A	C O N	DIFF.	•
HOLE LINE)	(M)	1	2	3	TYPE B	CIRC. ANG	. DIP	W	(cm)		TYPE	FF	ROM	TO	2	С	С	F	ANGLE	INITLS
-0.2.7	00.31	MBL	1.1.1		550	3358	72		90.	0	N	032	.90	03.4.	4	10A	21	3	1	SID
·	0.0. 67	1		1.1.	STE	5142	26		00.	1	C,	1 1	i•	1.1.1.	1	N	T	3	-	
· · · · ·	00.086	5			VNB	1.82	32	1	0.0.	3	L	1 1	•	•	1	. ^	11	3		1
	01.13	·V 3		1.	SJB	179	31		0,0,.	0	N				í .	N	2	3	1	-
-027	6.1	MBU		1.1	STB	0, 8, 1	75		0,0,.	0	N	032	.90	054	-	10 N	3	3	1	1
	60.00	1		1 1	1			N	· · ·	1		03.4	. 60	035.	9	0		-	1	-
	01.50	MBL	1	1 1	i i		1	N		1	1.1	03.4	.60	0.35.	,9	0			1	1
1000	00,00	it.	1.1.3	1 1	1			N	1.10			035	.90	036	3	O			1	- 1
•	00,40	MBL	1	1 1			1	N	1.	1		035	.90	036.	3	0		3	1	
+0,0,0	00.00	1.		1.1.	i	1 15	1	N				036	1.30	037.	4	0		-	13	-1
. V	00.09	V./	· Fi	1	11		~		1	1 19	1	·		1	-		2	1 pe	1	
10.0.0	10052	MBL	1	il.	PITT	35,0	55		00.	2	G,	036		037.	4	LO Y	1	3	1	51
-,2,6,8	A. 20								1.1.		1.1	0,3,8		0,3,8,.	,9	5-				
1.1.1	0,0,0,22				VNB	219,6	2,8		O.L.	0	L	1.1.1	• P -		-1	IN	1	3	1	- d
1. 1. 1.	0.0.36		1 1	SJB	1pz	5.7		0,0,.	,2,	X,	i IV			1	In N	1	3	XI.		
	0.0.41		11 1.	1.1	FITT	24.8	3,8		90,.	,4	C,L,				1	1 12	1	3	1	1
	00.66		1 1	UNB	0,0,8	34		0.0.	,5	Ti				1	N	1	3	1	1	
V/	01.04		1 1	VNB	2.9.2	40		0,0,.	5	L	1 1		i	1	N	1	3		1	
-2,6,8	01.25		1 1	1 1	553	25.0	47		00.	2	GL,	114			1	N	(	3	1.	1
	9,1,0,26	V.	1 1				-	N		1		V		4	1			1.1		
Si il	01.52	MBL	1.1				1	N	•	1	iii	0,37	.40	038.	,9	5		1	-	110
-2,24	011.29	MBL.		0	5,51	0,76	72		0,0,.	0	N	,3,8	.9.5	0,4,0,.	H	5 N	1	3	· F	
-113	0.01.23	MBIL	per l	1 12	SJE	243	58		0,0.	0	N	04,0	.45	04,2,	0	JAN	1	3	3	1
	00.91	ilse -		1.1	5,5 1	723,8	7,3		00.	0	N	64.1	V. int	, V.	1	·N	2	3		1
-1,1,3	01.33			SJE	248	49	1	00 1	Ø	N	0,4,0	.4.5	042	,0	ON	1	3	1		
	MISCELL		ROCK	TYPE A	BRRE	VIA	TIONS		STRUCTU	RE TYP	ARBRE	VIATIONS	FI		ΔF	RR	FV/IAT	IONS		
REF. ANGLE	"+" FOR TOP END OF CORE, "-" FOR BOTTO				11001		ODICE	•	nono	SI	SINGLE JO			TION	N	NONE	7.1	P	SERPE	NTINE
The	TOP OR BOTTOM END OF FRACTURE					2	Street Street			VN	VEIN				x	OXIDE	-	T	CALCIT	F
N/W	N-NON ORIENTABLE W-WHOLE CORE				1			1		BD	BEDDING				S	SULPH	DF		Oncon	-
s⊔c	SLICKENSIDES - Y							СТ	CONTACT		-		L	CHIOR	TF	1				
FRAC	1-Natural 2-Maybe (Natural or Mech.) 3-Mechanica					Stran 1	10.0			FT	FAULT			1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	0	QUART				192
CONF	F CONFIDENCE - 1-Poor 4-Excellent						10			FC	FAULT CO	NTACT			C	CLAY			1	
DIFF. ANGLE	ANGLE ANGULAR DIFFERENCE BETWEEN TOP LINES									SZ	SHEAR 70	NE		Sec.	A	ANHYDI	RITE			11
CALL & I	ALL & NICHOLAS. INC.					toro11-m.dv	wa	1.15						the state of the state of the	1			4	RAN7	AZU

file: ocore\_torm\_toro11-m.dwd

ARAN/A/U

PROJECT	Aranza		RIEN	ITEI	D CC	RE		DATA	ł	SHI	EET	(ME	T.)		PAGE	4	2	OF_	31
HOLE NO	GHP-6	MX-04 NOR	THING		- Gay	E	EAI AS	TING					DN	17			DIA.	HC	23
REF. ANGL	E DEPTH FROM	ROCK TYP	ΡĒ	S		E	N /	FILL		NG		DRILL RU	IN DEPTHS OLLAR (M)			S F	0	DIFE	
TOP OF HOLE LINE)	(M)	12	3	TYPE 1	B CIRC. ANG	DIP-	Ŵ.	(cm)	2	TYPE	F	ROM	ТС	)			F	ANGLE	INITLS
-0.7.5	0.0.21	MBL		550	32,9,6	54		0,0,0,0	2	N	0,4,7	9.0	0,43,	• ,5	ON	11	3	1	5,13
1.1.1	0.6.25		i i	SJE	3 1.1.2	5,3		0,0,0,0	0	$\sim$		h•1	L. ili	•	<u> </u>	75	3		
	0.029			224	32.24	64		00.0	2	N		1		•	1	1	3		
	0.0. 58		20.1	5,50	31.34	28		00.0	2	Li		L		•	1	JI	3		
N.	0.0.71			550	50.6.8	3,6		0.0.2	-	T		7	4	•	1	11	3		
-0.7.5	0	MUL	- Land	551	3 97.0	0,5 1		001	1	7	0,4,2	-,0,0	04.5	• 5	JON	1	3	1	
	0,0,0,0,0	1.	1.		1 i		W	r		1.1	0,4,3	1.5P	0,4,5,	• ,C	0,0				_
	0,1,.50	Ň,	1 1	2130			W	1.1.1.1		1 1	0,4,3		94,5,	., 0	p.			1	
-2.33	0,1,.18	MBL		5.TT	1,76	4.2		00.1	1	$C_{n-1}$	0,4,5	1.00	04.6	.,5	0	r 1	3	1	100
	00.000		1			1.5	N			1.21	0,4,6	1.50	0,4,8,	3, 0	15			1	- 1-
	0.029				1	N			1		1.		•	1 .					
-1,6,3	00.30			STT	04.8	16		0,0,.,	2	C.S.	1.1.1	4.		•		71	Z		1
	0.052		2 1 1	556	3002	53		00.00		2	11.11	V		•	N	16	S		1
-11.6.3	0,1,.,0,6		1.*1	558	31,0,3	67		00.00	2	NI	0,4,6	5,0	0,4:8,	.,0	SA	5 1	2		-1
-3.06	01	MBL	1.1.	530	338	6.2		00.00	2	NI	04,8	3.05	049	.,5	5N	11	2	40	
	0,0,.,0,0		1. 1	i	1 1		N	1 1 • 1		5 I I I	0,4,9	1.5,5	0,5,1,	.,0	5		1.44		et p.
San P	0,0,.,7,1					1	N	1 . 1 .		1.1		1.		•	1-1			1	1-
-2,80	0,0,.,72		11 1	SST	3,5,0	36		00.1		N.	0,4,9	1.55	0,5,1;	.,0	,SA	11	12	4	2.1
+0,0,0	01.03				31.8	65		• .		1.1	0,5,1	1.0,5	0,5,2,0	.,5	SA	JŻ	. 1	90	
	0,0,0,0	D.B.L				1	N			1 1	0,5,7	1.55	0,5,4	, C	5	3		1	
	0,0,. 53	MBY					N			1 -1 (		7. • , ,	1.1.			13		1	1
-3.2.0	0,1,.03	ES.K		F. TT	18,0	2,2		011.0	0	L	05,2	1.5,5	05.4	, 0	1SN	11	3	•	-
	0,0,.,8,2			5.5	354	10		0,0,.,3	3	L	0,5,0	1.05	0,5,5	1,5	51	11	3		
i in	0,1,.,2,8			SIT	197	22		00.1	(	L, ,	6,5,4	,.,6,5	0,5,5,	,5	,SA	JZ	3		
-6.72	0.0.13	V.G.K		SJT	- 1,0,9	39		0,0,0,0	-	4	0,5,5	1.5,5	0.57	)	on	51	S		
	MISCELL	ANEOUS	T	ROCH	K TYPE	ABBRE	VIA	TIONS	S	TRUCTU	RE TYP	F ABBR	VIATIONS	<b>I</b> FI		2 4	BRE	FVIAT	IONS
REF. ANGLE	"+" FOR TOP END	OF CORE. "-" FOR E	воттом	11001	<u>, , , , , , , , , , , , , , , , , , , </u>	IDDITE	• 17 (	s		SINGLE JO		FO FOU	ATION	N	NONE		P	SERDE	INTINE
T/R	TOP OR BOTTOM END OF FRACTURE				1	5-1.	-	V	N	VEIN				Y	OVIDE		Т	CALCIT	T
N/W	N-NON ORIENTABLE W-WHOLE CORE					1	-	B	D	BEDDING	•			ŝ	SHIP	IDE	-	CALCIT	-
SLIC	C SLICKENSIDES - YES OR NO						-	C	т	CONTACT	-			L	CHIOR		-		
FRAC	AC 1-Natural 2-Maybe (Natural or Mech.) 3-Mechanical							F	T	FALIIT	-			0	OLIADI	7			1
CONF	DNF CONFIDENCE - 1-Poor 4-Excellent					and the		F	c	FAULT CO	NTACT			1 C	CLAY	2	1		
DIFF. ANGLE	ANGLE ANGULAR DIFFERENCE BETWEEN TOP LINES					1	-	<b>C</b>	7	SHEAR 70	NF					RITE	+		
CALL &	LL & NICHOLAS. INC. file:				toro11-m.d	DW	-		-1	SHEW EU				12	2441116		-	RAN7	'A71

PROJECT	Aranza	zu	ORI	EN	<b>ITE</b>	D	CO	RE		DAT	Ά	SH	EET	- (	ME	T.)	Ē	PAGE		6	OF	31
LOCATION	51		INCLINAT		L. C. C.			_ B	EAF	RING				DAT	Έ	61-015	7			BY	DZA	0
HOLE NO	. GHP-GM	X-01	NORTHIN	G				_ E	AS					ELE	VATIO	N				DIA.	HG	13
REF ANGLE		ROO				STRUC	TUR	-	Ν	F	111	NG	2	DRI					SF	C		
(REF. LINE TO	START OF RUN			- 2		-/		-	7	THICKNE		Î		FR		ULLAR (M)					DIFE	1 1
HOLE LINE)	(M)	1	2 3	3	TYPE	BCIR	C. ANG.	DIP	Ŵ	(cm)	133	TYPE		FROM	1	TC	)			F	ANGLE	INITLS
-0.7.2	00.30	ESK			55	TZ	09	54		0,0,.	5	CL,S	0,5	5.	5.5	0,5,7	۱.	,01	Y	2		SD
11	00.37	t	1 1 1		VN	TE	46	44		0,0,0	4	6		)	<u> </u>		•	1 1	IL	3		
V	00.94	ESK		1	55	T 3	56	69		00.	5	e.	1. 1	4.		the state	• 1	1	UI	3		1
-0.72	00.94	ESK			FT	BZ	88	2,6	10	0,0.	4	LS	0,5,	5	55	95,7,	• ,	1,0	10	3	- P. 1	
	0,0,0,0	*		-	11		der 1		N		Î.		6,5	7	10	558	.,6	0		1		10
	0,1,.50	8/SK		1		1		a 1	N	i i•	í.		0,5	7	10	0,5,8,	• 6	0				
· · · ·	0,0,.15				x/1	TV	3/4	38	N	OXX4,	1ø	SIL	0,5	8,.	60	0,60,	. , 1	5	1/2	18		1 -
	1111.64	5			8/50	RACH	\$ 6	XX	N	66%	10	5////	1.1	. •	1		•	1	Al			1
	01.50	ESK		1	35	10	22	TAB	N	otel.	18	5/1/	0,5	5.	60	06,0,	• ,	1,50	47	1×		1
-088	0.0.64	, E,			55	TZ	7,4	7,2		0.0.	0	S.	0.6	0	15	0,6,1,	.,6	251	VZ	3		
	6.1	. 4			SJ	TO,	8,3	57		0,0,.	,D	N,		4.			•	1	12	3		12
-0.8.8	0,1,.,5,9	ESK		1	55	BQ	4,3	44	-	0,0,.	0	NI	0,6,	0,.	1,5	0,6,1,	• , 6	5,51	J 1	3		1
	0,0,.,0,0	ESK	i la la la		-		1		W				0,6	1	6,5	0,6,2,	• , 7	1,5		124		1
- Maria	01.25	ESK		1.	-		i		W		2		06,		65	0,6,2	. 1	,5			1	1
Chi I I	0,0,.,0,0	ESK			1	-		I.	N		1		06	2,.	7,5	0,6,4,	• . 3	30			1	1
	0.150	ESK			1	1		1	$\sim$		1	-1 1	06	2.0	2,5	0,6,4	. 3	50				
-300	0.068	ESK	ing the internet	_	SJ	T3	3.8	64		0,0,.	0	S.	0.6	4	30	0,6,5	8	3,01	SV	. 3	1	-
	0,0,0,0	i ı		-	1				RJ			1.1	0,6,	5	80	0,6,7	. 8	35				
	00.28	1				_	N	1.1.	1		11	1.		1 1 1	• 1				1	1		
-307	0037		55	TU	3.8	29		0,0,.	5	C			1		•	. 1	JI	3		P.		
-302	0.06.7			-	NN	BA	4.8	75		0.1.	U,	5			1	1917	• .	IN	11	3	1	
di la la	0.115		1 1	1	2.2	50	50	5.0	N	1 1 •	1	1 1					•	_			_	1
	0,1,.,5,5							1	N	1.1.	1		0,6	5.0	80	0,6.7.	• • •	S			1	
E. La	0,1,.40	E.S.K		1.	4/1	GPI	5/B	5.0	N	ON/	41	1 1	0.61	7	35	0.6.8.	.9	01	XX	B	1	-
	0,1,.,4,6	3,1,4,2, <b>5</b> , <b>K</b>				5/2	N.L.	42.9	2	90/1	11		66,	7	35	0,6,0,	.9	pr	XX	14		
	MISCELLANEOUS					KTY	PE A	BBRE	VIA	TIONS		STRUCTU	RE TY	PE A	BBRE	VIATIONS	<b>T</b> FI	LLING	G A	BBR	EVIATI	ONS
REF. ANGLE	NGLE "+" FOR TOP END OF CORE, "-" FOR BOTTOM										SJ	SINGLE JO	DINT	FO	FOLIA	TION	N	NONE	24	P	SERPEN	NTINE
T/B	B TOP OR BOTTOM END OF FRACTURE							1.8/1			VN	VEIN	-			Service States	X	OXIDE		T	CALCIT	E
N/W	W N-NON ORIENTABLE W-WHOLE CORE					TR	100				BD	BEDDING				1- 1	s	SULPH	IDE		-	-
SLIC	SLIC SLICKENSIDES - YES OR NO							5			СТ	CONTACT					L	CHLOF	RITE			
FRAC	RAC 1-Natural 2-Maybe (Natural or Mech.) 3-Mechanical							-			FT	FAULT					Q	QUART	Z	1.2	1945	-
CONF	CONF CONFIDENCE - 1-Poor 4-Excellent					-				15.15	FC	FAULT CO	NTACT		Jet.	7 842	C	CLAY	-		1.15	
DIFF. ANGLE	ANGLE ANGULAR DIFFERENCE BETWEEN TOP LINES				-			1.4		1.2	sz	SHEAR ZO	NE			Starling R	A	ANHYD	RITE		-	
CALL & I	LL & NICHOLAS. INC. file:					_toro11	-m.dw	a			- 1.1									F	RAN7	AZU

PROJECT	Aranza	zu	0	RIEN	ITE	DC	COR	E		DATA	A	SH	EET	(ME	T.)	PA	GE _	7		OF 31
LOCATION	GHP-GM	X-0-1	NORT	INATION_ THING	<u> </u>	,		EAS	AR ST	(ING TING			L	LEVATIO	DN	10		E	)IA.	HQ3
		RO	CK TYP	PF	S	TRUCT	URE .		V	FILI	IN	G	[	DRILL RU	N DEPTH	S	S	F	С	
(REF. LINE TO TOP OF	START OF RUN	1	2		1					THICKNES	s	TYPE	ED	FROM CO	DLLAR (M)	<u>,</u>		A	N	DIFF.
HOLE LINE)	(m)	000	2	5	TYPE	B CIRC.	ANG. DI		1	(em)	+			SIM Sta	020	U L		6		
	0,0,0,00	EXK	<u> </u>	<u> </u>		1	1	N	1	<u> </u>	+	1 1	060	·	070	· · · · ·	1			51
<u> </u>	01	ESA					1 1	-	2	<u> </u>	+	1-1	070	- 40	071	92			-	
	00.00	EL.	- 1 - 1		1		1 1	N	J	1 1 • 1		1 31.0	07 0	46	1271	93	-			1 1
	00 00	Erzia				-	1 1		1	<u></u>		1.10	071	95	1077	68	5			
	01 55				1		<u> </u>		ĭ			1	(171)	45	013	. 61		1		
	00 00	4						~	Ĵ				672	.68	075	6.4	5			
¢.	50	EG K				-	1				1		157.2	. 620	0.7.5		5			100
	60.00							A	ŭ				07.4	.15	075	. 36	2			
e.	01.55	21							1				07.4	.15	07.5	· 2.8	2			
	(20.00	20.00				201		N	1				127.5	. 90	077	.2.	5	5		A State of the
	01.10	20.00 21.10						٨	V			1.1	67.5	.20	0.7.7	. 20	2		-	
-120	(21, 18	2118				109	26	3		60.1	6	C.L.					N	1	3	· *
V	121: 32	21.0.1.8				DT CAS	14 9	3	T	00.2	- 10	SIL		•			Y	1	3	
-1.20	01, 46	25x			551	BOS	561	3		00.7	2 (	CLS	075	. 66	0.7.7		5 N	1	3	
	0.00	1		1 1 2						1			072	.25	07.8		3	-		
1 1 1 1 1	1.40	V	1 1	1 1	1						1			•			6.0			
19,00	1 41	ESK		1 1	101	1-3,7	1231	0		00.0	50	SIL	077	. 25	0,7,8		N	1	3	
Ci i	00.000	12	1.1.1	North I -			1	1	V			1 1	978	.80	080	.34	S.			
	01,.,5,5	EG.M	1					0	V	1 1 1 12			97,8	. 80	0,8,0		2			1 13
1110	00.000	C. A.	1.1.				1 Carto	X-A	3			(	6,8,0,	., 3,5	0,8,1		Er.	-	3.	P 1
	01.00			1 1			1 1	1	J	1 1 • 1		1 1	0,8,0	.35	130		2	-		1 1
1 L L	0,0,.,00	1	1 P	-11			1 1	N	1	1 1.01			081	.35	0.8.2		5			
1 12 12	0.0.36	V	1			1	1 1	A	1		1	1.1.2	9				- 22			
2010	0,0,.,37	V.G.K	1 . 1	1 - 1	5.51	10,5	.4.14:	2		0,0,.,1	1	en	0.81		00,0	• . 27	510	(	5	
1	MISCELLANEOUS				ROC	K TYP	E ABBI	REVI	AT	TIONS	ST	RUCTU	RE TYPE	ABBRE	VIATION	S FILI	ING	AB	BRI	EVIATIONS
REF. ANGLE	"+" FOR TOP END OF CORE, "-" FOR BOTTO				1 M 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		A. C. S.	1	101	S	J.	SINGLE JO		TO FOLI	ATION	N N	ONE	1	P	SERPENTINE
Т⁄в	TOP OR BOTTOM E	The start						V	N	VEIN	- 3			x o	XIDE	T.	T	CALCITE		
N/W	N-NON ORIENTABLE W-WHOLE CORE				19/6- 4		2533	- Com	-	В	D	BEDDING	Side 1	1	in the	S S	ULPHIC	DE		SEASING
SLIC	SLICKENSIDES - YES OR NO				1000	1			•	C	т	CONTACT				LC	HLORI	TE		
FRAC	1—Natural 2—Maybe (Natural or Mech.) 3—Mechanic			chanical		- 12.				F	т	FAULT	Markey 1	1	a we the	QQ	UARTZ		2	A THE L
CONF	CONFIDENCE - 1-Poor 4-Excellent			t			264 See			F	C	FAULT CON	NTACT		1950 B	CC	LAY	10		
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES					123				S	Z	SHEAR ZO	NE	21 1 1 1 1 N	100	AA	HYDR	ITE		
CALL & I	& NICHOLAS. INC.					torol1	m dwg	mission		2		and the second		See 112				1.2	٨	DANIZAZU

PROJECT LOCATION	Aranza	zu .			NTE	D	CO	RE	EAF		A	SH	EET	(M	ET.	201	P/ 17	AGE	BY		<u>3</u>
HOLE NO.	DEPTH FROM	RO	CK TYP	HING		STRUC	TURE	- E	N	F	ILLI	NG		DRILL R		EPTHS		SL	F C R O		
TOP OF HOLE LINE)	(M)	1	2	3	TYPE		. ANG.	DIP	w	THICKNI (cm)	ESS	TYPE	F	ROM	JULLA				A N C F	DIFF. ANGLE	INITLS
- 266	0,0, 5,6	ESK	1	1.1	55	BO	9,2	6.1		00.	1	L	08.	0,.35	50,0	3,2.	5	SN	24	1	SD
23 11	40.63		1.1.1	11	SJ	TON	0,4	59		00.	0	L,		1	1	.L.	1.1	N	TA		1
VI	00.85	1 July			SJ	B 3.	14	22		00.	1	6, ,		1.1.1	1	1 apr	1.1	V	17		
	0,1,04				55	B30	08	20		00.	0	L			-			N	1 1	1	1
-266	0,1,.17	ESK		1	SJ	B3	5,1	28		00.	0	L	0.8.	032	0	8.2.	15	5 N	11	1	1
	90.00	il.		1	- 1 ·	-	1.2	1	N		1	1-1-1	98.	4.55	0	3.3.	9	5	100	1	T
1111	61.40	4		1 1	1.1	- 1	1	A line	N			1 1	0.87	4.51	50	8.3.		5	-	1	1
-	0,0,0,0,6	ESK	1 1	1 1	1	1	1	1	V	111			0,8,	59	5.6	8,5,	4	0			
i tota	0,1,.0,0	ILI		1 1	1		1	2-1-2	N	1010	1	1 1		4			1 1	- 3ª	1	- 1951	
-1.7.9	0,1,01		1 1	- i - i -	SJ.	TZ	5,9	16		00.	2	L.		1	1			N	13	1	1
- 7	011.26	1	55	30	2,2	3,4	* -	00.	0	Li	1 1	V	1	4		N	13	L	1		
-1.7.4	0.14.2	1.1.	55	BZ	7.6	33	-	00.	0	N	08	3.95	0	6,5,		Q N	13	1	- 1		
1 1 1	0.0:.00	100			_		N			1 - 1	0.8.	3 4.1	0	8.6.	19:	5	4				
in the	01.55	1 1 1	1.		1	1	N	1.	2		08,	5	500	5.6.	191	S			1		
A.	60.00	1	1 .	ī		1	N	1.1.	1	1.1	0,86	2 7.5	PO	8,8,.	5	0		1			
	01.55		1	1		1	N		1		0,8,0	5 7.9	0	88.	15	0					
1.24.	00.00	1 1	1.5				N	1.1.	1		08	3.5.0	00	1.0.	0	5	1903		1		
	0.1.55	11				1	N		1	21 1-	0.8.8	3, 1, 5,4	0,	1.0.	105	5		1			
1.1.10	00.000		1 1	1				1	N	1 1.	1	1 1	0,9,0	0,.,05	10,	1.1.	,61	2		10	1
	01.55	111		1				1 2	$\sim$		1	1 1	09,0	1.03	10,0	1,1,	,61	2	1		1
-116	6.000	1 1	T			1	1	1	N		1	1 1	091	1 6.0	0	13.	,19	5			1
a salar in	00,18					. 1		1	2	i i •	1		1	1	1	11.				1	1
	00.1.9	11.0	100	1.1.	55	TO	46	39		00.	1	C,			100	110	<u> </u>	·Y	121		1
V	0,0,.30	V	1.1	1.1	FT	CS,	5,2	5,0	13	00.	5	CL.	1	4.1	1	\$		·Y	21	ì	1
-1.1.6	00		55	3	4.6	46		00	0	C	091		0	4,5,.	, 1,	SN	2				
Tel de la compa	MISCELL		ROO		PF AF	BBRF	VIA	TIONS		STRUCTU	RE TYP	PE ABBE	EVIA	TIONS	FIL	LING	ARRI	REVIAT	IONS		
REF. ANGLE	IGLE "+" FOR TOP END OF CORE, "-" FOR BOTTO								303		SJ	SINGLE JO		FO FOI	IATION		NN	ONF	P	SERPE	NTINE
T/B T	TOP OR BOTTOM END OF FRACTURE								1	19	VN	VEIN					XC	DXIDE	T	CALCIT	F
N/W 6	N-NON ORIENTABLE W-WHOLE CORE				1.00						BD	BEDDING					S	SULPHIDE		OF ILOT	-
SLIC	IC SLICKENSIDES - YES OR NO						5157				СТ	CONTACT			1		L				
FRAC	RAC 1—Natural 2—Maybe (Natural or Mech.) 3—Mechanic				4	5.			3		FT	FAULT			1.	1	0 0	UART7			
CONF	CONF CONFIDENCE - 1-Poor 4-Excellent				12	-			1	1	FC	FAULT CO	NTACT	1			CC	CLAY		25	See.
DIFF. ANGLE	F. ANGLE ANGULAR DIFFERENCE BETWEEN TOP LINES							1		11 11 11 11 11 11 11 11 11 11 11 11 11	57	SHEAR 70	DNE			1.5		NHYDRIT	E		
CALL & N	FF. ANGLE   ANGULAR DIFFERENCE BETWEEN TOP LINES      LLL & NICHOLAS. INC.    file:				re_form	_toro11	-m.dwa	a			102					2			-	ARAN7	'A7U

PROJECT	Aranza	izu	0	RIEN	ITE	DC	ORE		DATA	4	SHI	EET	(M	ET.)	() - F	PAGE	9	Su	OF_	31
HOLE NO	CHP- G	NX-0	INCL NORT	THING			B	AS	RING TING				ELEVAT				E		HQ	3
REF. ANGLE	DEPTH FROM	R	DCK TYF	ΡĒ	S	TRUCT	JRE	N /	FIL		NG		DRILL F	UN DEPTH	S )	SL	FR	С 0		1
TOP OF HOLE LINE)	(M)	1	2	3	TYPE	B CIRC.	ANG. DIP	ŵ	(cm)	S	TYPE	FI	ROM		, ГО	d	Ĉ	N F	ANGLE I	NITLS
-116	00.69	EGK			FT	10,5	571	N	00	1	C	0,9,1	1.66	20,9,3	1.1	5 4	1	2		
5116	0.0.13				F.7 3	201	099	M	94.	0	CL		1		1.	1 1	5	C		
<u> </u>	00.0.11	664	- La La	-		·····	1	N	<u> 1. 1</u>	-		091		0092	( · · )	2		+		-
	011.55	ET K	I		1		1	A1	1 1 • 1	-		093		- 1544	1.	5	1	-	1	
	00 63		I				1	N	<u> </u>		1 1	-112	<u>1 • 1 • 1</u>	OILI	1.10	11			- 1	-
-077	00.64		I I I A		517	F 7.7	776		00.0	2					1.1	W	1	2	1	1999 - 19
	00.82				51	219	8 23		00 1	5					1 1	Y	1	6		
	00.97	- I - T						N								-	1.0	1		See.
	0.1.10				25	6 10 at		N									1			
-671	0.1.20	C/G K			FF	3.1	PS P		00.	1	C.L.	093	5 1 9	094		5×	h	Z		
	00.00		30 10	1. 19				N		0	and the	090	1 6	5046		5	17			a star
	61.50	3		200		N				0,9,6	1 6	50,96	1	5	in al	-				
Sto.	00.000		Sec. 1	-		N			115000	0.96		509.7	16	5	14					
1 1 4	01.50	-#    -				N	1.1.1		1.1.4	0,9,6	1.1	50,9,7		25				1		
	0060		e				$\mathcal{N}$	1.1.	2		0,9,-	7 61	50,9,9		1,0					
	00.70			in the second second			N			1 1	1 1	1		1.	1	1.14		I.	1	
-267	00, 7.8			And A					1 I • I	-						1			1	
	00.83	Total 1							1.1.	-	1		1.		1.	T			1	1
	00, 84							N			-					168	1.4	-		1
	0.01.9.4		1 1			2		V	- · · · ·	1	The last					1	1			1
	0101.95	1 1.	1	1 1	FIT	F 06	243	-	0,0,.;	2	GL.	1 1	1.1	1 1		14	1	2		1
1	0,1,.19			. 1 1	FT	512	84.8	1	00.0	0	C.	Ser 1	4. 1	2 10 1		IN	11	2		1
	0,1,.,41	and the second	1. 1	1 1	5,58	310	DYY	24	00.0	0	LC	1.500	I I I		1.	1 A	- and	T.	1	
- 467	0.1		S. TI	321	65.5		0,0,0,0	0	Like	04.1	1.6:	50,9,9	1	,G A	11	2	1			
Vin. )	MISCELL	1. 1. 1. 1.	ROC	K TYPE	ABBRE	VIA	TIONS	S	TRUCTU	RE TYP	E ABB	REVIATION	SF	LLING	AE	BBR	EVIATI	ONS		
REF. ANGLE	"+" FOR TOP END	MOTTOM		and the second				SJ	SINGLE JO	DINT	FO FC	LIATION	N	NONE	N. N	P	SERPEN	TINE		
T/B	TOP OR BOTTOM E	1. T.		AL STORY		and a	Maria Maria	VN	VEIN	- 1 3 24		Sec.	X	OXIDE		Т	CALCITE	-		
N/W	N-NON ORIENTABL	E W-WHO	E CORE		1.19	1	14			BD	BEDDING	1	10.00		S	SULPH	DE			
S⊔C	SLICKENSIDES - Y	S. T.	1	all a	NORMAL DE LA COMPANY OF THE OWNER	-	Sale -	СТ	CONTACT				L	CHLOR	TE					
FRAC	FRAC 1-Natural 2-Maybe (Natural or Mech.) 3-Mechanic						and the second	and a second	Constant and a second	FT	FAULT				Q	QUART	z	1		
CONF	CONF CONFIDENCE - 1-Poor 4-Excellent					145	1-16-2		and the state	FC	FAULT CO	NTACT			С	CLAY		-		
DIFF. ANGLE	FF. ANGLE ANGULAR DIFFERENCE BETWEEN TOP LINES					See.	and the second	-	The second second	SZ	SHEAR ZO	INE		· 12	A	ANHYD	RITE			
CALL & I	file: oco	re_form_	toro11-r	m.dwa									and a set	West-Hom	A	RAN7	A711			

PROJECT LOCATION HOLE NO.	Aranza 6HP-61	<u>zu</u> <u>MX-04</u>	O INCL NORT	RIEN	NTE	D	CC		EAF	DATA	A	SH	EET	() DATE ELE		T.) 6/21	F /17	PAGE		BY	OFZA	31.
REF. ANGLE (REF. LINE TO TOP OF	DEPTH FROM START OF RUN	RO	CK TYF	PE`		STRU	CTURE	E	N / W	FIL THIÇKNES	LLII SS			DRILI FRO	L RUN M COI	N DEPTHS LLAR (M)			F R A	C O N	DIFF.	
HOLE LINE)	(111)	111	2	5	TYPE	B	C. ANG.	DIP	: )	(cm)	-		1000	RUM	T A	10	/	~ (		F	ANGLE	SA
	90.000	KY K	1.1	- I_ I_	1		1 1	1.1	N	<b>•</b>		- I-I-	09	<u>.</u>	10	100	-6	0	+			30
<u> </u>	01.50			·			1 1		IY A	ب• لـــَافِرْ مَ	-			1. • 1	40	100	1.6	0	-			
	00.00		1 1	1-1-1	Ĭ	- ×	1	1.	1		-		100	2. • 1	00	10.4		0	-	1	-1-	
	0,1, ., 50	1		1				- ! <u>.</u>	N	<u>• • 1 • 1</u>	-		1,0,0	2+10	50	102	• <u>1</u>	2			1	- 1
1.1.1.1.	00.00		1 1		- 1		<u> </u>	1	N	•-	-		10,0	<u>el • 1</u>	10	103	16	2	-		-	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	01 .55	ESK	<u>k</u> I	the free	-		1 1	1	M	<u> </u>		1 1	101	2	10	105	1	5	-		1	C. La C.
	00.00		1_1_	<u> </u>		-		-1-	1				1.01	2 • 11	52	105	1	F	-		-	-
	01.50		1 1				<u>l, - I.</u>	1	N		-			2. • 1	62	100		N			-	- 1
	00 00	141	1 1		1		1 1	- 1	N	1.1.			LI CI		13	106	17	10		-	1	1
1000	01 40	1 1	ST	13	Li /	27	-		7	1	1	7	15	106	7	0	1	-	1			
10,0,0	0,1,.,91		23	1.0	17.6	26	1		1.0		101		75	100	- 1/	2		6	-	1920		
	00.000			E. +			N			the literation	1.0.0		10	10 or	10	0.	1.1		1	1		
-107	011.0.4.6		ET.	TI	01	45	1.54	1. 8.4	0	(1	10/	47•1	70	103	7	AY	1	S	-1	1		
5101	01.43	1.	ST	20	81				~		4 46	1.	10	1-14	10	01	11	2		- 1		
-107	01.50		95	72	1010	110		00	1	1	1 A C	1.01	70	100	7	0		2				
-10.1	701.50ESK				23		100	4.9		00		-	100	2	70	109	7	in in		-	1	1
<u> </u>	01 50	ET.K	1 1	1 1			i I	1	10		1		100	21 • 1	7.0	100	7	0			. 1	1
L L MIN	00 22	LNG	-1 1	1 1 1	-		1 1	and the second	N			1 1	10,0	21.01	20	PI	1	0		e	1	1
	00.00	LAL	4.1		1		1-1	115	N	1 1 • 1	-	- 1 - 1	101	1	10	11111	17	0	in the		<u> </u>	
	01.50	MA S	1.1		1		1 1		N		-	<u> </u>	10	1	10	117	17	2			1	
	00.00		1 1				1		Al		-	1 1	44	1	20	112	1	2			1	
777	0 03	TV-5	1 1	r i		2	105	20	10		-	1 1	111	1	40	1114	-1	2	1.	0		
-6.50	00,000			<u> </u>	20	15 C	10,1	20		00	-		1,1,0	1.	15	111 -	1.5	0	1.	5	-	i
-720	01.05	E.C.d	1 1		23	102	10,0	50		07	0		11'	2 -	2-	111	17	A	1	2		1
0,00	30 01.05 E.G.M					13 2	21.0	13,7		0, 4, . ;		2,0	1:1:0	4	15	1.1.1.	1.7	6 1	11	2	1	
Lan	MISCELLANEOUS					CK T	YPE A	BBRE	VIA	TIONS	0	STRUCTU	IRE TYP	PE AE	BBRE	VIATIONS	FI	LLING	A	BBR	EVIAT	IONS
REF. ANGLE	ANGLE "+" FOR TOP END OF CORE, "-" FOR BOTTO						No.				SJ	SINGLE JO	TNIC	FO	FOLIA	TION	Ν	NONE	* 2	P	SERPE	INTINE
T/B	TOP OR BOTTOM END OF FRACTURE						12-51		11-	12	VN	VEIN					x	OXIDE		Т	CALCIT	Æ
N/W	W N-NON ORIENTABLE W-WHOLE CORE						198			1.1	BD	BEDDING		199	5 1 3		S	SULPH	IDE		North	
S⊔C	SLIC SLICKENSIDES - YES OR NO					. The			See.		СТ	CONTACT				10	L	CHLOR	ITE	14		
FRAC	FRAC 1-Natural 2-Maybe (Natural or Mech.) 3-Mechanic										FT	FAULT				e	Q	QUART	z		and a	
CONF	CONF CONFIDENCE - 1-Poor 4-Excellent						-	1			FC	FAULT CO	NTACT			1.	С	CLAY			-	
DIFF. ANGLE	IFF. ANGLE ANGULAR DIFFERENCE BETWEEN TOP LINES						1				SZ	SHEAR ZO	DNE				A	ANHYD	RITE			
CALL & N	CALL & NICHOLAS. INC. file					_toro1	1-m.dw	va		Contraction of	11251		No.			1				L	RAN7	'A711

PROJECT	Aranza	IZU	0	RIEN	ITE	D C	ORE	15	DATA	4	SH	EET	(	ME	T.)	F	PAGE	l	<		31
LOCATION	E-UP-CAAN	24	INCL				6	BEAF				100	DAT		6/21/1 N	7			BY	HI HI	03
			NOR			-	_	.A.3	TING					VAIIO	IN			SIF			
REF. ANGLE	DEPTH FROM	R	OCK TYP	ΡĒ	S	TRUCTU	RE	N /	FIL	LII	NG			L RUN	DEPTHS		34	_   F	2 0	DIFE	
TOP OF HOLE LINE)	(M)	1	2	3	TYPE	B CIRC. AN	IG. DIP	ŵ	THICKNES (cm)	SS	TYPE	F	ROM		TO	÷			A N C F	ANGLE	INITLS
-230	01, 23	E.SK		1.1	551	334	8 5,8		0,0,1	2	L	lili	2	7.5	11.4.	3	61	51	3	_	5,12
	91, 24	idi		- 1 - 1		1.1	1	N					to	i	4.	1	1 2				
-230	01,.55	ESK	1 1		1	1.1		N			- I I	1.6	2.	75	14.	13	36			1	
· ·	0.000	i				i.		N			-	111	9	3.6	1,15.	18	,0	_		•	
·	01.50	1 i		11			-	N	· · · ·			111	1	36	1115.	18	0	-	-	1	
	00.00	1. All		-1 1-			1	N	1 1 • 1			111	5	8.0	11.7.	15	5	-	-		
	01.55	, V,						N					5	0,0	1,1,7,.	-	25	-	-	1	
+10:010	00.15	ESIK	HFL		FTR	3 28,1	64,5		0,0,0,	1	G.B.	Lili	7	3,5	11.8.	9,1	51	1	3		2,D
1	0,0,.;5,0	11-1-	i li	<u> </u>	SJ	52,2	653		99.	1	6	1 1	1		- i-le	1	1	11	3	12	i
i i i i i i i i i i i i i i i i i i i	01.05	1	-ili		BDI	5 1,9,1	660		001.1	4	C.L.				<u> </u>	i_	- (	S.	13	1	-
14	0,1,.,1,6	1				31.98	3 67		00.01	1	L		1.1	2	V	1	1	1	3		
+0,0,0	0,1,.,7,8	0.06 EB KHFL				5 20,0	241		0, 3.0	1	2	Lili	1	5,5	1,1,8,.	18	50	11	3		
-1.54	00.06	EGIK	HFL		SIT	3 311	240		60	Ļ	L.	Leh	8	8.5	1,40,.	15	51	U	12	30	
- A.C.	0.051		1 1		ST	5 31.1	6 1.4		90.01	1	L	i i i i	11:1		<u> </u>	1	1 1	11	2		1
	0085	1	1	<u> </u>	FTU	5 361	244		0,0, .,	U	C	1 1	1			1 .	1		C	1	- 1
	011.01		1.1.	L. I	FTT		35.7.		00	1	LL	- I d	1			1	17	rll	5	- 1	1
in la	0.1.06	- II	1121		221	5 505	1417		00	1	L.C.		1				1	11	2	1	
- W	01		HIL	1 1	FTI	2 2 2	156		00	1	C,C				1. 1	1	-	1	C		1
H Pu	0,1,.10	2.6.1	<u> </u>		25 -		979	14	0.0	1	LC	2	1.1	0-	. Y	-	-	UI	0		1
-121	01,.50	EIZK		1.1	31.	71,24	240	1	0	1	24	17	5.+1	0,5	1.20.	13	121	4-1	C	1.4	-1
	0,0,0,0,0		_1_1_	11		1 1		N	1 1 • 1	-	1 1	1, 4,0	2	2,7	1.41.	10	0				
the state of the s	0,1,0,7,0						-	10		_	11	1,40	2	77	177	1	P	-	-		
	00.00							N		-		lic	1	90	1, 4, 0, .		10	-			
<u> </u>	00.00	2. 1 · · ·				1 1	1.	A)	1 1 • 1	-	1.1.1	17.	2	40	120	4	5			- 1	
	0,0,0,0					<u> </u>		10		-	1 1 1	1,01,	21 . 1	J.U		11	21			I.	
	MISCELLANEOUS				ROCI	K TYPE	ABBRE	VIA	TIONS	5	STRUCTU	RE TY	PE A	BBRE	VIATIONS	FI	LLING	G A	BBF	REVIAT	IONS
REF. ANGLE	"+" FOR TOP END OF CORE, "-" FOR BOTTOM				•	1.1.1.1			- 1999	SJ	SINGLE JO	DINT	FO	FOLIAT	NON	N	NONE	1	P	SERPE	ENTINE
'⁄B	TOP OR BOTTOM END OF FRACTURE					1		1	1	VN	VEIN			-		X	OXIDE	1	Т	CALCI	TE
N/W	N-NON ORIENTABLE W-WHOLE CORE						-		E	BD	BEDDING	-		-		S	SULPI	HIDE			
SLIC	SLICKENSIDES - YES OR NO				1.15					СТ	CONTACT	No. or and			and the second	L	CHLO	RITE	-		
FRAC	1-Natural 2-Maybe (Natural or Mech.) 3-Mechanica					1		1		FT	FAULT	141.7		-		Q	QUAR	Z	1		Ser.
CONF					M. Her			-	F	FC	FAULT CO	NTACT				C	CLAY		2		
DIFF. ANGLE	ANGULAR DIFFERENCE BETWEEN TOP LINES						-	1		SZ	SHEAR ZO	NE			1. A. A.	A	ANHY	RITE			
CALL & I	NICHOLAS. INC. file:				re_form_	torol1-m.	dwa													RAN	A/U

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PROJECT LOCATION HOLE NO	Aranzazu GHP-GMX	- 04		RIEN	NTEC			EAF AST	DATA	4	SH			T.) 6/21/	P.	AGE _	B <sup>N</sup> DI	01 0412	F <u>3</u> ZAO HQ3
REF. ANGLE (REF. LINE TO TOP OF	DEPTH FROM START OF RUN	RO	CK TYP	E -	ST	RUCTURE		N	FIL THIÇKNES	LIN	NG	. [	DRILL RU FROM CO	N DEPTHS DLLAR (M)		S L 1	F ( R ( A	D D D DIF	F.
HOLE LINE)	(M)	1	2	3	TYPE B	CIRC. ANG.	DIP	W	(cm)	_	ITPE	FR	OM	ТО	0	C	CI		SLE INITES
<u></u>	0,1, 5,5	SK			1			N		_	1	1,2,3	• 40	1,24	9	5			-
<u> </u>	00.00	1 1		1 1				N	1 1 • 1	-	1 1	1.41	• 15	1,46,	15	0			
	9.1 . 5.5	4					1	N	1 1 • 1	_	1 1	124	• 19.5	1,66,	12	0			
<u> </u>	90.00	r i		<u> </u>		List.	1.	N	1 1 • 1	_		146	· 50	1,20,	0	5			
<u></u>	01, 55	4 4		I	1			M	1 1 • 1	_	1 1	1,46	·15.0	1,48,	10	2			
	00.00	4						N	1 1 • 1	_		1,00	.05	1,69,	PI		-		
010	01.05	44				1. 0	20	~					• 1 1			5	1 3	- 1	< 10
-01.8	01.59	1			FIT	2,68	66	-	00	5	5.		• • •	1 1		1	10	- 1	20
	01 44	V I	1 1	<u> </u>	FID	45,9	10	1	991.	2			• • • •	1 2 0		Y	1	4 1	1
-010	01.1.28	BIR	1 1		331	060	20	-	001.	2	$L_{1}$	1,00	. 05	1, 4, 7,	,6	0 N		2 1	- 1
+10.0.0	00.06	4.	1.1		PIL	260	7.4	5		2	LL	1.69	. 60	1.31.	11	01	1	2.	
	0.0	4 5			DD D	419	50	-			\$ N		•	- 1 1 1	•	10	1		1
<u></u>	00.50	1 .	1	1 1	BDD CDD	474	20		99.		24		• • • •	1 1 1	<u>i</u> .	N	1 -	2 1	- 1
<u> </u>	00.64		1.6.1	11	DD IS	45,5	50		90.01	2	JEC		•	1 1 1	11	N	17	2 1	1
1.1.1	00.19	1		1	SJA	201	00		00	5		<u> </u>	•			N	1		1
	01 7 6	1 1			200	206	7.5		00	1	-B	1 1-1	•		1		1	5 1	1
	C21 . U.V.			1.11	STR	NO C	11		00	1	11		•		•	~	1 -	2 1 1	1
10.00	41.41	4-1-4-		121	200	201	7.1	- 1	<u> </u>	1	CILI	121	10	127	2	0		2 1	
	61 40	1				1 1	+	2	· · · · ·	-		121		127	2	2		1	
	00 235	1 1/1	IEI		KTT	110 2	1111	14		7	1	137	• 10	134	13		15		-
10,7,7	O ZN	1 AL	11.1	1 1	XJR	ZZQ	44		00	9	44	1216	·150	1.1.1.	101	0 0	1 2	-	
-645	00 49	<u> </u>	1		RAR	1210	70		S201.		GL,		•	1 1 1		N	15	1	
0,9,5	00 49				AND	11211	21	10	<u> </u>	1			•	1			-		-
	01 50	Vices	1 VI		-			2	1.1.1.1	-	1 1	132	50	134	0	5		1	
										_		e1 01 01				_			
	MISCELLAN	IEOUS	1.6%		ROCK	TYPE A	BBRE	VIA	TIONS	S	TRUCTU	RE TYPE	ABBRE	EVIATIONS	FIL	LING	ABE	BREV	IATIONS
REF. ANGLE	"+" FOR TOP END OF	F CORE, "	- FOR BO	MOTTO		and a second	-	1	in the second	SJ	SINGLE JO	DINT F	O FOLI	ATION	N	NONE	_	P SE	RPENTINE
'/B	TOP OR BOTTOM END	OF FRAC	TURE		1		-			VN	VEIN	S		the section	X	OXIDE	-	T CA	LCITE
N/W	N-NON ORIENTABLE	W-WHOLE	CORE		189	20122			1	BD	BEDDING				S	SULPHIC	E	14	
SLIC	SLICKENSIDES - YES	OR NO			1	and the second second		1	1	СТ	CONTACT			044	L	CHLORIT	E		A CAR
FRAC	1—Natural 2—Maybe (Nat	tural or Me	ech.) 3-Mec	hanical				-		FT	FAULT		1000		Q	QUARTZ		-	
CONF	CONFIDENCE - 1-Poo	or 4	-Excellent			- Aller	· • • • •	the	STR.	FC	FAULT CON	TACT	1		C	CLAY		_	- tr
DIFF. ANGLE	ANGULAR DIFFERENCE	BETWEEN	TOP LINES	5			-	24	:	SZ	SHEAR ZO	NE			A	ANHYDR	TE		

PROJECT LOCATION HOLE NO.	Aranza	zu x- 0-1		RIEN	NTE	D(		E bea eas	DAT RING	Ā	SH	EET	DATE ELEV		T.) \$/21/1 N	F ک	PAGE _	B D	<u>3</u> Y _	OF <u>31</u> ZAO HQ3
REF. ANGLE (REF. LINE TO TOP OF	DEPTH FROM START OF RUN (M)	R <sup>i</sup>		РЕ I З					F	ESS	NG TYPE	F			N DEPTHS LLAR (M)	<u>ר</u>	S L C	F R A	C O N I F A	DIFF. NGLE INITLS
HOLE LINE)		1 14	0:01		ITPE	B CIRC.	ANG. DI		(0.11	/	-	126		200	135	ć	5			
<u></u>	01 - C	Kr7K	FILL				1	N	, <u> </u>			13	4	00	1.35		5			
	(0,0), $(0,0)$	HEL					-	N				1.3	5. 4	5.5	1.3.7.	• . [	0	$\square$		
	61.55	HEL						N				13	55	5.5	1.37	. 1	0			
+318	0.0.06	11			BD	10.2	85	0	00	0	CL	13	7	10	1,38,	. 6	5A	11	3	SD
	00.16				BD	80,2	2,6 4,	8	001	.0	C/C	1,3	8 . (	55	1,40	. 7	ON	1	3	
	0.0 26	111			BD	BL	5,34	8	Op:	. 6	C.L.		1	1	1.1.1	•	N	1	3	
1.13.2	00.43	1.1.			BN	TE 017	04	4	00	2	T	-1-1	1	1		• .	N	1	3	
	60,52	1.1	1 1	1 1	BD	BLC	18 5,	1	0,0	0	L		1	-1-		• [-	N	1	3	1
and the second second	0,0,.5,5	1 1	1.1		ET	T 0,5	5,65	4	0,0,	5	CL,	- I - I	1	-		•	1 4	1	3	1 1 1
	0,0%, 6,5				BD	B1,2	,25	9	Upr	0	N			-	i i	•	N	11	3	
	00.81				BD	B.1.1	35	3	90	0	NI	1 1			1 Ir	• .	N	1	3	1 1.
	00 89	N.	1.1		BD	TOT	7,2 5,	9	001	0	N	1 5	<u>b. • .</u>			• .	N	1	>	1
4	01.00	4		1 1	BP	BLC	0,6 6	2	00.	1	Contraction 1	1			, VI	• 1	1 4	1	3	1.
+318	0,1,.08	HFL	1		BD	T 09	0 5	2	0,0,	0	NI	13	8	6,5	1,40	. 7	ON	([	3	1 1
-298	01.06	HFL	1.1	1.1.	V.N	T 31	05	4	6,0,	,5	SIL	146	)	20	141	• 1	SN	11.	3	1
	0.17	1.1		2 1 1	SJ	B07	61		00,	0	N,	1 1	Y			• 1	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	1	5	10 - 10
	0.22		11		BD	B 29	DY.	9	0,01	. 0	L	1 1	1.	1.		•	N	l.	3	
	0.39		1 1		3.5	13 0,5	143	4	UP.	.,2	L, i	1 1	1.			•	, N	1	3	i p. I.
	0.40	1.1	1.1		BD	TZC	104	GN	0,0T	0	t,	1 1				•	1	+	3	
		11	1.44.1	1 1	80	8-30	951	ZN	00	0	N	1 1		1		• 1. *	i Not		5	1 1
1 hi	0.51	11	- 1 - 1		B12	TZY	1,04	6	0,0,	.6	NI			-	111	• 7	N	11	5	1
the state of the s	057				3,0	13 3,0	,95,	2	061	10	NI		TP.		1.17	• 1	1~	> (	3	i
	0.58	4			1		1 1	N	1.1.	•	1.1		1.1			•	i j		-	1
- 248	10.80	H, F, L	· · · · ·	1				N	1	• •		14	0,.,(	10	1,9,1	• 11	5		i	i la
	MISCELL	ANEOUS			ROC	K TYP	E ABB	REVIA	TIONS		STRUCTU	IRE TY	PE AB	BBRE	VIATIONS	FI	LLING	AB	BR	VIATIONS
REF. ANGLE	"+" FOR TOP END	OF CORE.	- FOR	воттом			-			SJ	SINGLE J	DINT	FO	FOLIA	TION	N	NONE	1	P	SERPENTINE
T/B	TOP OR BOTTOM E	ND OF FR	ACTURE				8 11			VN	VEIN		1			x	OXIDE	20.40	т	CALCITE
N/W	N-NON ORIENTABL	E W-WHO	LE CORE	1						BD	BEDDING	•				S	SULPHI	DE		
SLIC	SLICKENSIDES - Y	ES OR NO	1						6 ·	СТ	CONTACT					L	CHLORI	ΤE		
FRAC	1-Natural 2-Maybe	(Natural or	Mech.) 3–M	echanical				1	per de trans	FT	FAULT					Q	QUARTZ			1000
CONF	IF CONFIDENCE – 1–Poor 4–Excellent							10. C		FC	FAULT CO	NTACT		Ý		С	CLAY			
DIFF. ANGLE	ANGLE ANGULAR DIFFERENCE BETWEEN TOP LINES							1000	1.1	SZ	SHEAR ZO	ONE				A	ANHYDR	RITE		N
CALL & I	ANGLE   ANGULAR DIFFERENCE BEIWEEN TOP LINES    & NICHOLAS. INC.					_toro11-	-m.dwa			¥.				1		1			Α	RAN7A7U

PROJECT	Aranza	iz'u	0	RIEN	ITEC	) CO	RE	73	DATA	1	SH	EET	(ME	T.)		PAGE _	14	_ OF	31
	CHP- (my)	L- 14					_ 8 _	EAF	RING	<u></u>	- 4			-6/-	cl	(7	BY	H	Q3
HOLE NO	·		NOR		2					_				2IN		S	FLC	\ <u></u>	
REF ANGLE	DEPTH FROM	RO	CK TYF	ΡĒ	ST	RUCTURE	×	N /	FILL		IG		DRILL RU	IN DEPTH	1S 1)	L	RC	DIFF	
TOP OF HOLE LINE)	(M)	1	2	3		CIRC. ANG.	DIP	w	THICKNESS (cm)		TYPE	F	ROM		TO	c	A N C F	ANGLE	
-72,4,8	5,0,.81	HFIL	1		KNT	23,0	5,8	n - 1	00.5		T,	1,4,0	0,0,5,0,0	1,4,1	1.01	SN	13		SD
	01.09		1 1	i i	FTC	329,7	5,8		0.0.5	5	C, ,		1		1.1	, Y	1 2	5	1
	6,1,.,16	i I I	11	1	BDB	2,9,2	46	1	00,00	1	$\mathcal{O}_{1}$	1 1	1.1.1	1.1	1.1	N	13	1	
and the	0,1,.,7,0		1 1		BDT	26.0	47		0,0,0,0	2	$N_{1}$			1.1		N	1 2		
1.1.1	0,1,.,2,3		1 1	- ( - T -	BDB	311	34		0,0,.1		LI				1.1	N	12		
	0,1,.34	-	1.1		BDB	7,9,2	5,9		0,0,0,0	2	N.		1		1.	N	13	1	
Li di la	0,1,.,4,0		i i		BDB	29.4	4,4	1	0,0,0,0	1	$\mathcal{N}_{\perp}$			1 P	1	N	13		1
. 4	0,1,.45	4	1 1	1 1	BOT	5240	44		0,0,0,0	2	N		♥, • ,	i. I		N	13		
-74.8	al. 52	H.F.L.			BDT	2,3,4	50		0,0,0,0	2	N	1,4,0	0,0,7,0	1,4,1	1.1	15 N	1 3		100
	00.00	PPB	1.1		SOT	208	36	N	0000		N	1,4,1	1.7,5	1,43	5, . , 2	-5. N	13	E	
3 in the	0,1,.,56	P, P, B			1 Section			N			1	1,4,1	1.75	1,4,3	5	5		1	13 100
-344	00.09	PPB		· ·	SJT	20,8	3,6		0,0,00		N	1,4,2	5.0,25	1,40	1 8	BON	13		
	40	11-1	1 1	1 4	YN C	31,9,6	4,5		0,0,.,4	ł	T	I - I	1		1. • 1	N	13		1
1.1.1.1.1.1.1	00.52	× 1937	12313		STB	30,4	3,8		0,0,0,0	>	NI	•				N	13		1
A to	0,6,.,7,0			1.1	SJP	2,3,1	5,3		0,0,0,0		NII	i i			1	N	13		1
- 1 P.F.	61.20				W, NB	261	5,4		0,0,0	>	T		1		4. • 1	N	1 3	3	
7	61.30		1. 1	1 1	SJR	210	46		0,0,0	>	$N_{1}$		V.,			N	13		1.1
-3,4,4	01.51	P.P.B.	1 1		55 B	0,54	55		64.0	2	NI	14:	32,5	1,4,4	1, ., 8	3,6 N	1.3		
-27.5	(20.18	V.	1 1	i i i	553	26.4	4,1		0,0,.,0	7	N,	1,4,4	1	1,4,0	5	SON	13	1	
1	00.26	PPB			SJT	246	4,0		00.2		CT	1	1	1,1		N	13		E.
1.1	0,0,0;3,7	HEL	- I		STT	262	54		00.00		N,					. ~	13		100
14	0.0.5.4				BDB	276	53	50	00.0		V.	- 1				N	13		Company and
N.	06.6.3				STR	278	4.8	2	60.0	7	N	1.1				N	13		
	00.72	5		1.1.0	SJT	0,40	4.5		00.0	)	N,			7	7	N	13		
-275	0.0 9.7	HFL			BDR	1.63	4,8		0,0,0,0		N,	144	. 8,0	146		BON	1 3		
	MISCELL	ANFOLIS			ROCK		BBBE			C	TRUCTU								TIONS
REF. ANGLE	"+" FOR TOP FND	OF CORE.	- FOR F	BOTTOM			DDILL		I UNS	J.	SINGLE		FO FOU			NONE	ADD	SFRP	ENTINE
T/B	TOP OR BOTTOM E	ND OF FRAC	TURE					-	VN	N	VEIN				X	OXIDE	-	CALC	TF
N/W	N-NON ORIENTABL	E W-WHOLE	CORE				-	-	BD		BEDDING			1	s	SULPHID	F		
SLIC	SLICKENSIDES - Y	ES OR NO							СТ	r	CONTACT			•	L	CHLORIT	E	1.4	1
FRAC	1-Natural 2-Maybe	(Natural or Me	ech.) 3-Me	chanical				+	FT	r	FAULT	antes en es			Q	QUARTZ		-	
CONF	F CONFIDENCE – 1–Poor 4–Excellent			t					FC		FAULT CON	TACT			c	CLAY			
DIFF. ANGLE	ANGLE ANGULAR DIFFERENCE BETWEEN TOP LINES			s		С.			SZ	z	SHEAR ZO	NE			A	ANHYDRI	TE		
CALL & I	VICHOLAS. IN	IC.		file: oco	re_form_t	oro11-m.dw	a •	*0		-								ARAN	ZAZU

tile: ocore\_torm\_toro11-m.dwa

ARAN/A/U

PROJECT LOCATION HOLE NO	Aranza	zu oY		RIEN	ITE	DC		BEAI	DAT RING	A	SHI	EET	(ME DATE ELEVATIO	ET.) 6/22	רו /	PAGE _	IS BY DIA	- OF BAOZ H	3   AO Q3
REF. ANGLE (REF. LINE TO TOP OF	DEPTH FROM START OF RUN	R	OCK TYF	DE -	S		URE	N /	FI THIÇKNE	ILLII ESS			DRILL RU FROM C	JN DEPTHS OLLAR (M)		S L 	F C R O A N	DIFF.	
HOLE LINE)	(M)	Т	Z	3	TYPE	B CIRC.	ANG. DIP	1	(cm)			F	ROM		0	C	CF	ANGLO	
-,2,7,5	0.1.13	HIFL	1.15		5:5	1316	452		401.	10	N	774	1	146	• 1 5	GN	13		> p
- in the	0,17		لم ور	F. 1.	BD	B15	1278		00.	0	N		1.1		•	N	1		
	01.2	1		1 1	55	TOC	- ( 47		00.	2	N			14	• 1	N	15	<u> </u>	
-275	0,130	P P	1, 1, -	1 1	55	102	076		00.	0	$\mathcal{N}_{\mathcal{N}}$	19.5	1 8.0	1,7,6,	• 7	ON	1)	1	
	0,0, . 0,0	HFL		<u> </u>		-	1 1	N	and i	1.,		14.6	1.30	147	• 0	0			- 1
<u> </u>	0.030	JAK			110	- 10	1 37	N	01268	11		1,4,6	1. 10	1,47	• 6	N	115	, 1	
1.1	9.01.07	/A/			M	14	1991		221	17	CIVI-	1/1/1	1-1-1	1/1-1	<u>/-</u>	1/2	1.12	- 1	
- Piner	90, 19	4/4/	<u> </u>	<u> </u>	7D	200	9961	-	00	1	47	( +	h•1/1	1/1/	•		17	1	
	991/39	/W/		1.1	XX	SOF.	10 94	-	001	14	2/17			1-1-1-1	•/	1 1	1P2	1	
	0.01.17	K fr /			PP	502	314151	$\vdash$		Ur-	1.11	h Ki	1-2%	167	e a	0	14		
-115	0,1,.5,9	FAR		1 1	50	112	6.9 9.9		op.	14	NC	199.6		I U G	• 0 Z	CN	ry s	1	
-1.8.0	00.00		- 1 I. S	1		1	-	M	<u> </u>	-		1.4.	1.0.0		•10	2		1	
كأجاب أ	(10, 3,3	11	- 1 - 1		1	2 0 2	0 (1)	M	11. ·			<u> </u>			•		2 2		1
<u> </u>	00.31	HIFIL	<u> </u>	<u>.     .</u>	37	000	2061		40.	P	$N_{1}$	<u> </u>	-1 • I I'		•	1	42		- I .
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	00.0.41	1 1	1_1		231	5 qq	2348		00.	0	N	1.1	1.1	<u> </u>	•	U	13		1
1 1 12	90.052	<u></u>	<u> </u>	1 1	EII I	200	0 20		010	0		<u> </u>			•	T.	10		1
	0.0 5.9			1 1	201	BOI	600		00	0		<u> </u>	1		•	N	12		
in in t	60 19	<u>, i li i</u>	1	·	IS D	T I G	12 5.7		00.	0	N	<u> </u>	1.01		• 1		1 2	1.	1
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-180	01.97	<u></u>			50	BOG	-0 50		00.	0	N	1 7 1	1,0,0,0	157	• 7	ZN	13		1
-3,1,5							<u>,                                     </u>		•	1	1 1	1,9,9	1.2,5	1,2,0,	•,8	2	1		1
	MISCELL	ANEOUS			ROC	K TYP	E ABBRE	VIA	TIONS		STRUCTU	RE TYP	E ABBR	EVIATIONS	FI	LLING	ABB	REVIA	TIONS
REF. ANGLE	"+" FOR TOP END	OF CORE,	"-" FOR I	воттом					1. A.	SJ	SINGLE JO	DINT	FO FOL	IATION	N	NONE	F	SERF	ENTINE
T/B	TOP OR BOTTOM E	ND OF FRA	ACTURE							VN	VEIN				X	OXIDE	-	CALC	ITE
N/W	N-NON ORIENTABL	E W-WHO	LE CORE	1					2	BD	BEDDING	21 .			s	SULPHI	DE		
SLIC	SLICKENSIDES - YES OR NO									ст	CONTACT			1	L	CHLORI	E		• •
FRAC	1-Natural 2-Maybe (Natural or Mech.) 3-Mechanical					a.				FT	FAULT				Q	QUARTZ			
CONF	CONFIDENCE - 1-Poor 4-Excellent						A		· · · ·	FC	FAULT CO	NTACT			С	CLAY			
DIFF. ANGLE	NGLE ANGULAR DIFFERENCE BETWEEN TOP LINES					6.74	and the	i		sz	SHEAR ZO	DNE			A	ANHYDR	ITE	1	
CALL & I	ANGLE ANGULAR DIFFERENCE BETWEEN TOP LINES				re_form	_toro11-	-m.dwa	-						1			1	ARAN	7A7U

PROJECT LOCATION HOLE NO.	Aranza GHP-GN	zu n X- o4	O INCLII	RIEN NATION_ HING	ITED	CO		EAR AST	DATA RING TING		SHE	ET	(ME DATE ELEVATI	T.) 6/27/	PAG	E	<u>I6</u> BY DI/	_ C (SM) A	DF DZAC HQ	<u>3</u>
REF. ANGLE (REF. LINE TO	DEPTH FROM START OF RUN	RO	СК ТҮР	E	STI	RUCTURE		n Z	FILL THIÇKNESS				DRILL RI	JN DEPTHS OLLAR (M)		L	R C		IFF.	NITI S
HOLE LINE)	(M)	1	2	3	TYPE B	CIRC. ANG.	DIP	W	(cm)	╀	TIPE	FF	TOM .	10	65					
-315	00.16	HEL		1 1			11 2	N		+	1 1 -	1.4.9	1 • 1 > >	(,7,0,•	1012	. 5	1 7	2		SD
	00.17	11.	21 ° 12	/	BDT	318	4,2		00.00	1		<u> </u>			<u> </u>	N	77	3	1	
	6.0.24		1 1		550	436	5,0		0,0,•,0	1		<u> </u>	1 • 1 1		1_1	N	0	2	-	
	00.46	1-1-1	1	1_1_	BDR	20,8	50		0.0 0		<u> </u>	1 1	1. 1. 1		. <u> </u>	N	7	3		
	00. 55				550	246	41	-	00.00	1	1		<u></u>			N	1 -	3		
1.101	00.67	1/2	1-1-4	1 15	SDC	541,0	5.7		00.00					4		N	1	3		
	0,1,.00	V	1 1	1 1	SITT	20.0	61	-	00.0	ť	×1 1	140	30	-1.50	8,0		1.	2		5.0
-3.15	01.23	HFL		11	555	61,0	4.1		99.0	1	Ni	150	93	5157	35	-		-		
	00.0.00			- 1 - 1	1	1 1	<u> </u>	N	1 1 • 1		1.1	TEC	5 8	5157	35	-	$\top$			134.54
	0,1.50	L.		111	1		1	M		4	1	1.20	7 30	5153	8.5					
- 1 - 1 - T	00.000	V	i	<u></u>	1.2	<u> </u>		N		+		13.	7.30	153	8.5	- 1				
	0,1,.50	H.F.C	1.1	1	0.5-0	1//	111	IV.				15	2 0	5155	35	N	1	2		
-1.26	00.11				605	16.6	7.0		001.01			11/1-	21.01	11/121		N	1	3		
	0.04.7	- 1 12		1	201	0,23	140		00.00	1	N		1 • 1 - 1:			N	(	3		Sec.
	6.060	11		1 1	171715	212-6	43			1	T	1.1				N	1	3	-	
in finis	0,0,.,69	1.1	1 1	1 1-	VNI	140	4.7		0.0.			1 1	1.1			N	1	3	1985	
<u> </u>	6.09.6		1 1	<u> </u>	1201	1014	4.0		00101			1 1				N	1	3	9.3	
1 12.01	0,1,.0,5	1.	1 1 -	<u> </u>	12 D C		76		00	,	C .	1 1	V	2		N	1	3		
	0,1,.,21	N.			33		9.1	-	00.	-	0	15	3 8	5155	35	N	11	3		
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	00.00	1 1	1_1_			1 1		N	1 1 • 1	+	1_1_	15	5.3	5156	90	1	•			
1 1 1 1	01 . 55	1.1				1 1	223 1	1	, I I • I	+		150	5.9	0158	. 40	5				
	961.00	2 1 1	1 1	1 1	1	1-1-		N	1 1.01	+	1 1	150	6 9	6158	40	)				
	91, 5,0	>	<u> </u>	1 1	- 1		- 1	14	1 1.01	+	<u> </u>	15	8 4	0159	95	-			1997 - 19	
1.1.1.1.	00,00		1 1	1 1			l r	_	1 1 1 1	_	1 1		9		I mus	1110		200		TIONS
	MISCEL	LANEOUS		- 41 A	ROC	K TYPE	ABBR	EVI,	ATIONS	S	TRUCT	URE TY	PE ABE	REVIATIONS	FILL	ING	AE	3BK	EVIA	TIONS
REF. ANGLE	"+" FOR TOP EN	D OF CORE,	"-" FOR	BOTTOM	, £					SJ	SINGLE	JOINT	FO F	DLIATION	NN	ONE	1812	P	SERP	
T/B	TOP OR BOTTOM	END OF FRA	ACTURE	10			1.1		1.1.1.1	VN	VEIN	5 <sup>-2</sup>	1		X O	XIDE			CALCI	<u>ite</u>
N/W	N-NON ORIENTAE	BLE W-WHO	LE CORE	1.					-	BD	BEDDING	;	-		S S	ULPH	IDE		100	
SLIC	SLICKENSIDES -	YES OR NO								СТ	CONTAC	Г			L C	HLOR				
FRAC	1-Natural 2-Maybe	e (Natural or	Mech.) 3-M	lechanical			2.00		1.1.1	FT	FAULT	1	-		99	UART	٢			-
CONF	CONFIDENCE - 1	ent	a. 4	1	-		1.14	FC	FAULT C	CONTACT	-					-	-	110		
DIFF. ANGLE	E ANGULAR DIFFERENCE BETWEEN TOP LINES								1.0	SZ	SHEAR	ZONE			AA	NHYD	RITE	<u> </u>	DAN	74711
CATE O	MIGILAT 10	<b>611</b>		4												F	ARAN	AIU		

CALL & NICHOLAS. INC.

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PROJECT LOCATION	Aranza	zu		RIEN	ITEL	) C		EAF	DATA	•	SHE	ET	(ML	6/22/	PA	GE _	17 B	<u></u> ( 154		
HOLE NO.	GHP-GMX	-04	NORT	THING		7	E.	AST	ΓING				ELEVATIC	DN			D	IA	ngo	_
REF. ANGLE	DEPTH FROM	R	OCK TYP	ΡĒ	ST	FRUCTU	RE	N /	FILL		G		DRILL RU FROM CO	N DEPTHS DLLAR (M)		S L	F R A	C O N D	IFF.	
TOP OF HOLE LINE)	(M)	1	2	3			NG. DIP	ŵ	(cm)	<u>`</u>	TYPE	FI	ROM	TO		Ċ	C	F AN	IGLE INIT	<b>FLS</b>
	01.55	H.F.L	1 1		1	1 1	1	N	1 1 • 1	+	15	1.5.8	5 40	1.59	7:	5		_	0	D
	0,0,0,0,0		1.1	1.1	1			N		+	1 1	15,0	175	161.	1	>				-
	00.10	1/1	1 1	1 1			1	N	<u> </u>			1 1	· · · · ·	· · · · ·		V	)	2		-
-1.75	0.0 20	1.	ESK		551	323	0 5.0		00	$\frac{l}{l}$				<u> </u>	<u> </u>	1	1	2		-
	40. 25	1	1	- AL 1	5.51	330	844	Az	00	1 6		<u> </u>	1	1 1 1 •	<u> </u>	~		2		-
	00.26		- i -	1 1		- 1-1		14	<u> </u>		- I		1.1.1		<u>     </u>	+			-	-
i li	00.43		- 1 I		1.50		011-	~	· · · ·	Æ		1 1	<u>  •   </u>	1 1 1		A	1	2	-	-
	00.44				1-1-1	1 1, 7,	845		00100	7	C		1 • I I	<u> </u>	11	A	1	3		-
	00.52			1 1	27.1	304	245				1 6 .				1	N	1	8		-
	00.70		i li	1 - 1	221	50.6	774		201.		rs rs	1.1	1.			A	1	3		-
	00.85	1.1	i	1 1	531	504	3 21	1	00.01	1	<		1.		11	- AS	1	3		
	00.08	i		1 1	SIT	807	4 74		00.00	2	5				1	N	11	2		
	0.0. 9.6	<u> </u>	<u> </u>	<u> </u>	22	000	0 50		00	2	N		7	1 1		N	1	3		
	61.10	17.	11	1 1	231	540	0 4.4			Ň	()	<u>· 1 · 1</u>	V	1	1	N	1	3		
	01	n en	111		22	200	0 20		00.	2	1	150	9 95	161	4	SN	1	3		
-1.75	01.40	H.F.L		1	22		921		001.1	0	N.	16	.46	162	9	51	11	3		
-1.39	0.010		1 1	1 1	53	TINT	143		6.0	2		1100		- HOI		· N	1	3	E.	
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	00.51	11			20	2 1 9	278	-	00,	-	N					1	17	3		
	00.95				20	T 2 1	779	2	00	0	N				1	1	1	3		1
	00.58	L 1	1 1		27	RIE	730		()()	0	al .					A	11	3	1	1
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		1121110			019		1000	0.4	ATIONIC						Ell	LING		RR	EVIATIC	ONS
9	MISCEL	LANEOUS	5	100	ROC	CK TYPE	- ABBK	EVI,	ATIONS	2	STRUCT	JRE IT	PE ADD		N	NONE			SERPEN	TINE
REF. ANGLE	"+" FOR TOP EN	D OF CORE	"-" FOR	BOTTOM		17				SJ	SINGLE		FU FU	LIATION		OVIDE		T	CALCITE	
Т/в	TOP OR BOTTOM	END OF FF	RACTURE			10.04				VN	VEIN				^ c	SI II DL		<u> </u>	ONLOTIC	
N/W	N-NON ORIENTAE	BLE W-WH	OLE CORE	11.						BD	BEDDING					CHLOR		+	1	
SLIC	SLICKENSIDES -	YES OR NO	)				÷.,	_			CUNIACI			12 10 10.1	0	OUAPT	7			
FRAC	1-Natural 2-Maybe	e (Natural or	Mech.) 3—I	Mechanical				-			FAULT	ONTACT		1.1.2	C	CLAY	-			
CONF	CONFIDENCE - 1	-Poor	. 4-Excelle	ent						FC	FAULI C					ANHYT	RITE		4	
DIFF. ANGLE	ANGULAR DIFFERE	ENCE BETWE	EEN TOP LI	NES		1				52	SPIEAR 2			*				4	RAN7A	4711

PROJECT LOCATION HOLE NO.	Aranza GHP-GMY	zu (-04		RIEN	ITE		)RE _ в _ с	EAF AST	DATA RING		SHE	ET	DATE ELEV		[.) <u>6/22/1</u>	PA	GE _	<u>18</u> B	( y5 <u>4</u> IA	DF DZA HC	<u>S</u> 0- 13
REF. ANGLE (REF. LINE TO	DEPTH FROM START OF RUN	RC	CK TYF	Έ	S'		Ē	N / W	FILL	IN S	G TYPF		DRILL FROI	RUN VI COL	DEPTHS LAR (M)		S L L	F R A		NFF.	INITLS
HOLE LINE)	(M)	- 20 J	2	3	TYPE	B CIRC. ANG.	. DIP		(cm)	+			RUM	15	1/7	90		1	7		SA
-1.3.9	0,1,0,0,6	ESK	1 1	1	55	1032	4.6		00.0	2	M	1.6.1	1.	15	1.6.6.		N X	1.	2	_	-11
	6.1.1.6			1 1	FIN	>0,6,1	46		(20 -	7 0	4	1 / 1	0 · · · ·	15	1 / 7	9	5 AN	(	-	_	
-139	61.37	- L	1 1		271	15006	3,6		00.010	-	4.62	161	7 1	ar	1/4	5	3		1		
<u> </u>	60.00	1		1_1_				N		+		16	7	92	1/4	2	6			-	
	01.55	ESKI	- M.S	1 1	1	- <u>L</u> .		N		╉	1 1 .	1.0.0	5	20	166	0	6			-	
	0.00.0		<u> </u>	1 1.		. 1		N	1 1 • 1		<u> </u>	1/ (	1	50	100	0	5		-	-	
	01.50				1		- I	M		ł	1 1	161	- <u> </u>  •	20	147	51	5				
	00.00		- 1 - 1	1 1	1			N		+	1 1	1016	21 • 1	20	1/7	50	0			-	
	01,.50					1 1		N	1 1 1		1 1	LI DI	7	50	169	0	5		3		
	0.01.00			1 1	1		1	N		┦		16-	1 • 1	50	169	0	5				
	01			I	1	1 1	1	N	- N • 1	+		1/0	1	25	120	4	0				
1 1 11	00.00			1 1		1 1	+ (	N		+	1 1	16.	1 • 19	25	170	4	0		T		
	01.05				1			1		┩		170	0	40	171	9.	E			1000	
	00.00			<u> </u>				$\mathbb{Z}$		+		17	0	40	171	9	5	-	1	Sec. 1	2
	011.55	1 4	-1-	1 1			1 -	12	1 1 • 1	+	1 1	17		95	173	50	5			-	Rep.
	00.00		1 6	1-1-	1	- 1 - 1	1-	X	1 1 • 1	+		1.1	1.1	40	110121	12.3					
	00	En	LWD		2-	T 1 4 7	4		001	2						1	N	2	3		
-121	00.0.98	1.1.1.1		1 1	27	2 3 4	211	-		~	A					-	~	11	3		
- ite	91.09		1_1_		20	2100	24	-	00.0	2	7		0	-	1	1.1	A	12	5		
	0.1.1.1.4	11			VN			-	01	2	0	171	1.6	15	173.	5	MA	11	3		
-1.41	01.11	27, 1	LW 2	>	53	1 116		1	011.	1	N. N.	17	2	50	175	0	5 ~	1	3		
-3,5,0	0.09	1 1			23	1 4 4	10	-	00.	~	**	11.61		10	11/131		N	1	3		
	0.00		1 1		DIX	1201	170	2	40	0	N	1 1	4	1			N	51	3		
	0. 70		1 01 5	11	60	720		-	00.	6	2	17	3	50	175	0	50	12	3		
-220		N.C.W	14.00		152F	13 - 11	6121	1	OM I I	/		1 21 21				-			DDE		TIONS
	MISCEL	LANEOUS			RO	CK TYPE	ABBR	EVI/	ATIONS	5	STRUCT	JRE TY	PE A	ABBRE	VIATIONS	FIL	LLING	A	<b>BRK</b>	EVIA	TIONS
REF. ANGLE	"+" FOR TOP EN	D OF CORE,	"-" FOR	BOTTOM		-		s. *	-	SJ	SINGLE	JOINT	FO	FOLIA	ATION	N	NONE		P	SERI	PENIINE
T/B	TOP OR BOTTOM	END OF FR	ACTURE							VN	VEIN		-	1-1-1-		X	OXIDE		+-	CALC	ILE
N/W	N-NON ORIENTAE	BLE W-WHO	DLE CORE	and a star						BD	BEDDING					S	SULPH	IIDE	-	-	
SLIC	SLICKENSIDES -	YES OR NO								СТ	CONTACT	r				L	CHLOF	ITE			100
FRAC	1-Natural 2-Maybe	e (Natural or	Mech.) 3-1	lechanical			192	3		FT	FAULT					Q	QUART	2	-		-
CONF	CONFIDENCE - 1	-Poor	4-Excelle	ent		14. A. A. A.			1.1.1	FC	FAULT C	ONTACT				C	CLAY		+		1000
DIFF. ANGLE	ANGULAR DIFFERE	ENCE BETWE	EN TOP LI	NES						SZ	SHEAR 2	ZONE				A	ANHYD	RITE			174711
CALL &	NICHOLAS. I	INC.		file: o	core_forr	n_toro11-m.	.dwa												4	ARAN	IT AT U

PROJECT	Aranza	zu	0	RIEN	ITEL	) CC	DRE	гт <b>л</b> г	DATA		SHE	EET	(M	ET	.)	PA	GE _	10	ysi	OF _ ZA	$\leq 1$
HOLE NO.	GHP-GMX	-04	NORT	HING		8	_ В	EAF AST	ring				ELEVAT	FION				D	IA.	HG	13
REF. ANGLE	DEPTH FROM	R	DCK TYP	Έ	° S	TRUCTUR	E	N /	FILL	IN	G	3	DRILL F	RUN COL	DEPTHS LAR (M)		S L	F R	C O N	DIFF.	
TOP OF HOLE LINE)	(M)	1	2	3		CIRC. AND	G. DIP	Ŵ	(cm)		TYPE	FF	ROM	, A	то		Ċ	ĉ	FA	NGLE	INITLS
-350	0.5.6	ESK	Lm, S	Î.Î.	BDT	T 2,4,2	57		00.00	A	<u>)</u>	173		0	175.	0	SN	1	3	-1	SD
-1 4				1.1.2	5.51	5282	3 4.7		00.00	21	2	1 - C	1.1	-		1	N	-	3	_	
	1.1.90			1_1_1	226	5 20,0	- 5,4		00.1	-	<u> </u>	<u> </u>	1.	+	1 1 1 •	1	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	-	2	-	
		<u> </u>		<u> </u>		11		N		+		<u> </u>		+			-	-		-	
	11.0.5	1 1		1_1_	1-1-	- 1 U 1		10	0.1 0		1			+			N	1	3	_	
	1 77	1		1 1	270	2317	23	1	00.00								N	1	2		
141	11.0.6.7	· VI	1	. 1 1	330	z 1 6 6	140	-				1 1					N	1	3	-	
-250	1 34	ES H	Lus		201	T 7 87	40		0.0		N	1.7	3. 50	0	175	0	5 N	(	3	1	
- 7,5,0	11.0	Ciria	1		2)	1900		N		T		17.9	5.0	5	1.7.6.	6	0			i	1.3
	14 55							N		1		170	5.0	5	176.	6	0			1	
	00.00	1.	ł.					N		T	1 1	17,0	5.6	0	1,7,8,.	, 1	0			1	
	(2) 50	E.5.K	L.M.S					N		T	1 1	1,7,6	56	0	178	, (,	0			1	1
	00 00	V	1					N			1	171	8 1	U	1,79.	6	5			1	1
	01 55	ESK	LNG					R	1.1.1		1 1	171	0, )	0	179.	6	5			1	
	00.000	ESK	LMS	1	1			N	1.1.1	1		1,79	1,.6	5	1811.	2	0	-			
	01.55	ESK	Lus					N		4		17.0	16	5	181.	2	0	-	-	1	1
-1665	0.0 11	17FL			BOI	3156	42	T.	00,00	2	N	18	12	0	182.	1	ON	1	5	1,	1
	00.18			1 1	BD	31.21	133		0,0,0,0	2	N.		1	1		1	1/1	1	2	<u> </u>	
	00.29		1.50		BD	3 10.2	44		0,0,0,0		NI	5 15 AL	1.01	-	i•	1	N	11	3		-
	0.0.74	11			KT	BUR	244		00.	-	G		1	-	1 1/1.	1	4	1	2		1
je li i	00.91	11-		1 1	FI	BILL	> 48	-	0,0,.	2	CL	1 13	1	-		1	1	1	2		1
. 4.	0.1.05		1 1	1.1	23	010.0	5 5.9		0,0,0,0	2	N	1 1	0	1		1	1	1	P		
	01 06	N.	1 1	1 i i	+			N		+		1.8	1.2	10	182.	7	0	-			
-0.6,5	61.63			<u> </u>				_		-					MATIONIC			•			TIONS
	MISCEL	LANEOUS	5		ROC	K TYPE	ABBR	EVI/	ATIONS	S	TRUCIU	URE IY	PE ABI	BKF	VIATIONS	FIL	LLING	A	DDr	SEDE	TIONS
REF. ANGLE	"+" FOR TOP EN	D OF CORE	, "" FOR	BOTTOM		121/2-				SJ	SINGLE	JOINT	FOI	FOLIA	TION	N	OVIDE	12	Т	CALC	
<u>'/</u> B	TOP OR BOTTOM	END OF FF	ACTURE					1		VN	VEIN		1			~	SUIPH	IDE	+	CALC	<u></u>
N/W	N-NON ORIENTAB	LE W-WH	DLE CORE							30	BEDDING			1		L	CHLOR		+		with the
SLIC	SLICKENSIDES -	YES OR NO	)	1			<u>8794</u> 1	12			CONTACT			10		0	QUART	<u>-</u> Z	-		
FRAC	1—Natural 2—Maybe	(Natural or	Mech.) 3-N	lechanical							FAULT	ONTACT			5	C	CLAY	-	-		
CONF	CONFIDENCE - 1	-Poor	. 4-Excelle	nt						57	SHEAR 7	ONF				A	ANHYD	RITE			-
DIFF. ANGLE	ANGULAR DIFFERE	NCE BEIWE	EN IOP LI	file: or	core form	toro11-m	.dwa			JE				. 11	1 State	-		13		RAN	7471

PROJECT LOCATION HOLE NO.	Aranza	zu ⊀-0Ч	OF INCLIN NORTH	RIEN IATION HING	ITED	COR	BEA EAS	ARII STII	)ATA ng ng		SHE		(ME DATE ELEVATIO	T.) 6/22/	РА 17	(GE	B	<u>0</u> ( Y <sup>5</sup> 4 IA	DF ZA HQ	<u>8</u> 0- 13
REF. ANGLE (REF. LINE TO TOP OF	DEPTH FROM START OF RUN (M)	8 RC	DCK TYPE	= 3		RUCTURE	N / VIP W	√/- ∨	FILLI THICKNESS (cm)		G 6 TYPE	۰». ۲۳	DRILL RU FROM CC	N DEPTHS LLAR (M) TO		S L - I C	F R A C	C O N F A	NFF.	INITLS
HOLE LINE)	61 74	HEL		100 M	STT	2504	0		00.00	1	U I	1,8,1		182.	7	ON	2	3		S,D
-065	01.38	HFL			5.5B	2334	7	0	0,0,0,0	2		131	. 20	18,2.	7	ON	2	3		
-0.46	0.0 03	HFL	LMS		BUT	3464	μ	Ċ	0.00	A	1, 1	1,8,2	. 70	184.	50	SN	1	2		
-0.46	0.10			ř. T	BOB	20,64	13	(	50.00	1	J		1 • 1	· · · · ·		N	1	2	_	
	10. 27		T I	1 1	BDT	35,24	4	(	00.00	1	J		<u>. •</u>			N	1	2	-	
	0.38			1 1	BDB	20,63	,3	C	20.1	l	-1 1	L	. •	· · · · ·	11	N	1	2	1.	
	0.49				BDT	1864	4	(	501.19	1	N	L İ		1.1.1.	1 1	N	1	2	-	
	0.57			1	ETT	20,65	3	+	0.2.0	4	-1-12			<u> </u>	1_1	N	1	6	1	
	0.,79	- drine			BDB	1.6.8 5	>,7	4	0,0,0,0	20					1 1	N	1	0	1	
	1.03	1 1			BOT	3599	17	4	20.0.0		V		1.1	<u> </u>		ev	1	-7	1	
	1.1.5				BOB	1744	6	(	50.00	2 (	1.1	1 1	1.	·····	1_1	N	1	0	_	
	1.1.7.4			1 1	551	0383	12	-	0.0.0	A	<u></u>		1 • 1 1		1	IV N	1	2	1	
	1.37				5.53	1.6.6 5	2		00.00	4	NIL		1.			10	1	7	1	
- l'	1		1	1 1	-		-	H	I tor	+		<u> </u>	1.	1 1 1 •		-		7	-	
	1.47	1	il.	1 1	0.0	1 2 2 2 2	0	Ĭ		-		107	1.70	194	5	a N	1	2	_	1
5,6,4,6	1.48	, V	- Y		1212 1	013.00	00		0,0,0,0	1	N	100	1 50	10 -	7	2		4	1	
	0,0, .,0,0			1.18			1 4	N	1 1 • 1	+	. 1 . 1	10	10	16,7,	16		-		-	
	0.0. 55	1		i		2012	G	N	01 1	+	/		1 ····	1 1	1	Y	1	2	1	
- 6 92	0050	1 1				2307	27	+	0,1,.0			1 1	1.1			Ň	1	3		
	00.0.03	1			12,01	-7: 27 2	24		0.0	5							1	3		
	90	ILEI	-V-		NAL D	SES 1	55	-	00.2		T	T	7	V	-	A	1	3		
	00.00	MIL			527	3571	15	+	00.0	5	N	184		1.8.5	.7	51	1	3	1	
1641	01.08	LMS			1.2		42	N		1		185	55	187	.3	6	0		1	1
<u> </u>	00.00	Imh					1	N		1		185	55	-1.67	3	0			1	
	141						000	// 4 7		-						LINC	٨	BBB		TIONS
	MISCEL	LANEOUS	5		ROCH	K TYPE AB	BREV		TIONS	5	TRUCIU	JRE IT		EVIATIONS		NONE			SEDD	ENTINE
REF. ANGLE	"+" FOR TOP EN	D OF CORE	, "-" FOR B	BOTTOM						5J	SINGLE J		FO FOL	JATION		OVIDE		T	CALC	ITE
1/B	TOP OR BOTTOM	END OF FR	ACTURE			2		-			VEIN				^ c	SUIPH	IDE	+	UNEO	
N/W	N-NON ORIENTAB	LE W-WHO	DLE CORE							30	BEDDING				L	CHLOR	TF	-	1	-
SLIC	SLICKENSIDES -	YES OR NO	)	Section and				-			CONTACT				0	QUART	7		2/13	The Contract
FRAC	1—Natural 2—Maybe	(Natural or	Mech.) 3-Me	echanical			1000	-			FAULI	ONITACT			C	CLAY	-	-	1	-
CONF	CONFIDENCE - 1	-Poor	. 4-Excellen	it					ľ	-0	CUEAD 7		5		A	ANHYD	RITE			
DIFF. ANGLE	ANGULAR DIFFERE	NCE BETWE	EN TOP LINE	ES files as	l form	toroll-m dwg		-		52	JILAN Z	JUIL						L	RAN	7A7U

	Aranzaz	u 			ITE	C C	ORE	EAR	DATA RING	4	SHI	EET	(ME DATE ELEVATIO	T.) 6/23/17 N	PAG	-	BY DIA	_ OF	- 31 ZAO SAU HQ3
REF. ANGLE (REF. LINE TO	DEPTH FROM START OF RUN	RC	DCK TYP	E	S		IRE	N /	FIL	LIN	G		DRILL RUI FROM CO	N DEPTHS LLAR (M)		SI LI	F C R C A N	DIF	F.
HOLE LINE)	_(M)	1	2	3	TYPE	É CIRC. A	NG. DIP	W	(cm)	+		1 a =	ROM		8.0				
	00,000	LMS	HPL	1 1	1	1		N	<u> </u>	11	~	181	1	1001	00		17	-	SD
E. F. K	00.14		1	1 1	450	120	640	N	0,0, •	41	<u> </u>	1-1-4	1.1			nr		5	24
-261	0.0.15	1 1		11	5.5	145	6 50	$\vdash$	00	10	<u> </u>		1.			SI		1	
11	0,0,0,7,9	. la	1	1 1	55	549	04.0	+	0.01.	0.1	N.	1 1	1.01.1			NI		3	- 1.
	0.0.43	V	7		SJ	13 31	120	$\vdash$	0.0.	2			1.01		1		2		
	60.56	LM 5	HFL	1	35	040	241	$\vdash$	0.0.	4	RY P				L	N	1	3	
<u> </u>	00.0,0,0	rp B	1 1	1_1_	SU	BLL	57.4		00.		GITI	1 1			1	N	1 7	5	
	0,0,0,00	1			V.N	00,5	227	-	001	1	2141			1		N	1-	3	
	0 00	PPB		<u> </u>	32	500	1 22		0.0	0	5	10.	2 30	18.9	80	N	1 -	5	
-261	01.64	END	HAL		50	140	148	+	K.		<u>N      </u>	10-	1 30	188	20	N	1-	5	
-261	01 . 55	LMS	H. Y. L	<u> </u>	DU	274	7 70	+	00.	2	C e	199	. 90	190	30	N	1-	5	
-168	0.0.12	<u> </u>		1 1	50	17 11	137		0.0.	2	N	4010		L'INT	1210	N	1 7	5	
	0.0.54			1 1	1717	16.9	6 3		0.0	3	<u>.</u>	- <u></u>				N	15	2	
· · · · ·	00.67	1	1 1 1	1 1	DV	0 27	0 10		0.01.	M		1 1		<u> </u>		N	1	5	
i i i	0.0. 7.8	1		1.1	1517	6 07	0 27		00.	0	N	1 1		<u> </u>	<u> </u>	N	1 7	5	
	00 96	17-	1		32	2010	720		00.	0	N	1 1		1 1 1.	1	N	17	5	
1	01.02		1124		55	1 01	201		00.	0	N	1 1	1 • L - L -	1 1 1 •		N	1.	3	
-26 8	011.1.19	LMS	HYU	1	4512	004	5 44	-	0.0.	V	C I	1 1	<u> </u>		<u> </u>	10	1 1	-	
- I all	01.25	1	44		35	540	6 7.1	-	6	1-1	C. I	- L. L	· · · · ·	<u> </u>	1 1	N	1 -	2	1
1	. 1, . 54	1	it.		15,5	1 13	1 50	-	00.	0	N	1 9.	0 01	190	30	N	1	5	
-268	1.94	LM,5	HFL		25	60,4	1,0 5,1	1	00.	0	N	1.0	0.00	191	85	14	-	2	
- <u> </u>	00.000	LMS	HFL			1	1 1-	N	· · · ·	!	1 1	14	0 20	1 6 1	8 5				
	01.55	.).	1				1 1	N	1.1.	-	1 - 1	1 01	25	162	LA				
-1, 55	06.00	- lu				L.	1 1	NN	1 1.	1	1 °1	14	85	193	40				
-, 2, 5, 5	6 90, . , 0, 8	, V,	, V,				1			1	1 1	1111	1	1,1,2,0					
	MISCELL	ANEOUS	5		RO	CK TYP	E ABBR	EVI	ATIONS		STRUCT	URE TY	PE ABBR	EVIATIONS	FILL	ING	AB	BRE	VIATIONS
REF. ANGLE	"+" FOR TOP END	OF CORE	, "" FOR	BOTTOM						SJ	SINGLE	JOINT	FO FOL	IATION	N NO	NE		P S	SERPENTINE
T/R	TOP OR BOTTOM E	ND OF FR	ACTURE						54	VN	VEIN	-	2		X OX	IDE		TC	ALCITE
N/W	N-NON ORIENTABL	E W-WH	OLE CORE							BD	BEDDING	;			S SU	LPHI	DE		й. 
SLIC	SLICKENSIDES - Y	ES OR NO	)	1	2		2			ст	CONTAC	г			L CH	ILORI	TE		
FRAC	1-Natural 2-Maybe	(Natural or	Mech.) 3-N	lechanical						FT	FAULT		-	1.1	Q Q1	JARTZ	2		
CONF	CONFIDENCE - 1-	-Poor	. 4-Excelle	nt	0.					FC	FAULT C	CONTACT			CCL	AY			
DIFF. ANGI F	ANGULAR DIFFEREN	NCE BETWE	EN TOP LI	NES						SZ	SHEAR	ZONE			A AM	IHYDR	RITE		11
CALL &	NICHOLAS. II	VC.		file: o	core_for	n_toro11-	-m.dwa	e.				505 B						AF	2AN7A7U

PROJECT	Aranza	zu	0	RIEN	ITED	) CC	DRE			•	SHE	EET		ME	Г.)	PA	GE	ZZ BY	_ 0 54	F <u>3</u> ZAO	L
LOCATION .	GHP-GM)	X-04		NATION_ THING			D E	AST	ring				ELEV	ATION	1			DI/	٩	HQ3	
DEE ANCLE		R		PF	ST	RUCTUR	E	N	FILL	IN	G		DRIL	RUN	DEPTHS	5	S	F C R C			٦
(REF. LINE TO TOP OF	START OF RUN	1	2	- 3				$\overline{w}$	THICKNESS	T	TYPE	F	FR0	M COL	LAR (M)	0		A N C F		FF. GLE INIT	гLS
HOLE LINE)			2	5	ITPE B		DIP	H	(0.1.)		3	19		85	193	4	ON	( -	5	S	0
-16,55	00.07	L1M12	H, Y,L	1 1		072	27	$\square$				<u><u></u> (41, 5, 17)</u>	1				N	1	3		
	0,0,0,4/			<u> </u>	15,00	0,00	27	. 5	0,0,0,0	1		1-1-1	1.				1	1	2		
	0101.1218	<u> </u>	i	- I - I	13,011	1,7,6	5,1	N	$O_1 O_1 \bullet_1 O$			1 1	1.				10		1		
	0101.01515		<u>_</u>	1 1	6 7 7	-1-1	27	1		+		<u> </u>	1-1			1 1 1	N	12			
· · · ·	01010156	<u> </u>		<u> </u>	1201	7.4	1 180			+		<u> </u>					A.2	1 -	3		
i i i	00.011	1		1 1 - 1 -	531	1 60-	175		0101-10	$\pm$	<u> </u>		1.		<u>_</u>		N	1	3		
	011.1.15	1.40 1		1.1	1321	<u>102</u>	165	. 3	0101019	Ŧ	×1 1	1	1.		7		1.545				
	al1.1		V.	L L		1 1	1	N		+		16		25	19 2	L. Y	n				
-,2,5,5	0,1, . 5,5	5 M 3	HFL	1			12/	10	- 1 · • 1			V C.	7	96	194	9	() AS	) -	7		
F. 3.4.0	0.005			1 1	55	01.91	26	-	QC.		1	1.4.	2	40		1.	LA LA	17	7		
<u> </u>	0.025		<u> </u>		5,01	5 67.6	200	-	60.		~		1	_		1.	A	5	7	-	-
	0.0	1	- I I	1	1517	51.0.0	3 26		2010				+ •				N	1-	2		
I	6.0 5.4	1 1	<u> </u>		25	4 4	5 1 7		QPIN	7	<u> </u>	1	1	1 1	L		A	1	7		
	0,0,0,6,6			<u></u> ii	15 D	2 7 1 8 7	20		00.07	$\frac{1}{2}$		1 - 1 - 1	1		<u> </u>	1 • I	1 IN	1	2		-
F.3.40	00.78		- L	1 1	551	56,6,6	50		00	-	N	1.1	1.01	_	<u> </u>	V	1 /	1	-		-
	0.07.4	,V,				1.1	1 -	N	1 1 • 1	+		1 6 3	×1 • 1 Z	UN	Tab	1.1.	0.			1	-
	0,1,.,5,0	LMG	AL F	1 1	- I			R	1 1 • 1	+		191	<u>~</u> _	40	196	U.	0				-
	00.00	N. N.	1.12				-	N	1 1 • 1	+			1	40	110		1.2				-
	0,0,.9,4	LWJ	HEL	<u> </u>	1			N	1 1 1 1	+	<u> </u>	1 1	1.	1			1	1	1		-
-2,80	0,1,.,0,0	12,11,7	H.B.K		551	95,0	240	+	0,0,.,	1	11		1	,		1.		1	1	1	-
	6,1,.05	11			FT I	D 4.4.	644	+	0.()	2	L.C.				1			11	Y	-	
1 1/1-	0,1,.,20				50		245	-		-	N	1 1	1		IV	1.	1	1	7		
1	0,1,.3,7	1	1	1 1	55	46	165	-	00.0	$\frac{1}{2}$		1 6	<u>•</u> ••	90	161	1.	15 N	1	2.		-
-2,8,6	6,1,.,4,4	ILM.S	H, F, L		5.5	5 2.9.	237	-	10000	4	~	1.7	1	110	198	B	0		-	1	
	0,0,0,0,0			1-1-		k i i		1.	1.1.01		1 1	14.10	6	-1.3					_		
	MISCEL	LANEOUS	5		ROC	K TYPE	ABBR	EVI,	ATIONS	S	STRUCT	URE TY	PE /	ABBRE	EVIATION	IS FI	LLING	AE	BRI		INS
REF. ANGLE	"+" FOR TOP EN	D OF CORE	, "—" FOR	BOTTOM				÷.		SJ	SINGLE	JOINT	FO	FOLI	ATION	N	NONE		P	SERPEN	TINE
T/B	TOP OR BOTTOM	END OF FR	ACTURE							VN	VEIN	2	1	1		X	OXIDE		T	CALCITE	
N/W	N-NON ORIENTAE	BLE W-WHO	OLE CORE					5		BD	BEDDING	;		÷		S	SULPH	IDE		1. 1. 1.	
SLIC	SLICKENSIDES -	YES OR NO	)	1.7						СТ	CONTACT	Г				L	CHLOR	ITE			-
FRAC	1-Natural 2-Maybe	e (Natural or	Mech.) 3I	Mechanical						FT	FAULT					Q	QUART	Z			
CONF	CONFIDENCE - 1	I-Poor	. 4-Excelle	ent			-			FC	FAULT C	CONTACT		1.6		C	CLAY				
DIFF. ANGLE	ANGULAR DIFFER	ENCE BETWE	EN TOP L	NES		30		. × 11		SZ	SHEAR	ZONE		6 - F.		A	ANHYD	RITE			
CALL &	NICHOLAS	INC		file: o	core form	toro11-m	.dwa		¥1.										A	RAN/A	¥7U

PROJECT	Aranzaz	zu			ITEI		ORE	EAF AS1	DATA RING		SHE		(ME	G/23/17 N	PA	GE	BY DI	0 541 4.	F _3   ZAO- HQ3	
HULE NO.	20.0					TOUCTU		N	FILL	NC	2	וח	RILL RUN	N DEPTHS		S	F			
REF. ANGLE	DEPTH FROM START OF RUN	RO	CK IYE	۴Ľ	5			7	THICKNESS	T		F	ROM CO	LLAR (M)		나는	A	V DI	FF.	
TOP OF HOLE LINE)	(M)	1	2	3	TYPE	B CIRC. AI	NG. DIP	W	(cm)	L	TYPE	FRC	M	TO	0.0	С	CI	AN	GLE INII	LS
	0,1, .5,5	LMST	C SK	1 1				N	<u>. 1 1 • 1 °</u>	╞	1 1 -	1.9.61	. 45	198.	00			-	1. 631	Sund.
	0,0,.0,0	ESK		1 1	-1		-	N	1 1 • 1	╀	<u> </u>	140	• 00	1.7.	315			+		
	00 4.1		1.1	1 1		- 2	3 2 2	(V	00.3	-	- C'	<u> </u>	• [			N	17	•		
-3,5,6	00.42		1_1	<u> </u>	DI	231	5/11		0,0,0	1	-121 1		••••			N	1	3		
1 1 1	90,0,2	1.1	1 1	1_1_	2.5	071	725	⊢	00.0	1	-1 -1 - 1 - 5-					N	1	3		
	0,1,.0,>		1	I	BD	521	576	┢	0.0.2	K			• • •		( ) (	N	and in	3		
	0.110	- 1 1			50	1 0 0 T 1 7	315		0.0.1	T			•			N	1	3		
i abi	01.13		1	1	45	BION	-160		0.0.0.0			V.	• 1 1	V		2		3	1	
-2 -1	UNI-DI	CCV/			35	TIT	267		00.0	n iu	/ /	198	.06	199.	5	SN	1	5	1	
1226		EDIK	<u>· I I </u>		100 A			N		T	1 1	1,9,9,	. 50	2011.	,00	5		-	1	
No.	01.50							N				1,9,9	.,5,0	2011.	O.	5	1.	-	1	1
11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	DD AD	BRX						N			· I – I	2011	. 0.6	202.	5	5	22		1	-
	01.55	BRX			GS.	B.		N		1	1 1	201	.00	20.2.	55	5	-	2	1	
-1.7.6	00.24	8. 5. K	1 14		SJ	B18	228	<u>,                                     </u>	00.7	_	$C_{1}S_{1}$	202	.55	20,4.	16	NC	(	>		1
	0.0. 3.8	1.1	1 1		55	TOR	040		0,0,	(	65.	. 5	•	1.4.0	1 1	N	1	2	.1	-
-1.7.5	01.55	EGK	1 1	1 1	ST	TQL	46.8		0.0.0	4	N	202	.55	20.4.	<u>ili</u>	ON	C	2	-	1
-3.0.8	00.08	ESK	1	1.1	SIT	BQY	877	T	00.00			2,0,7		40.5.	161		2	2	1	-
*	00, 4,7	1.	1 1	1 1 1	55	323	16.7	1	00.00		N	10	1.0	700		N	27	2	1	1
-30.8	0,1,.,1,9	ESK	1 1		SJ	TUS	75	-	0,0,.,0	4	N	20.7		707	101	2	C	-	20	1-
Si ila	0,0, .,0,0	ESK	1 1				1 1	h	1	+	1 1	40,5		767	1	D		-	25	-
···· [ ] ] ]	0,1,.,5,0	ESK				2011	111 0	h			/	10,7		208	6	5 1	1	2	15	-
	00.90	ESK	1	1 1	33	209	919	-	00.01	4		708	15	210	0	SN	i	31	5	
5/16	90.12	45.K	1_1_1		75	6 44	8 50	+	6.6		5	708	-65	7.1.0	. 1.	SN	2	3	15	1
, 1, 1, 6	0,0,., 2,9	ESA	1		155	140	160		0.0.0.		1 1	000					AF	ומסמ		INIC
10.1	MISCEL	LANEOUS	1	1 200	RO	CK TYPI	E ABBR	EVI	ATIONS	S	TRUCT	URE TYP	E ABBR	EVIATIONS	FIL	LING	At	SRKI		TIME
REF. ANGLE	"+" FOR TOP EN	D OF CORE,	"" FOR	BOTTOM			24	-		SJ	SINGLE	JOINT	FO FOL	LATION	N	NONE	1	P T	CALCITE	TINC
T/B	TOP OR BOTTOM	END OF FRA	ACTURE						<u> </u>	٧N	VEIN		-		X			-	CALCITE	•
N/W	N-NON ORIENTAB	LE W-WHO	LE CORE	-				-	E	3D	BEDDING				3				1	
S⊔C	SLICKENSIDES -	YES OR NO						-			CONTAC				0	QUART	Z		1	
FRAC	1-Natural 2-Maybe	e (Natural or	Mech.) 3-	Mechanical				-		FT	FAULT	TATIACT			C	CLAY	1			104
CONF	CONFIDENCE - 1	-Poor	4-Excell	ent			Presenter des			FC	FAULI C				A	ANHYD	RITE			
DIFF. ANGLE	GLE ANGULAR DIFFERENCE BETWEEN TOP LINES					1				32	STICAR							A	RAN7A	471

CALL & NICHOLAS. INC.

file: ocore\_form\_toro11-m.dwa

REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)    DEPTH FROM (M)    ROCK TYPE    STRUCTURE TYPE    N FILLING (m)    FILLING THICKNESS (m)    DRILL RUN DEPTHS FROM COLLAR (M)    S I A N    F C A N    S F C C    F C C    C C    C    C C    C    C C    C    C C    C <th< th=""><th>-A0 -IQ3</th></th<>	-A0 -IQ3
HOLE LINE)	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	550
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	\$
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	550
$\frac{1101}{1101} 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 $	1
$\frac{1}{1000} = \frac{1}{1000} = \frac{1}{1000} = \frac{1}{1000} = \frac{1}{1000} = \frac{1}{10000} = \frac{1}{10000000000000000000000000000000000$	
1. 0.9. 90 ES.M	
717.60.213.70	and the second
	and the
	1
-34600,38E51 55113879 000 N, 212,6021,3.20N2C,	50
DO, DO 1 21,3,.20 21,3,.90 1	1
DD 36 KGX 21,3,90	1
-73600,4689K 57827068 00. EN, 21,3,90215,45 NZ3	- Jim
00-58 H 55825396 00 0 V 1101 NZ3	1-1
-73601 40K5V 55735453 00.45 313.402615.45N13	115
20.00 FTT 1717 N 215.45217.00	
-19501 D7 1 FTT 7547 80.05CL	- 1
V 01 31 V 57805050 00.0 N V N3	1 .
-19501 47EGK STB10774 00, 165 415, 45217,00 N23	-
N	
01,55 × 6 × B R X N N Z1,7,00 Z1,8,55	-
N 11 218,557,20,00	1
01.05 C51 BRX N N N Z18.55 ZZ,0.10	
DOCK TYPE APPRENIATIONS STRUCTURE TYPE ABBREVIATIONS FILLING ABBREV	IATIONS
MISCELLANEOUS RUCK ITPE ABBREVIATIONS STRUCTURE THE ABBREVIATIONS INCLETION N NONE P SE	RPENTINE
REF. ANGLE "+" FOR TOP END OF CORE, "-" FOR BOTTOM	ALCITE
TOP OR BOTTOM END OF FRACTURE	
N/W N-NON ORIENTABLE W-WHOLE CORE	
SUC 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	AN7A7U

PROJECT	Aranza	zu O	RIEN	ITED	COR	RE	Ľ	)ATA		SHE	ET	(M	E	Γ.)	PA	GE _	2	5	OF_	31
LOCATION .		INCLI	NATION	A., 7 17 18		BEA	ARII	NG	-		[			6121	/17		R R	Υ ιλ	HQ	23
HOLE NO.	G-HP-GMX	NORT	HING			EA:	SII	NG	_			LEVA	nor	N			F			
REF. ANGLE	DEPTH FROM	ROCK TYP	ΡĒ	STR	UCTURE	Ν	۱	FILLI	N	G	[	ORILL	RUN	DEPTHS		L	R	õ _		
(REF. LINE TO TOP OF	START OF RUN	1 1 2	3				N <sup>-</sup>	THICKNESS (cm)		TYPE	FR	OM			0		A C	N L F AI	NGLE	INITLS
HOLE LINE)	()	K C H B D V	0	CAA	01 4 2	5		00.0	1	U.	21.8	.5	5	220	.1.0	N	1	3	1	SD
5108	1.06	ESADICX		SPI	7342	37	Ľ	10.7	1	U						N	1	3	1	
	1.4.4.4			STI	005 4	16		C>0 7	C	25	4	9		4		N	(	3		
100	1	1 1 4	1 1	STR	1474	5		20.0		)	710	5	-5	220	• 1.0	N	t	3		
-1.00	1. 50	ESIKBINIX	1_1_	STR	7472	37		20 1	<	5	220		0	221	. 6.	TN	(	3		
- 40	60.09		- I - I	STR	1001	10		00.7	1		720		0	221	.6	5. N	2	3	1	SD
-1.40	60,0,22	V ZIC DICA	1 1	1,50	1,5,00	10		0,0,0,0	ł		771	6	5	2.2.2	.25	-			1	
<u> </u>	90.00	ENN	1 1	<u> </u>		1	2		Ŧ		221	. 16	5	22.2	20	-			1	
1 1	00.00	YSK I	1 1	SAF	1054	-	1	00 0		<u>,                                     </u>	772	. 7	5	7.2.3	80	SIS	2	3		1
-,6,18	0,0, , 44		<u> </u>	STR	2023	39	-			5	777	. 7	5	7.7.2	.80	SN	1	3	1	-
-018	0,0, •, 6,6	V.S.K	1 1	3,7 9	40,50	1	1	-P1-1	十		713	. 8	6	22.5	.30	>	-			-
	00.000	141	1 1 *	1		1 N	1	R V Y	t		27.2	9	30	22.5	.30	2			1	
0.20	01.070	EJK	1 1	158	IATL	12	~	00	2/	N	77.5	3	0	22.6	. 8	5 N	1	2	1	1
-039	00.117		1 1	SUD	0694	1 U		00.0		N	1	1.10		. ).		N	1	Z	100	
	0,0,.,5,6			5) 9 6- R	0.237	20			- 0	5		1	1 -			N	7	2	and an	
	0,0, .4,5			2212	3 0	10	ť	00 7	2 0	<u> </u>	1 14		-	4		N	I	4		
1 7 1	00.0.63		1_1_	200	1277	72		00 7	1	5	775	3	0	726	. 8	SN	2	9		
-0.39	0,1,0,2	E, J,K		2013	221-	12	×	00.0	~	211	776	8	55	279	4	ON	Z	4	10	See and
-0,22	01.55		1 1	531	2.6.8	73			2		44,4	1	1-	- L		N	2	4	10	
1	61.43		1.1	307		2 1	-	00.00	1		776	. 0	0	778	4	OA	3	Lf	10	and start
-0,62	01.53	V.S.K		551	8,8,0,9	00		0.0.0	-	N	17.0	1.0	10	774	9	SN	2	4	06	
-089	6.040			255	0.6.7	614	-	0.0.0.0	4		444	1 • 1	10	441	1.	1	1	Y	0.6	
· · · ·	0.0, ., 6,5		1 1	331	1261	1.0	-	00.0.0	1	N	770	· ·	101	776	G	2 A	1	L	06	Decision.
-,0,84	0,0, . 92	EYN	1 1 -	SJIS	1,204	10	-	0,0,.,0		NI	779	) • II G	40	731	4	CA	11	4	20	
-1.8.8	0.06.4			201	1644	16	-	0.0	1	NI	77.4	4	15	731	4	SA	1	Y.	0.8	
-188	0,1,06	ES, K		200	10,11	1,0	-	0.0		N	90,1	1.	1	9511		~			-	TIONO
3	MISCEL	LANEOUS		ROCK	TYPE AB	BBRE/	VIA	TIONS	S	STRUCT	JRE TYP	PE AE	BR	EVIATION	S FIL	LING	A	BBK	EVIA	TIONS
REF. ANGLE	"+" FOR TOP EN	D OF CORE, "-" FOR	воттом					S	SJ	SINGLE	JOINT	FO	FOLL	ATION	N	NONE		P	SERF	PENTINE
Т/в	TOP OR BOTTOM	END OF FRACTURE			•			V	/N	VEIN			135		X	OXIDE		T	CALC	RE
N/W	N-NON ORIENTAE	BLE W-WHOLE CORE	1993 A	· .				B	3D	BEDDING					S	SULPH	IDE	-		
SLIC	SLICKENSIDES -	YES OR NO					-	C	СТ	CONTACT				•	L	CHLOF	RILE	-		
FRAC	1-Natural 2-Maybe	e (Natural or Mech.) 3-I	Vechanical				1	F	FT	FAULT	1	1	12		Q	QUART	Z	-		
CONF	CONFIDENCE - 1	-Poor 4-Excelle	ent			1.4.4		F	FC	FAULT C	ONTACT				C	CLAY		-		
DIFF. ANGLE	ANGULAR DIFFER	ENCE BETWEEN TOP'LI	NES					5	SZ	SHEAR 2	ZONE				A	ANHYD	RITE		1	
CALL &	NICHOLAS.	INC.	file: o	core_form_	toro11-m.dwa													'	ARAN	1/A/U

PROJECT	Aranza	zu	OF	RIEN	ITED	CO	RE		DATA		SHE	EET	(ME	T.)	PA	GE	26	541	DF	<u>&gt;</u>
LOCATION .	CUP Co	N-244	INCLIN				_ BI	FUH VUL	RING			L		DN	÷ /		DI	A	HQ	3
HOLE NO.	_6-m- em	XUT	NURT													S	F	C		
REF. ANGLE	DEPTH FROM	RO	CK TYPI	E	STF	RUCTURE	-	N 			5		FROM CO	DLLAR (M)			R (	O N D	IFF.	
TOP OF HOLE LINE)	(M)	1	2	3	TYPE B	CIRC. ANG	DIP	ŵ	(cm)	ľ	TYPE	FR	NOM	TC	)	Ċ	C	FAN	IGLE I	NITLS
-1 45	0,0,.25	ESK		1	SJB	3,29	45		0,0,0,	1	5.	231	45	2,3,2,	.15	N	1	7	1	212
ų,	6,0,0,7,7	17 I			SJT	26.9	51	1.00	001	-	<u></u>	771		1777	•     G (	-N	1	1	-	4 D
-1,45	0,1,.76	ESK		1.51	SJB	21.7	3.4		00.1	1	>	451	1. <u>1</u> ) G -	6,5,4	• <u>•</u> • <u>•</u> • <u>•</u> •		1	37		
1104	0.067	ili		I	SIT	011	37		00.0	3		2210	1.7.5	135	G	E	1 .	-		-1-
1 1 1	0,0,.,0,0				1		i	W	· · · ·	+	1	634	· 95	423	•   .   . G. I		-	+	+ +	
Se de la	0.1.155	1 1	1 . 1	1 1			1110	60	1 1 · · ·	7		230	1.512	6727	• 1 11 1		1	2 :	2A	
-0,40	00.132		1 1		551	0,1,6	40		00.00			6,5,5	· 10	4714	• 1 1 1	AI	1	2	3 R	
	0,0,.,58	. P.	Transfer 1		5,5B	0,7,5	14.6		0000		-1914-		1.	1 1 1	• 1 1	AT	1	5. 3	30	
	0.0 8.2	EXK	1 1	1 1	5,57	93,3	50		0,0,0,	1	C	1 1	1•1 I	1 3	•		1	2:	20	
	0,1,.,1,6		1 1	1 1	SJB	1.5.1	68	-	20.01			727	1 · 1 · 1	-727	•	611	1	7	2	
0,400	01.25	ESK	1.1	1.1.	557	0,4,0	50	-	00.	-	GL.	72-		728	9	22	1	7	210	
+,1,6,6	0,0,0,2,4	1.1.	1 1	1_1_	551	1.8.2	68		0,0,0,0	2	-151-	60,1	· · · · ·	10,20	• 1 8 1	2 /0	7	7	-	
	0,0, .,6,6				SJB	3.2.4	68		001.1	위	N		1.1	1 1	• • •		1	7	1	
	0,1,.18			1.1	57515	49.4	41		00.07	7		1.14	1.	1-1-1-71	•		1	7		
4	0,1,.,2,6	17.	1 1	1 1	SJT	28.9	6.7		0.0.01	2	<u> </u>	72-	7 410	729	• 1 1 9	CN	7	7	1	
+1,6,6	01:37	ESK	- i i	1.1.	555	0,1,0	5.2		00,0,	1	UI I	720	0.0	740	L	CN	2	7	-	
+,2,0,0	00	1.1	· ·	1 1	553	125	42		00,01			42,0	<u>• • • • • • • • • • • • • • • • • • • </u>	410	• 1 1	2	1	7		
1	0.07.9	14	1 1 .	1	SIF	2	146	-	0,0,.,	2	<u>C</u>		<u>1 • 1 - 1</u>		• • • •		7	7	1	
	0,1,.0,7	7			351	10,2,6	143	-	00.00	4			7	1 1	•	10	C	4	1	
1	01.08	111	1 1		1			~	1 1 1 1	-	<u> </u>	720	9:	740	• 4	3	12.3		- 1	
+,2,0,0	0,1,.,5,0		1 1				1	100	1 1 • 1	-	<u> </u>	74		747	- 6	6			<u> </u>	
	0,0,0,0,0		1.1			1 1	1	N	<u> </u>	-	1 1	740	> 40	747	0	0				Page -
I	01.55	2	1.1	1	1			P	00	1	<	747		742	5	04	1	4	00	
- 106	00.25		1.1	1	550	1145	26		00.	17	211	74-		5242	5	ON	1	41	00	
-, 1,0,6	0,0,.,9,1	ESK			TC, C	00,5,6	163		00.01	2	C. I	1-11								TIONIC
	MISCEL	LANEOUS		1	ROCH	K TYPE	ABBR	EVI	ATIONS	5	STRUCT	JRE TYP	PE ABBI	REVIATIONS	S FIL	LING	At	BRK	EVIA	TIONS
REF. ANGLE	"+" FOR TOP EN	ID OF CORE,	- FOR	воттом		2.9.90		-		SJ	SINGLE	JOINT	FO FO	LIATION	N	NONE		P	SERP	ENTINE
Т/в	TOP OR BOTTOM	END OF FR	ACTURE							VN	VEIN				X	OXIDE	-	T	CALCI	IE
N/W	N-NON ORIENTAE	BLE W-WHO	LE CORE					1.1		BD	BEDDING				S	SULPH		-	1	
SLIC	SLICKENSIDES -	YES OR NO								СТ	CONTACT	1			L	CHLOR		1		
FRAC	1-Natural 2-Maybe	e (Natural or	Mech.) 3-M	echanical			Stand 4			FT	FAULT		-		Q	QUART	۷	-		
CONF	CONFIDENCE - 1	-Poor	4-Exceller	nt				t		FC	FAULT C	ONTACT			C	CLAY	DITT		1.525	
DIFF. ANGLE	ANGULAR DIFFERE	ENCE BETWE	EN TOP LIN	IES		Marine St.				SZ	SHEAR 2	ZONE			A	ANHYD	RITE		DAN	74711
CALL &	NICHOLAS	INC		file: o	core form	toro11-m.	dwa											4	ARAIN	ATU

PROJECT	Aranza	zu		RIEN	ITEI	DC	ORE	FAF		1	SHE			6/24		GE	BY	_ OF	A0-
HOLE NO.	GHP- GMX-	04	NORT		¢1	8	E	AST			-	E	ELEVATI	0N			DI	۸ <u>.</u> ۲	HQ3
REF. ANGLE	DEPTH FROM	RO	CK TYP	E	S	TRUCTU	RE	N	FIL	LIN	G		DRILL R		5	S L	F C R C		1
(REF. LINE TO	START OF RUN (M)	1	2	3	TYPE	T/ B CIRC. AI	NG. DIP	w	THICKNES (cm)	s	TYPE	FR	OM	ULLAR (M	0		A N C F	ANGL	E INITLS
	00.55	FSK			5.5	T 0.6	238		00.	20	$C_1S_1$	2,4,2	1. 90	243	1.50	N	1.	100	550
+1.24	00.04	1210			VN	T 21.	329		Q1.	5	5	24,3	.50	>245		N	14	1	-
4131011	00.50				35	T D.Y.	762		00.	U	N		1 •			N	1.	-	
7	20.83	7			5.5	120	626	-	90.0	2	N	7		1		N	1-		1
+117 4	00.96	ES.K			55	6 34	740		0,0,.	1	MA	24,3		524,5	1.65	N	1	1 .	
	00:97		Samp 1					2	Б. Г.• 1			, t		4				-	
	01.55	86.X			6	_		N				2,4,3		2,4,5	1.05	5		-	
1000	00.93	E. S. K	PPB		VN	324	6 3,8		01	5	5	24,5		52,4,6	1.5	5 10	1	5 .	
-048	00.52	PPB		5	UN	TIO.	6.37		00.	1	5	246		5248	L.C.	SN	1	5 18	
	00 65		10 12 M	-	5.5	TOZ.	437	1	0,0,0,0	Z	N	1		1		N	1	518	>
	00.79		1.		55	BIU	746		60.	53	T					A	1	51	pare -
1	66.85		1. 18	1.201	ST	T06	6 37		00.0	2	NII	1		1 1	1.	N	1	3 7.	
-048	01.07	PPB			VN	BLZ	564		00.	4	SII	246	. 5	5242	and the	2N	1	3 14	5
-025	(71, 13)	PPB		1000	UN	TQY	925		90.	5	Tim	24,8	». • . L.	02,4,9	1.6,0	DN	(	40,	3
	00.00	1.	1					w		-19		249	1.61	0251	1.14	>		1	- Carlos
	01.55	C.P.B						W				24.4	1.6.	02,5,1	1.1.	5 0		-	- 1
TODD	00.84				ST	T19	042		00.	0	N, I	125	1, . 1,	52,5,0		ON	2	411	0
TOPP	00.00	1.10		1			120	N				25,2		025,0	19	S	84	1	
	00.97	T	1.225					N	1	1		11		7	1.1.1			- 1	1
12000	01.38	PPB			55	TOZ	YGL	1	00.	0	N	2,5,1	4.5	かてらい	1.0	SN	-1	3 .	513
- FICIOLO	00.00	1.						V		1		25,	1,0,0	525.5	51	5			S Mart
	010100	PPB					1	1h	1	-	1	2,5,4	1:0	525,	5	5		1	1
	00 51	L			VN	TRIL	220	13	00.	5	TI	75,5	51	5256	,.,7;	UN	1	3.	1
	00.80	PPB	1.1		5.5	30.8	8 85	-	00.	C	N	2,5,5		525,6	27	ON	3	5,	
-074	00.93	A CL			55	TOO	935		0.0.	0	N	2,5,6	···. 7.	0 75,6	3	5N	L	21	
			2		DO				ATIONS		TRUCT	IRE TYP	PE ABB	REVIATION	IS FIL	LING	AB	BREV	IATIONS
	MISCELI	LANEOUS			RU	UN TIFE	ADDR		ATIONS	51	SINCLE		FO FO	OLIATION	N	NONE		P SE	RPENTINE
REF. ANGLE	"+" FOR TOP EN	D OF CORE,	"-" FOR	BOTTOM						VN	VEIN				X	DXIDE		TCA	
'/B	TOP OR BOTTOM	END OF FR	ACTURE					1		BD	BEDDING	• *		100	S	SULPHI	DE		
N/W	N-NON ORIENTAB	LE W-WHC	DLE CORE				2010-1	-		CT	CONTACT	1	2	Sec. 201	L	CHLOR	TE		
	SLICKENSIDES -	TES OR NO		4			C STORY	-		FT	FAULT			1.5	Q	QUART	z	12	
FRAC	1-Natural 2-Maybe	(Natural or	Mech.) 3-1	Nechanical					12.00	FC	FAULT	ONTACT		1	C	CLAY-		2	
CONF	CONFIDENCE - 1	-Poor	4-Lxcelle			100 - 1 - 5 - 5 - 5 - 5 - 5 - 5 - 5 - 5 - 5			No. 1	\$7	SHEAR 7	ZONE		de la	A	ANHYD	RITE		a la serie de la s
DIFF. ANGLE	ANGULAR DIFFERE	NC BETWE	EN TOP LI	file: or	core for	n toro11-	m.dwa	-	-	1.02					· ·	15.5	5	ARA	N7A71

PROJECT	Aranza	zu	0	RIEN	ITE	D (	CO	RE	- • •		4	SHE	EET	(M	ET.	)	PAGE	28	5 Fals	OF	<u>5 (</u> 0 <sup>-</sup>
LOCATION	(-110- (-M)	1-04	INCL		in the second	2 -		Bt F/	Ar 4.ST	TING			L					_ C	DIA.	HQ	13
HULE NO.	Green Green		NUKI									0				EDTUS		SF	С		
REF. ANGLE	DEPTH FROM	RO	CK TYP	Έ	S	TRUC	IURE			FIL		G	l	FROM	COLLA	R (M)			0 N	DIFF.	
TOP OF HOLE LINE)	(M)	1	2	3	TYPE		. ANG.	DIP	ŵ	(cm)	55	TYPE	FR	ОМ		TO		C C	FA	NGLE I	INITLS
-0.2.0	0,1,.1,2	PPB		1 1	55	TO,	201	4,8		00.	0	N	25.8	. 2	52	5.9.	80	NI	3		SD
	0,1,.29	5			50	BZ	6,6	6,4		0,0,.	01	0	1 0	7.	- 7	1 4.	0.0	NI	2		
-0,20	0,1,.47	PPB			SJ	B.I.	6,2	3,8		00.	0		258	. 2	54	5.7	20		2		
- 26,8	0,0,0,6,6	ile	1 1		5,5	BU	5:0	5,0	_	00.	01	J	45,7	· · · 8	OL.	0,1,.	27	NI	2		
-268	6.1	1 1	1 1		55	14	0,0	1.6	-	0,0,.	01	~	25,7	• 0	0 4	211-	20	NI	~	-	
	0,0, •,0,0	7		1:1			-	-	N		-		46,1	1.0	22	6.4.	28				
1. I. I. I.	0,1,0,0	PPB	- Contra	1.1.	1			1	2	· · · ·	4	1 1	261	2	24	6 4.	1212				-
	0,0,0,0,0	J.	1			1	1		N			1 1.	212	2	57	6.3.	10				
	0.0 75	r, PB			1-	+ 2	11.	27	$\sim$	( ) ( ) ·	-		46,6	1.12	57	6 4	15	NI	4	-1	
-33.8	0,1,0,6	1.1.1	- India	1 1	22	15	4,6	01		PP.	2	N	263	• •	07	6.4	65	NT 7	N	1	
7338	01.49		1 +1	1 1	23	BU,	17	21		0.0.	U U	D.C.	1/4		51	66	70	NI	5	03	
-314	0.113		<u> </u>	1 1	VN	1 C	4.1.	26		0,0.	1		714	1.6	57	66	70	NI	Y	03	
-31.4	01, 44	P.P.D	<u> </u>		5,5	DL	10	70		0.01.	0		261	1.10	07	67	75	NI	4	13	
- 2.7.6	0,1,.,21	1	1 1	- L - L -	27	100	21	60		0.0.	2	<	716	7	07	67	75	101	4	13	1.0
-3-96	01.94		1 . 1	1 1	23	DL	011	6,1		0.0.	2	CI S	767	7	57	69	30	NI	3		
-0 8,9	00.11				2)	TOI	210	4.9		00	7	(1 c	- 0,1 -	1.1	10	4	1-1-	NI	3		
1 1 1	0,1,0,0,0		<u> </u>	1.1.	27	22	35	42		00	2	N	767	7	52	6.9.	3.0	NI	3	1	
- 6 8 9	01.07	1,1,17		1 1	50	400	A V	22	$\vdash$	00	0	N	269	3	07	7.0.	85	NI	3		
-1,44	0.0.87		<u> </u>		11	BO	4 3	10		00	4	L	1			J.		41	3		
	0,0,0,9,0	ppg	1 1	1 1	DID VIA	5	4	35		00	5	TIS	269	. 3	02	7.0	.8.5	N1	3		Sis a
	000 48	11.2	1.1	1 1	ST	TO	29	55		00	0	N.	2.7.0		57	7.2.	ELO B	NI	2	36	
-0,70	01 21		<u> </u>		27	NI	37	39	1				2.7.0	2.8	52	72	K O	NI	5	36	
		PPR	1 1	<u> </u>	57	R ?	90	50		00	.6	N.	271	6	102	73	90	NZ	1	99+	27.
1, 1,0	100 00	1110	1 1		112			510					27.3	3.9	02	75	95				
	100.00		1 1					DDDI		ATIONIC		TDUCT			BREVU	SNOITA	EILL	NG A	BBF	REVIA	TIONS
19.1	MISCEL	LANEOUS	-	2	RO	CKI	rpe a	BRK	_VI/	ATIONS		SIRUCIO		L AD	FOLIATIO	N	N NO	NE	P	SERP	ENTINE
REF. ANGLE	"+" FOR TOP EN	D OF CORE,	"-" FOR	BOTTOM		-			-		SJ	SINGLE C			TOLIANO		x ox	IDE	Т	CALC	
1/B	TOP OR BOTTOM	END OF FRA	CTURE	T		-										and the second	S SU	PHIDE			
N/W	N-NON ORIENTAE	ILE W-WHO	LE CORE				100	-			OT	CONTACT	-			1025-11	LCH	ORITE	3		- Alter
SLIC	SLICKENSIDES -	YES OR NO			1.5.2	-					ET	FALIT	ALC ST IN			1.18	Q OL	ARTZ		18.2	
FRAC	1-Natural 2-Maybe	e (Natural or I	Mech.) 3-N	Mechanical		2	-				FC	FAULT	ONTACT			N	C CL	AY	5	1.33	
CONF	CONFIDENCE - 1	-Poor	4-Excelle	ent		-				-	57	SHEAR 7	ZONE				A AN	HYDRITT			120-12
DIFF. ANGLE	ANGULAR DIFFERE	NCE BETWEE	N TOP LI	NES		-	1			-	132	SILAR Z	Lone			1 Agentes		1		ARAN	7471
CALL &	NICHULAS. I	140.		The: or	Jore_100		-m.uv	n u													

PROJECT LOCATION HOLE NO.	Aranza GHP- GMX-	zu - c4		RIEN	ITED	CO		EAR AST	DATA		SHE		(ME DATE	CT.) 6/25/17 ON	PAG	GE _2	G BYSU DIA.	OF_ <u>&gt;_ZA</u> HQ	3   0- 13
REF. ANGLE	DEPTH FROM START OF RUN	RO	CK TYP	Έ	STF	RUCTURE		N /	FILL		G	1	DRILL RI FROM C	JN DEPTHS OLLAR (M)		S F L R		DIFF.	
TOP OF HOLE LINE)	(M)	1	2	3	TYPE B	CIRC. ANG.	DIP	Ŵ	(cm)	1	TYPE	FR	OM	ТО		C C	; F /	NGLE	INITLS
r i n	91,.55	PPB			SIT	0,69	47	W	00.01	3		27,3	. 9,0	275.0	45	N	2		>P
-112	01.33	P.P.B			SJT	0,6,9	4.7		00.3	1		6,1,5	•	61,6.	1.3	> N	12		
-1.1.2	0,1,.,40		1.1	1.1	VNT	0,8,5	5,7.	-	0,0,.,	1	T	41,5	• 49	7770	115	NI	14	28	
-1,7,8	0017				5,513	1.8.4	54	_	0,0,0,0	21		446		- 4101.	136		1 4	79	
	0,0,.,5,5	1 1	1 1		VNT	1,5,4	5.5	_	00	4	21				l	NT	14	7 8	
1 7	00.0,7,9		1 1	1 1	5,515	07 /	40	_	0,0,0,1	-1	2				<u> </u>	10 1	19	28	
	01.09			- 1 - 1 -	5,77	1,50	57		0,0,0,		21-1-	771	9	5778	50		14	28	
-1.7.8	01.36	FF,B			530	1230	612		0011	0	NI	278		5780	1 1 1		14	20	
-0.66	00, 6,2	P D D	<u></u>		>,31	3,2,0	00		0,0,0,0		<	778	5	5780	()	NI	4	05	S. Sala
-0,66	011.16	1,1,1	. I. I	1 1	100	1774	50	-	00	5		780	. 0.	7.8.1	.50	SN	3	1128	
- 444	008.9			1 1	271	1790	01	vi				781	. 50	07.83	0	ON	13		
	0,0,0,0	2 2 2	<u> </u>	1.1.	213	2010		w	GON			2.81		52,8,3,	,0,0	C	1		186
2211	0,1,0,5,0	P P D			K TT	788	YN		00	T.	N.	283		0284.	5	SN	14	0,7	
PR	0.0	1			STR	781	53		00	5	N.	7.9.3	.0.0	>284.	150	5NI	14	0,7	dine.
7 5 6	0,1,0,0	DOR		1 1	STB	009	+7		0.0.	5	5.	28,4		52,8,6,.	10	5 N	14	06	S-133
-797	00.51				STR	310	17		00.1		LS	28,6	. 0	52.8.7.	,6,	SN	13	1,6	
	06 50				STT	2.4.6	55		0.0	I	LS			1, 4, .	1 1	N	13	1,6	
-7 97	00.97	PPB			5-8	3.5 2	5.4		0.0	0	N.	2,8,6	0	528,7,.	,60	SN	13	16	
	00.00							W				28,7	1.60	5 28,9,	, 1,	0	- 23	13	1.
	01.50			1.50			1.4	N	1			2,8,7		0289.	, [,	Ó		1.5	1
+ 2,8,8	0.6. 21			1.18	SJB	154	5,6	5	0,0,.,	O	N.	28,0	1	029.0.	,6;	5N	13	1,5	1
-	01.05	4			5,5 1	31,4,2	5,2		0,0,.,	0	N. I	1.10	1	1 2 1	<u> </u>	N	15	1,>	
+28.8	6.1.08	PPB		1 1	557	0,20	5,9		0.0.01	2	N,	28.	1 <u>. t</u>	0 49,0,	,6	SN	13	12	
	0,0,0,0		1		1		1	N	1			29,0		5 4,9,6.	. 1	S	1		N Star
	MISCEL				ROCK	TYPE	ABBRE	-VI/	ATIONS	S	STRUCT	JRE TYP	E ABB	REVIATIONS	FIL	LING	ABB	REVIA	TIONS
	THE FOR TOP FN	D OF CORF	"" FOR	BOTTOM		CALCULATION OF			¢	SJ	SINGLE	JOINT	FO FO	OLIATION	N 1	NONE	P	SERP	ENTINE
T/G	TOP OR BOTTOM	END OF FR	ACTURE							VN	VEIN	1 · · · ·			X	OXIDE	T	CALC	ITE
N/W	N-NON ORIENTAE	BLE W-WHO	LE CORE	84		C. S. S. S.	<i>.t.</i>	-		BD	BEDDING			1. A	S	SULPHID	E		100 M
SUC	SLICKENSIDES -	YES OR NO	(e. 1	C.A.					1	СТ	CONTACT	A Para	Sec.		L	CHLORITI	Ε		
FRAC	1-Natural 2-Maybe	e (Natural or	Mech.) 3-M	lechanical						FT	FAULT			and the second	Q	QUARTZ			N. A.
CONF	CONFIDENCE - 1	-Poor	4-Excelle	int			-		e .	FC	FAULT C	ONTACT			C	CLAY			
DIFF. ANGLE	ANGULAR DIFFERE	ENCE BETWE	IN TOP LIN	NES		12 3142	1		And A	SZ	SHEAR 2	ZONE	A	1000	A.	ANHYDRI	TE	1	
CALL &	NICHOLAS.	INC.		file: o	core_form_	toro11-m.c	dwa											ARAN	/A/U

PROJECT	Aranza	zu	0	RIEN	ITE	D CC	RE		DATA	Ĵ.	SHE	ET	(M	ET.)	PA	GE <u>30</u>	<u>)</u> 1514	)F 31
LOCATION	GHP-GMX	- 69	INCLI	NATION_	<u>1</u>		_ •B			-	199	U		ON 0103/11		D	Δ	HQ3
HOLE NO.			NORT	HING			_ E	ASI		-	-	<u>x</u>			-	SF	C	
REF. ANGLE	DEPTH FROM	RO	CK TYP	E	S	TRUCTURI	E	N	FILL	<u>IN(</u>	G	C	RILL R	UN DEPTHS		LR	0	
(REF. LINE TO TOP OF	START OF RUN (M)	s. 1.	2	3		CIRC. ANG		w	THICKNESS (cm)		TYPE	FR	DM				F AN	IGLE INITLS
HOLE LINE)	01 50	PPB						N		1		290	. 65	29,20	1 5	L.S.		SD
-146	00 67				5.5-	TO90	6.0		001	<	S.	2,9,2	. 13	529,3,.	7,0	ONI	8	
1	0.07.8		1 2 4 2		551	31,39	67		0,0, ., 0	>1	Ų,		•	· · · · · · · ·	1	NZU	B	
V	0.6 7.0	1		1. 1.	551	3 1 8 1	31		0,0,.,0	2.1	Ú.	4	• 1 - 1	*	_	NJ	B	1-1-1
-146	01.43	PPB			SJ	TOON	7.4		0,0,.0	2	)	69,2	• 1.	5 69 5	10	ONZ	6	1 1 1
-244	00,77			1	551	F141	6.8	-	0.0.0	2 1		293	• 16	249.5.	20	SNC	71	0
-244	611.10		E I		5,5	B348	5.7	1	0,0,.,	4	21	29.3	• 7	0 6,9 5,0	2	0 N 4	210	
-256	0.0.36			ar i	55	T 1.8.1	67		0,0,0	5 0		44,5	•	5 4 7,6, .	111	202	u e	217 -
	0,0,,73	4	i i i i	1 1	SJ	15 5,0,4	76		00.00	21	×	70-	• 1	79/	-	CN7	YE	24
-12,5,6	01.38	P.P.B	·	14	>12	8357	5,5		00.010		DE	295	•	5790	7	507	yr	4
20,4.8	- die lat	1º,0°, B.	- I - I		VN	1046	27	1				790	7 4	5799	8	GALL	41	.0
-092	00.51	0.00			5.5	DIC!	1012		00. 4		TIS	798	. 7 .	5799	9.	ONIL	8	0
-0.9.2	0,1,.,2,2	1,1,0	1 1 .		27	ID OZIE	EUU		00.0		11212	299	8	03.01	3	ONI	41	0
-155	61.4	000	1 1	1.1	5.5	TUTU	277		00.0	)	5	299	8	630.1.	3	ONZ	41	0
1135	6.1	I, I,D	1 1	* 1 * 1	1	1071	145	N		+		3.0.1	.30	30.2.	.8	5		Them the part
1 1 1	00.00		,		1			N		1		3.0.1	.3	0302.	, 8,	5		
-120	01		<u></u>		SK	BIZ	148		00.0	2	N.	3.0.2	.8	5304.	,3	SNI	40	2,5 1
- 1.74	001.116		1		L-	67.1	1 5.4		0.0.	0	N	304	.3	5305.	9	ONI	2	1
1 1 1	00.47		h l		55	BZYC	3.2		0.0.	0	N,	I T		1.	1	NI	4	
	00.99				NA	B1.64	13.7	7	00	3	TIL	Ser Pre			1	NI	SI	1 1
	01 05	4			35	T 318	34,6	>	00.0	2	NII	V V		7	1.4	NI	4	1 1
-124	01.46	PPB			5.5	T1,3,0	144	1	0,0,.	0	N, I	30,4	1.3	5305.	9	ONI	7	
-114	00.21	5			35	6026	63,8	3	0,6	0	L	30,5	1.9	036.7.	4	SNI	4	13 1
+114	00. 70	PPB		100	5,5	10,0,7	767	)	00	0	N,	36,9		630,7.	,4	SNI	41	1.5 1
	MISCEL				ROO	CK TYPE	ABBR	FVI	ATIONS	S	TRUCT	JRE TYP	E ABE	REVIATIONS	FIL	LING A	3BR	EVIATIONS
	"+" FOR TOP EN	D OF CORE	"" FOR	BOTTOM		JIX III L	1001.			SJ	SINGLE	IOINT	FO F	OLIATION	N	NONE	P	SERPENTINE
T/		END OF FRA	CTURE	Borrow			Line			VN	VEIN	- ~~ ~~ ~~ ~~ ~~ ~~ ~~ ~~ ~~ ~~ ~~ ~~ ~~			x	OXIDE	T	CALCITE
N/W	N-NON ORIENTAE	BLE W-WHO					and .	1.1	- Company	BD	BEDDING				S	SULPHIDE		
SLIC	SLICKENSIDES -	YES OR NO	4			1.15	and the second			СТ	CONTACT			Marine .	L	CHLORITE		
FRAC	1-Natural 2-Maybe	e (Natural or I	Mech.) 3-M	lechanical	1			1	1.1.10	FT	FAULT	1		R. A.	Q	QUARTZ		
CONF	CONFIDENCE - 1	-Poor	4-Excelle	nt					1.5	FC	FAULT C	ONTACT			С	CLAY		and the second
DIFF. ANGLE	ANGULAR DIFFER	ENCE BETWEE	N TOP LIN	NES				121-		SZ	SHEAR Z	ONE			A	ANHYDRITE		DANIZAZU
CALL &	NICHOLAS.	INC.		file: o	core_form	n_toro11-m.	.dwa										A	RANZAZU

PROJECT	Aranza	zu	0	RIEN	ITED	COR	RE	DATA	1	SHE	EET	( N	1E	1.)	PA	GE _B	31	OF	31
LOCATION			INCLI	NATION_			BEA	RING		đ		DATE		67261	/		BY		-/\U
HOLE NO.	G-14 P- GM.	1-04	NORT	HING			EAS	HNG	1.1	e.		ELEVA	AHOP	N					
REF. ANGLE	DEPTH FROM	RO	CK TYF	Έ	STR	RUCTURE	N	FIL	LIN	G		DRILL		DEPTHS		LF	२ 0		
(REF. LINE TO TOP OF	START OF RUN	2 1	2	7	<u>.</u> ⊻			THICKNES	s	TYPE	5						A N C F	ANG	
HOLE LINE)	(M)	200		5	TYPE	CIRC. ANG.			5	4.1	30	5	10	307.	4.	5NZ	24	1	SSD
-1.1.4	0.0 9,1	r r s	1 1		001	2668	7	000	01	2	30	5.9	20	30.7.	4,0	SNZ	24	1.	3
7114	01.02	PPD	1 1	1 1	SDIV	GGEI	7	00	0 1	V	30.	7.4	15	30.8.	92	5100	23	20	5
-7,0,6	00.11	1,1,15		<u> </u>	STR	3324	15	0.0	0	2		(				N	23		1
<u> </u>	00.26		1	<u> </u>	SKR	3581	26	0.0.	J,	NI. AL						NZ	13		1
	FILI-IO	7			CKR	6553	3.5	0.0.	00			7		Þ		N	(3	7	
-2 08	01.57	PPB			VALE	1431	5	00.4	Ĭ	IT5	30	7.1	1,5	3,0,8,.	95	N	1.3	20	þ i
-247	0015				STB	2471	41	00	Y	L.L.	30	8 9	5	3,1,0,.	50	N	14	11.	3
13141/	00 77				VALT	3.2.54	1.7	0.0.	70	Q,			1	1 1 1	1 . 1	N	14	11	3
<u> </u>	00 66	194	- L		STB	3.1.7 5	5.4	0.0.	0	N		. • .		•	1 1	N	14	1 7	1
- 3.47	AL 13	PPB			VNT	07.81	1	00.	5	QLS	30	8.0	15	310.	50	NC	19	12.	3
-055	00.70	PPB			SJB	0948	3.4	00.0	21	N	31	0	50	313.	6	NC	20	0	(
-777	0.0.87				SJT	2426	7.	20.	0	N	31	2.00	0,0	3,1,3,.	,5,	5NI	24	p.	0
	60 94			1.1	SJB	2,7,87	2,8	90.0	5	N		1.	_	· · ·		N	24	1	- Int
Å	61 06	2			SJT	1705	5.9	0.0.	0	N, I		V.	1	V.•	1	N	4		- 1
-277	01 37	P. P.B			VINB	2783	5.3	00.	1	5.	3,1	12	0,0	31.5.	5	Jal	14	0,0	
	00.00			1 1							3,1	3	53	315.	14	0	15	1	
	0.0 518	PPB	1.1.	1 1				)			3.1	3	5,5	5115.	, 1,	0	1	2 1	- 1
(FD)	0,1,.15	*	1	1 1			1				121.	<u></u>		- CTD			1		1
	01.25	PPB					-		_	1 1	5,1	5	2,5	315.	11	2	-	2 1	1.
	0,	P	1 1	En 1 - 1		1.1		· · · •	-	1	-	1 1 • 1	1	1.1.1.	1 1		-		1
		1 1 1	1 91	18.1		1 1	1		-	<u> </u>			1	1 1 1 •	1				
	1.1.	i i		* -1 T					-	1	-		1		1_1		-		
	i v•i i		<u> </u>	1 1	1	1.1		1.1.	-	<u> </u>		• .		• • • •	1.1				1
	1 1 1 1 1	1 1	1 1	1 - I - I	17		1					1 1 • 1	1						
-	MISCEL	LANEOUS	1.1		ROCK	TYPE AB	BBREV	IATIONS	S	STRUCT	URE T	YPE A	BBR	EVIATIONS	FIL	LING	ABE	BREV	IATIONS
REF. ANGLE	"+" FOR TOP EN	D OF CORE,	"-" FOR	BOTTOM					SJ	SINGLE	JOINT	FO	FOL	ATION	Ν	NONE		P St	RPENTINE
Т/в	TOP OR BOTTOM	END OF FRA	ACTURE			180			VN	VEIN	5 1	~~			X	OXIDE		T C/	
N/W	N-NON ORIENTAE	BLE W-WHO	LE CORE			en		-	BD	BEDDING		_			S	SULPHIC	)E		
SLIC	SLICKENSIDES -	YES OR NO			14				СТ	CONTACT	Г					CHLORI	E		
FRAC	1-Natural 2-Maybe	e (Natural or	Mech.) 3—I	echanical					FT	FAULT			-		Q	QUARTZ	_		
CONF	CONFIDENCE - 1	I-Poor	4-Excelle	ent					FC	FAULT C	ONTACT				C				
DIFF. ANGLE	ANGULAR DIFFERE	ENCE BETWEE	EN TOP LI	NES					SZ	SHEAR 2	ZONE				A	ANHYUR	IIE		NIZAZU
CALL &	NICHOLAS	INC.		file: of	core_form_	toro11-m.dwg	1											AR	ANTATU

## **ORIENTED CORE DATA SHEETS**

DRILL HOLE GHP\_GMX05



CALL & NICHOLAS, INC.

PROJECT LOCATION HOLE NO.	Aranza: 2000 L GHP-G-MX	zu -1 -05		RIEN	ITE	D	CO		BEAR		4	SH	ET	(ME DATE ELEVATIO	T.) 16/17 N	PA	GE	( B` Di	C Y IA	DF 個 HQ	DJR 13
REF. ANGLE	DEPTH FROM	RC	OCK TYP	ΡE	5	STRU	CTURE		N	FiL	LIN.	G		DRILL RU	N DEPTHS		L	R	C O		
(REF. LINE TO TOP OF HOLE LINE)	START OF RUN (M)	1 ]	2	3	TYPE		RC. ANG.	DIP	w	THICKNES (cm)	S	TYPE	F	ROM			- c	A C	F A	NGLE	INITLS
111	0.0.0	in the		1.1			l i		N					0,0,0,0	16,5.	7	6	-	-	-	
	1,65.,7,6				1				M	1.1.1.	_		1,0	0.0	1,6,5,.	7.	6		+		
	,0,0,0,0			1.	1				M		4	1 1	1,6,	5.16	1,6,8,.	.7.	5	-	-	-	
	,2, 8,5			-		-	<u> </u>		M		_		1,6	5 7.6	1,6,8,.	1	5 11	1		+ +	
-,0,7,2	2.87				53	150	15.0	69	Н	0,0,.,	0	A	1,6,	2 7.6	16.8.				1.18	-	
-0.7.2	2.90	in a la	1.20	1.1	5,5	БЗ	1,1,5	4,5		$\mathcal{O}_{\mathcal{O}}}}}}}}}}$	9	2	1.0.2	2 75	1 7 3	2			1	1	1
1-1-1-	0.00	The same	1.1		125		1_1_		N	1-1-1	4	-1-1-	16,2		1 -7 -8	2	2	-		Yal	1
	460			1. 1.	1 min			-		1 1 9 1	-		168	111/2	176	2	2	-	1	1400	
	0.0.00	1 1	1 1			-	1.1.	1	N	1.1.		-1-1	1 7	2 2 2	176	3	5		E	1	
	12	1 27	1 1	1 1	27	71	51	27		00		15	1-7:	3 3 3	176	3	5 4	2	13	1	
-0.8.7	0,10,0,8,3	- 1 - 1	1-1-1	+ +	20	Rá	100	U.		00	5	65	17	2.25	176	3	5 4	B	1		
-0,8,4	a. 8,1			1			1010	1,0	N	0,0,0			170	3.5	179	4	5 4	50			
		1 1			27	Q	1-1-2	120	+N		2	1	170	3.5	1.7.9.	4	SN	242	1	100	D.
- 0 9 0	11.13	<u> </u>	tt.		5	R	122	30		00.	0	CS	1	. t.	1	L	N	2	1		N. A.
-040	2 11	- Land	1.1	1 1	64		96	20		00.	0	C	1.7.0	3.5	1.7.9.	.4	5N	1	1		
- 0 0 0	0.00	1 1	d at	1 1	1212		1110		N	0.0.			1.7.0	45	1.8.2.	5	5			1	1
1 1 1	1 57	1 1	1 1					-	N	0101			1.7.0	9. 4.5	1.8.2.	5	5				
-082	1 59	- la -	1 1		55	7	80	7.0	2	0.0.	0	5	1				N	2	1		
-082	2.59		1		5.5	BI	9.6	6.0		0.0.0	2	C				1	N		1		
-082	2.67				5.5	T	5.4	7 5	5	0,0.	U	۷.		1.1.1		í	N	1	1	1	1
-082	2.95				53	BI	0.5.8	3.3	3	00.	D	0,5,			1 1 1 0	1	N	2	11	1	
	60.0	12.		1 12					N			1 1	1,8,	3,.,55	1,8,3,.	,2	S	0			15
	07.5	Re.		1.1			1.		N			1	1.8.	255	183.	2	5			-	1
		120		1.12		No. and	1.1				1	1.1.				1	_				L
	MISCELL	ANEOUS			T RO	CK .	TYPE	ARRR	FVI	ATIONS		STRUCT	JRE TY	PE ABBR	EVIATIONS	FI	LLING	AE	3BR	EVIA	TIONS
	MISCELL	ANEOUS	*_* FOP	BOTTON		<u>UR</u>		ADDIN			SJ	SINGLE	JOINT	FO FOL	JATION	N	NONE		P	SERP	ENTINE
T/	TOP OR BOTTOM	END OF ER		BOITOM			11	-	-		VN	VEIN	1.1	1 1 1 1 1 1 1	1.00	x	OXIDE		Т	CALCI	πε
	N-NON OPIENTAR	END OF PR	ACTORE		-	a series t	-				BD	BEDDING	1.			s	SULPH	DE			
SUC	SI ICKENSIDES -	YES OR NO									ст	CONTACT	F.			L	CHLOR	ΠE			1
FRAC	1-Natural 2-Mauta	(Natural or	Mech.) 3-	Mechanical		1	500	100			FT	FAULT				Q	QUART	z			
CONF	CONFIDENCE - 1	-Poor	4-Excell	ent		1		1.4	26		FC	FAULT C	ONTACT		inter et a	С	CLAY				
DIFE ANCIE	ANGULAR DIFFERE	NCE BETWE	EN TOP I	INE					1	Sec.	sz	SHEAR 2	ZONE			A	ANHYD	RITE			
CATI &	ANGULAR DIFFERE	NCE BETWE	EN TOP L	file: o	core for	m tor	o11-m.	dwa	5		132			1.1.					A	RAN	7

PROJECT LOCATION HOLE NO.	Aranzazu 2000 Lul GHP-GMX-05	OR INCLINA	ATION	TEC	0 00	RE BI	EAF AST			SHI		( N DATE ELEV		N	P	\GE _	г В` DI	C Y IA	HQ3	3 3
REF. ANGLE (REF. LINE TO TOP OF	DEPTH FROM START OF RUN (M) 1	ROCK TYPE	3				N / W	FILL THICKNESS (cm)		G TYPE	F	DRILL FROI	RUN M CO	N DEPTHS LLAR (M) T	5 0		F R A C	C O N F AN	IFF. IGLE IN	NITLS
HOLE LINE)	0 70		-	< J 7	338	5.9	Η	0.1.0		CS.	1.8	3	2,5	1,8,6	34	5 N	a	Γ	1	5,6-
1	1.20	1 1 1 1		< 57	1.05	6.2		0.0.0	t	S.C.	I.		4	12,	1.1	N	2	1	,	
- 2 57	1.50	1 1 1 1		SJE	220	2.5		0.0.0	5-	T.	1.8.	5	2,5	1,8,6	.2.	SN	1			1
-081	0.05			5.36	30.0.5	3,5		0.0.0		5	1,8,6	6	25	1,8,9		SN	1	3	1	1
	00.06			· V	V	and a	1			and a second	. 2		1	.4					1	1
-081	02.90		1	V	V	1.9-3		1.1.1.1			1,8,	6. 9	1,5	1,8,9	2.	5			1	1
-320	0.00		1.45				W	1.1.1.	I		1,8,	9	25	1.9.2		0		10	1	1
	1.6.4		1				W	1			1. 11		11	14		1		_	1	1
- 3.2.0	1.6.5		11	STI	B 0,6,6	7.0		0,0,.0	2	5	A. In		1.			N	2	31		ud.
J. J.	.288		1	5.3	T 2, 5,2	4.1		00.1	2	T1 ,	1 M		V.		I. V	N	1	4	1	1
- 3,20	.2. 98	1 States	1.1.1	551	F 0,7,6	6,4	20	0,0.0		S.T.	1,89	1.+2	2,5	119,2	1.4	QN	2	3	14	12.e
4.3.0.0	0.17			5.3-	T09.8	57		0.0.0	2	ST.	L.g.	2, .,	40	1,9,5	4	SIN	1	3	1	1.25
d. A	0.41		-1 1	5, 51	3 3,5,4	7,6		0,0,00	M	S.T.	0 7 10	1		1	1. 0.1	N	11	41	1	
	0.67		1	5,5 1	8 1,7,2	6,3		0.0.0		SITI	1 1	1		1 1		N	1	4	1 -	1
	1.06	in the second second	1.1	5.31	3 1,7,2	2,7		0,0,0		TS:	10.1	1.0.1	- 1	1.1	1.0 1	N	11	5	1	1
	1.20			3,5	80.37	12,0		9.0.0	2	ST.	1.1	1.1.0.1	- 1	1 1		N		2.	1	11
1000 1000	1.8.1			SJ	F 2,8,4	4.4		0.0,00	2	5		1.01	1			N	(	3	1	1,
	2.04		In La	5,31	8 1.3.8	3,2		0,9.0	2	5,	F 1	1	1	1 4	1	N	1	9	1	1
	,2,0,9		The state	5,5-	10,70	3,2		0,0,0	-	ST.		1.01			1.4.1		1	3	4	
187	2.30			5,5	B 1,5,4	3,4		0,0,.0	2	5, ,	1 1	1	1	1	1.0.1	, p	1	4	1	-+-
	2.36	The second	1 1	5.5	T 1,5,6	2,1	-	0,0,0	3	5	1	1.0.1	1		1.	N	1	1	111	1
	2.37		I T		1-1-1-1		N	1 1.41	4	1 1	- inter		1	21	101	1				1
	,2,.5,7 ,		1 1	1		I.	N	1.1.01	_	- i i -	1.1	11 1	1	izt	1.01	1	_		1-+	1
VAV	2.58		de l	i-	1.1	1	W	1 1 1 1	-	hard	N.V		1	111	1.17	1-		-	14	1.
+.300	3.05			1		1	W	1 1.07	1	and and the	11,7,	du i	4,0	1,7,5	1.0.7	21			-a-l	
	MISCELLANE	0015	Ser of	ROC	K TYPE	ABBR	EVI	ATIONS	S	TRUCT	JRE T	PE	BBR	EVIATION	IS   FI	LLING	; Ae	BBRE	VIATI	IONS
	"L" FOR TOP FND OF	CORE "-" FOR BC	MOTTOM	T					SJ	SINGLE	JOINT	FO	FOL	INTION	N	NONE		P	SERPE	INTINE
T/s	TOP OR BOTTOM FND	OF FRACTURE		- A		-		10	VN	VEIN	220		1.4	and the second	X	OXIDE		τ	GALCIT	Æ
N/W	N-NON ORIENTARIE	W-WHOLE CORF							BD	BEDDING			19		S	SULPH	IDE	and	31	-
SUC	SLICKENSIDES - YES	OR NO		100		10		1000	ст	CONTACT	T.		-	1244	L	CHLOP	ITE	1	8	Cot.
FRAC	1-Natural 2-Maybe (Natu	urpl or Mech ) 3-Mech	hanical	1	C		-		FT	FAULT				10	Q	QUART	Z	and and	S.A	
CONF	CONFIDENCE - 1-Poo	- 4-Fycelient	4	100	*	}		1	FC	FAULT C	ONTACT			17 22	С	CLAY			1.0.1	Les !!
					1999	100	-	2	07	CUEAD -	TONE	1	100.000	1		ANILINT	RITE			BELL.
PROJECT	Aranzaz 2000 Lvl	:u		RIEN	ITED	CO	RE	EAR	DAIA	S	HEE	DATE		16/17	P/	AGE _	S BY	OF	HQ3	
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HOLE NO.	GHY-GMX-05		NORT	THING			- E	ASI	ING			ELE	VAHO	IN	-		UIP			
REF. ANGLE (REF. LINE TO	DEPTH FROM START OF RUN	RO	CK TYP	Έ	STR	RUCTURE		N /	FILLI	NG		DRIL	L RUM	LLAR (M)			F C R C A N	DIFF		
HOLE LINE)	(M)	1	2	3	TYPE B	CIRC. ANG.	DIP	W	(cm)		TPE	FROM			0	C	CF	ANG	E INITLS	
-086	0,0,.06		1 1-	1.1	V,NT	05,0	38		0.0.0	5	L,T 1,9	5	45	1,9,8,	.,5	N	1 4		76	
in dal	90,.2,5	1.1	1 1		VNB	0,96	5.9		0,0,0	5	<u></u>	1			• 10		10	1		
	00.65	124			VNB	1,3,0	5,4		0,0,0	L,	5, ,	11.			• .	-N	14	1-	-	
	00,.76	1			5. JB	03.6	7,0		99.0	L	5	1		i h	• .	N	Ø.	5		
	90,.81	1.1	1 1	1.21	N.MT.	TO. 3.6	3.5		90.0	C	54				•		1 0	4.		
	0,0,.9,1	1.1.1	- F		VNB	0,3,8	3,6		0,1,0	5.	C.L.	4.00		14	• 12	M	1 5	1 1		
	0,1,.2,1	1.1%	1.1.4		10.		1	$\sim$				1	200	1.1.	•	-		-		
	0,2,0,1		1			1.1		N				1			•			1	and the second	
	0.2.14		245	1.1	VNB	05,8	1,2		01.0	6	5L	1		- te		N	10	2 .	1	
	0,2.20		-		FTT	3,5,0	08		0,1,0	C	4.5 .				• .	1				
	0, 2. 4.7				SJB	1,4,6	43		0,0.0	L.	5		2	Line .		Y	1 4	1 1	- Sale	
	0,26.3			~100 <sup>10</sup>	VNB	1,2,6	34		0,0,0	L.	SI	1/101	1	- N/		N		5 1	1.1.	
	0,2.84		1.4	1	VNT	038	5,5		01.0	15;	T.L.	1	-	- 1 - 1		. A	) [ ]		-	
-0.86	02.94			1 1	5,5B	1,2,2	50		0.0.0	5	1.	1,5,.	4.5	1,9,8	5	IN	119	1	- Pro-	
- 2.6.4	00.08				SJB	3286	4,3		0,0,0	L.	5,61,9	18.	51	201	4	,6 N	20	2 1	1.1	
	0.0.1		and a	1 12	SJT	246	60		00:0	L.		1		1		A	ルマ	5 1	-	
	00.36		1 1	12010	5.J B	330	4.0		0,0,0	5.	t	1		1		- 11	12-	5 1	- 1-	
	00.36			1	557	1,9,6	33	-	90,00	) 5 .	L					11	12	3	1	
11	00.57		1.1		SJT	22.4	4.7		00.0	C.	LS.	1. 1.		1.1.		. 2	11	1 .		
	0.0. 7.0				SZB	3.5.0	18		0, 1, .P	C,	LS	1. 1.		1		. 17	11-	5	-	
	00.85				SZT	1,90	08		01.0	C	45	1				1 3	11	3	1	
	01.16				SJB	30,38	63		0,0,.0	L.	5	1		1.1.		, A	119	1	- in	
	01.31			1000	5.5 1	\$2,0,0	3,2		00.00	) 4,		N.				N	11	3 .		
V	01.36				SZI	3336	26		0,1,.,0	DC.	LS.	1.1+		, V		1. 1	11	3	1	
- 26.4	0.1.6.1				VNT	216	40		01.0	5	L [ ]	1,8,.	,5,1	20 1	1.4	6 N	1 6	1	1 1	
Contract of the second s					DOOL					STD	UCTURE	TYPE		EVIATION	SE		AB	BRFV	IATIONS	
	MISCELL	ANEOUS	1.1.000		RUCH	N TIPE /						FO	FOI			NONE	1.5	P SE	RPENTINE	
REF. ANGLE	"+" FOR TOP END	OF CORE,	FOR	BOLLOW				-	- V			10	100		X	OXIDE		TC	LCITE	
'/B	TOP OR BOTTOM E	ND OF FRA	ACTURE		-		-	-			DDING		Jer.		S	SUI PH	IDE		ist day	
N/W	N-NON ORIENTABL	E W-WHO	LE CORE	124									Barr.	42.5	L	CHLOF	ITE		Arre	
SUC	SLICKENSIDES - Y	ES OR NO					-			TEA			2.		0	QUART	Z			
FRAC	1-Natural 2-Maybe	(Natural or	Mech.) 3-4	wechanical						C EA	ULT CONTAC	т			C	CLAY		-		
CONF	CONFIDENCE - 1-	-Poor	4-Excelle	300			-	-	C	7 61	HEAR ZONE		5 N A	States and	A	ANHYT	RITE			
DIFF. ANGLE	ANGULAR DIFFEREN	NCE BETWEE	EN TOP U	NES			_	-	3	2 31	ILAN LUNC	1	100 L	-	14	1.44144.6		AD/	ANIZAZU	

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ARANZAZU

PROJECT LOCATION HOLE NO.	Aranzaz 2000 L-1 GHP-GMX-05	<u>s</u>	O INCLI NORT	RIEN	ITE	D	CO	RE B	EAF	DAIA RING		SHE		( N DATE ELEV		16/17 N	1		GE _	" B" D	Y	OF ZA	10 Je /
REF. ANGLE (REF. LINE TO	DEPTH FROM START OF RUN	RC	OCK TYP	E	ç	STRU	ICTURE		N /	FIL	LIN s I	G	Ē	DRILL	RUN	N DEPT	HS V)			F R A	C O N	DIFF.	
HOLE LINE)	(M)	1	2	3	TYPE	B CII	RC. ANG.	DIP	W	(cm)	4	TYPE	F	ROM		-	то		Ċ	С	FA	NGLE	INITES
- 2,6,4	0,2,0,0		10.1	1.11.1	8 2	B 3	3,3,0	3,5		0, 9.6	)	LS.	1,9,	8=		2,0,	19	fo	4		4		JE
	0,2,.29		1.1.	1.1	55	Bä	252	57		0,0,00	)	LCS	1.54	1.1	1-	1 1	1.	1	X		3		
	0,3.,39	1 1		. i. i	SJ	Ti	218	35		0,0,.,	2	L.5.			-		1.01		Y	1	4	_1	
	02.72	_	1 1		5]	B	218	2,7		00.0	1	C.L.	.V	4.1	in.	11	Vier	1	N	Ľŀ	5	3	
-,2,6,4	0,2. 8.7	1 1 10 10	1 1	1.1.	SJ	T	2,6,4	47		0,0,0	2	LS	1,9,9	8,.,	5,1	20	1,0,4	1.6	N	11	4		
-, 3, 4,6	0,0,.0,0		ll	1	-	2	2 1 1	17	N				20	1,.,	1,6	20	4.0	19		$\square$	-	1	1
, il i	0,0,.70	1 1	1.1	i di	1	3	1 03	1	N	Wit.	4	1.1	21 1	1.0	ð	1.1	1.	1			_		e .
	00.73		100		SJ	TZ	2,7,8	4,7		00.0	2	15		1.4.	10		1	4	N		3		
	0,1,.18		6.5		5,5	Bô	2,6,8	55		90.0	C	LS		1.1.1-	1		1.1	4	N	1	4	1	
V	0,2,.1,3	and a start	dered a	t also	55	B	270	23		0,0,0	2	45,	1.1	1.1.1	1		Y		- Y		5		1 P. 1
- 346	02.63	1 1	1 1		55	B	24,4	1.8		0,0,0	5	LS	20,	1,	6	200	1	2.9		1	ک		Sec.
-+++	0,0,00	- 1 - 1	10.1			12	1 I		R		4	1-1-	2,0,	4,.,0	29	30	7	19	-		-		
	0,0,.,6,0	1 1			14		Will 1		$\mathbb{N}$					1	-		1.11	1			-	1	in the second
-1.1.4	01.05	1			3,5	T	2,46	22		0.0.1	5	4.5.	. 1	1.00	-			1	Ņ	11	2	1	
d a d	01.59				53	B	27,5	2,4		00.	0	LS			1	1.1.		1	- N	11	2.	1	- I -
	0,1,.,6,6	5	1.1		S,J	T	2,0,8	33		0,0,0,	5	LS,		1.11			1.01	1	A	11	2		
Contra la	0,1,.,8,2	1 1	1.4		SJ	T	2,1,8	5.2		0,0,.	0	45		1.00	-		101	1	N	1	9		- de la composition de la comp
	0,2,0,2	APP T	1		55	B	31.4	4.4		0,0,.1	>	LCS		1.1.1	1	14		1	<u>Y</u>		3	-	
VIV	0,2,0,20		-1-1	1.1.1	5.5	B	3 30	2,2		90,09	)	45,		1	V	V	1.11	Y	Y	1	3	i -	1
- 1 1 4	02.70,2	1.1	1.1		SJ	B:	304	3,8		60.	0	4.6.5	30,	4.0	9	30	7	1	1 1	1	3	1	1
1.51.1.5	0,0,0,0			1 1			1.		N			1.1	20,	7	1,4	2,0,	8	3,	0		with	Mirie .	K
	01,.16	1.1	1.1				1		N	1 1			2,0,	7	14	2,0,	81.1	3 0	5	1	196	15	and a state
1 COL	0.0.00		1.11				1		N			1 1	20,	8	30	21,	0,.,	1.	5			1	130
1	0,1,.8,5		1 1				1.1.		N			J. I.	2.0.	81+1	3,0	21	0,+,	1.1	5			1	
Sec. 1			1 1						1				1.1					1				-	
1	MISCELL	ANFOLIS		1	RO	CK T	TYPE	ABBR		TIONS	S	TRUCTU	RE TY	PE A	BR	EVIATIC	NS I	FIL	LING	AE	BBR	EVIA	TIONS
REF. ANGLE	"+" FOR TOP END	OF CORE.	"-" FOR	воттом							SJ	SINGLE J	OINT	FO	FOL	ATION	N	N	IONE		P	SERP	ENTINE
T/P	TOP OR BOTTOM E	ND OF FRA	CTURE					-			VN	VEIN					>		XIDE		Т	CALC	ITE
N/W	N-NON ORIENTABL	E W-WHO	LE CORE	¥.		G					BD	BEDDING	1.2				5	: 5	ULPH	IDE		-	
SLIC	SLICKENSIDES - Y	ES OR NO				100					СТ	CONTACT					L	. (	HLOR	ITE			
FRAC	1-Natural 2-Maybe	(Natural or	Mech.) 3-M	echanical							FT	FAULT			18		0	0	UART	z		- Con	
CONF	CONFIDENCE - 1-	Poor	4-Exceller	nt	0.1						FC	FAULT CO	ONTACT				0	: 0	LAY		3	180	
DIFF. ANGLE	ANGULAR DIFFEREN	ICE BETWEE	IN TOP LIN	IES					3		SZ	SHEAR Z	ONE				1	1	NHYD	RITE	12	20	

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ARAN7A7U

PROJECT LOCATION HOLE NO.	Aranza	zu		RIEN	ITE	D	CC		EAF	DATA RING		SHI	EET	DAT ELE		T.)	PA	GE _	S E C	BY . DIA.	OF ZA HC	40 23
REF. ANGLE	DEPTH FROM	R	OCK TY	PE		STR	JCTURE		N	FILL	١١	١G	-	DRI	LL RU	N DEPTHS		S	F	C Q		
TOP OF HOLE LINE)	(M)	1	2	3	TYPE		IRC. ANG.	DIP	w	THICKNESS (cm)	5	TYPE		FRON	OM CO	LLAR (M) TO			AC	N	DIFF. ANGLE	INITLS
	0,0,.,0,0	tl			L L			1	$\sim$				21	0,.	1,5	21	6	-				
	0,1,.,0,1						t t	1	N				21	0.	15	312.	,4,0	2				
- 1,6,0	0,1,.,0,2				5,3	T	2,8,4	4,8		0,0.0	2	5	1 41				1.1	N	2	2		
	0,1,.,2,2				$\Sigma_i \mathcal{E}_i$	R	3,1,0	40		0, 0.0	)	S.L.						N	2	2		
	0,1,3,5				VN	ß	2,0,2	3,5		0,1,0	)	LS			1			N	1	3		
	0.160	12.3			5 3	B	1,9,8	18	ų	0,0,.0	2	15		E •	F F		1 4	N	1	3		1
VV	12.10				5,5	T.	202	5,7		$\mathcal{O}_1\mathcal{O}_1\bullet\mathcal{O}_1$	5.	1.5			N/	Y.	NY.	N	ス	1		
-,1,6,0	0.223	1 C. 1			VN	ß	1,8,8	3,1		0,0,	2	$L, \leq$	21	0, •	LI'S	21.2.	,4,2	ξN	1	2		
	a. h		1 1	<u>11</u>	5,3	ß	952	41		0,0,00		L.S.	8	2,1	, 4,2	2,1,5;	,5,0	N	2	3		
			II		VN	B	0,7,2	38		0,0,.(	2	$L_{1}$					1 1	N	1	3		
	0 8.9	LL	1 1	· · · · · ·	V.M	T-c	5-9-2	2,6		0,0,.,0	2	L					11	N	t	2		
and the second	0.100				5,3	T	4,9,4	61		0,0.0		L ,					11	N	1	4		
	0,1, , 4,5	I	í í		VN	ß (	0,2,0	3,7		00.5		6.5					10.2	N	1	3		
	0,1,.,5,8				5,5	B	0,0,6	S,S		00.0		L				1.1		N	1	4		
- I - I	0,1,.,8,0	1 1			NN	ß	3,5,0	4.9		00.0	2	S,L,						N	1	4		
- di	0,1,.9,5		L E		SJ	T	1.4.8	5,4		0.0.0		SL	3	/	. W.		V.	N	1	3		
Y	0,2,.1,5	II	E F		VN	R	0,0,4	57		00.4		LC.	.V.			V		N	2	3		Sector.
-234	0	1 1			5,3	T	1,5,2	5,7		90.0		5	21	2	42	815	50	$\mathcal{N}$	2	3		2
-001	01.1.1			1 1	NN	T	3.3.8	61		00.0	1	S.L.	21	5	50	21.8.	50	N	1	4	1.0	
	611, 96,0				55	B	102	63		00.0	)	LS	V			1	L.	N	2	3	5	81
E. 0 #0.1	0,2,.4,7				55	TI	010	6.1		0.0.0		L.5. C	21	5.	50	21.8	.50	N	a	3	10	and -
.0. 1	6	1 1	1- E		SJ	B	2.7.6	3.7		0.0.0	T	LTS	21	8.	50	22 .	4 5	N	Ĩ	4	20	1
J. J.	0.0, 38,2-		E E		VN	T	2,80	.5,2		00.5	1	LTS					11	N	1	2		
Y.	0,1,.,1,3;				YN	Ba	2,5,2	68		00.5		SET						N	1	4	11	0
-00,1	6, 1,						8	C 1744	W		1				2.00	7					V	
W. Mir-	MISCELL				POO	<u>чи</u> -		DDDE	1/1 4-		-	TOUCTU			DOOD		Leni I	IN CO.				
REF ANCIE	"+" FOR TOR END	OF COPE	*_* FOR	ROTTON	NUC		ITE A	DDRE	.VIA		2	SNOLE	KE IT	PE A	ABBKE	VIATIONS	FILL	ING	AB	BR	EVIAI	IONS
T/2	TOP OR BOTTOM F	ND OF FR		BOTTOM	-	-		-		3	N N	SINGLE JU		FU	FOLIA	TION	N NO	DNE	-	P	SERPE	NTINE
N/W	N-NON OPENTADIA		LE CODE					-	-	V		VEIN			-		X O	RIDE	-	Т	CALCI	E
SUIC	SUCKENSIDES - M		LE CORE		3:45	-				в		BEDDING		-		146	S SL	ILPHIC	DE	2		
EDAC	1 Network 0 Martine		Mark V 7 14	a alta at	1.1	-			-	C		CONTACT		++	-		L CH	ILORIT	ε			and the second
CONE			месп.) 3-М	ecțianicăl			- 11 - 11 - 11 - 11 - 11 - 11 - 11 - 1		-	F	r	FAULT		-	-	-	Q QL	JARTZ	_	10000		-
	ANOUNAR DISCORDE		4-LXCelle				_	-	-	F	C	FAULT CO	NTACT				C CL	AY	_	-	the second second	
CLATT ANGLE	ANGULAR DIFFEREN	UE BETWEE	IN TOP LIN	ils		-	_	-	_	S	Z	SHEAR ZO	NE		5		A AN	HYDR	ITE		-	10.

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PROJECT LOCATION HOLE NO.	GHP-GMX-03	5		RIEN	ITE	)	CO	KE B	EAF	DAIA RING		SHI	- E I D/ EI		I.)	PA	GE	6 B' D	Y _	OF ZA HG	0
REF. ANGLE	DEPTH FROM	RC	OCK TYP	E	S	TRUC	CTURE		N /	FILL	IN	G	DI	RILL RU ROM CO	N DEPTHS DLLAR (M)			R		DIFF.	
TOP OF HOLE LINE)	(M)	1	2	3	TYPE		C. ANG.	DIP	Ŵ	(cm)		TYPE	FRC	M	ТО		ċ	ĉ	F A	NGLE	INITLS
-001	,2. 95								W	1			21.8.	.50	22.1.	4 6	5		6	20	
	0,0,0,0				1	1	2		N	• • •	+		2,2,1,	. 4.5	22,4.0	5 .	<u> </u>				
	12, . 90			1 1	/	V	1		[V		-			•	2 2 1	- 3	A I		1	-1-	
-1,2,0	d. 95			t	55.	TO	30	31		<u>0, 0, 0</u>		<u> 5 _ L _</u>	2, 2, 1,	• 4 5	227	24		à			
1.1.1	, O, . , O D					_	<u> </u>	<u> </u>					A. A. 9.	• 5.5	didi /i.e.	2.	2	$\vdash$	+		
	2.40	·				0 0		11/			ł	<u> </u>		• 1		1	- NI		2		t
-1.0.8	, 2 . 4,9		<u></u>		V N	52	12	4,6				<u>-121</u>		• <u>1 × 1</u>	227	E I	e N	2	2		
-1, 8,8		<u> </u>		- <u> </u>	5.2	15 d	0,	<u>     </u>		0,0,0,0	-	<u>&gt;</u>	A 2 7	<u>-1-1-1</u>	220	$0 \ge 1$		-		-	
<u> </u>	0, 0, 0, 0					_	1 1	- 1		1.•		<u></u>		• • • • •	<u> <u> </u></u>			-	-		
	12.0.2.9				6 -			6	1		4	51.	2 2 7	. 55	230	0	S N	2	2		
- 280	23.0			<u> </u>	27		<u>97</u>	Did	-	0.0.00			MAL A	<u>•   / P ,</u>							
	1 1 1 1			1			<u> </u>			1.1.0				• <u> </u>		11					
		- 1 - 1		<u>11</u>			<u>t t</u>					<u> </u>	1 1 1	• • •		· · · · ·					
	E 1									1	╉			• 1 1		<u></u>					
1 1 1	<u>11.•1</u>		<u> </u>	11			1_1_				-†			•							
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<u> </u>		LL									t	ll									
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		1										TOULOT				L E I	LINC				TIONS
	MISCELL	ANEOUS	5		ROC	CK I	YPE .	ABBK	EVI/	ATIONS			URE ITPE			N	NONE			SERE	FNTINE
REF. ANGLE	"+" FOR TOP END	OF CORE	. "" FOR	BOTTOM		_		_	-		SJ	SINGLE				Y	OXIDE		T	CALC	
<u> //B</u>	TOP OR BOTTOM E	END OF FR			┨───┼─			_				VEIN				ĉ	SHIPH	IDE		Unito	
N/₩	N-NON ORIENTABL	E W-WHO	DLE CORE				_		-		80	BEDUING				L	CHLOS	<u>जण</u> नग			
SLIC	SLICKENSIDES - 1			-		-				CUNTAC		_	_	0	OUART	7					
FRAC	1-Natural 2-Maybe	(Natural or	Mech.) 3-k	lechanical							ri FC	FAULI	ONTACT			C	CLAY				_
CONF	CONFIDENCE - 1-	-Poor	. 4-Excelle	nt			1		_		FU 67	CHEAD				Ă	ANHYT	RITE			
DIFF. ANGLE	ANGULAR DIFFEREN	NCE BETWE	EN TOP LI	NES			-	-	à		32	SHEAK					PARTIC				74711

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# **ORIENTED CORE DATA SHEETS**

DRILL HOLE GHP\_GMX06



PROJECT	Aranza	zu (	DRIEN	<b>ITE</b>	D CO	RE		DATA		SHE	EET	(ME	1.)	PA	GE		OF_	A TRA
LOCATION		INC	LINATION		50	_ B	EAF	RING	de	05	C		1 2600			BY	H	03
HOLE NO.	GHP-GMX-C	<u> </u>	RTHING	21	24023	- E	AS	FING 25	54	10	E	LEVATIO	N	-		UIA		
REF. ANGLE	DEPTH FROM	ROCK T	YPE		STRUCTURE		N	FILL	IN	G	C	ORILL RUI	N DEPTHS			2 0	4	
(REF. LINE TO	START OF RUN				T/1			THICKNESS	5	TYPE		FROM	LLAR (M)			N	DIFF.	INITLS
HOLE LINE)	(M)	1 2	3	TYPE	B CIRC. ANG.	DIP	VV	(cm)	+				$(1 \cap 2)$	1	2			TA
	0,0,0,0,0	LMSSK		-		5	N	1 1 • 1	+	1 1	$C_1 0_1 0_1$		00.0.			-		2,0
1 1 1	0,3,.10	LM,SS,K	N	1	- 1 -	12	N	. r•1	+	1_1	0,0,0		0,0,0,.					
	0,0,.,0,0	Lms		- 1-	101*	111	N		+		O(0, 3)	• • • •	0,0,0,.		- +			
· · · · ·	0,3,.0,5	2,14,5	1 12			1		1 1 1 1	+		C10, S		0,0,6,.		2	-		
	0.0.00	LMSPPI	3					- I I . I	+	-1/1	0,0,6		0.0.1	1041		-		
	0:305	Limis P.C.	3 1	1		1	//	1 1 1 1	+	<u> </u>	0,0,0	201	0,0,0,.	2		-		1
21 1-Y	0,0,.,0,0	LMS					N		4	11.	0,0,1	1. AV	0,1,0,.	2	2	-		
	03.05	LMS	<u> </u>	1		2 1	N		+		0,0,1	1.00	0,1,0.	21		-		
·	0,0,.,0,0	L, m, S					N	1 1	+	1 1	0,1,2	1. × >	0, , , , , .	154		-		
	0,3,0,0,5	Lm, 5				1	N		4	<u> </u>	0,1,2	70	$O, I, \Sigma, \bullet$	251		-		
	0,0,0,0	LMS			21.12		N				015	1.5P	0,1,3,.	121		-		
10 11 1	0,3,0,5	L, m, 5	1 1			1	P	1 101	+	.1_1	Q1,5	10,50	01 81.	15 -	2			
	0,0,.,0,0	L, m, 5	1 1	_			N		H	1 1	0,1,8	1.57	0,2,1.	11				
1 1	03.05	L, M, 5	- I. I	-			M	1.01	-		0,0	10,55	0.2.	141		-	-	
1 1 1	90,0,0,0	LMS	-	1		1	N	1.1.	+	<u> </u>	94	. 10	0,2,5,0	17 (	6	100	1	100
	0,2,.,0,0	L,M,S	1 1	1	1 1 1		N	1 1.00	+	1_1_	0,2,1	1.7,0	0, 4, 5, .	9				1
	0,0,0,0,0	LMS	1.1				N	· · · · ·	+	<u> </u>	0,2,5	1. MP	0,2,6,.	59		-	1	1
1 1 1 1	0,3,.,10	LM,S	·			-	TV.	1 I.I.	-		0,2,5	· · · · · ·	0.,2,6,.	24	2		1	1
1 1 1	0,0,0,0	L, M, 5 5, K	N	1			N		4	í I.	0,2,6	1.50	0,2,8,0	5	0			1
	0,2,:,0,0	L, 11, 5 5, 14	N				N	1 1 • 1	_	1 1	0,2,6	1.50	0,2,8,.	151	0	-	-	
	0,0,0,0	LMSSK	N		1	1	N	1 1 • 1	_	1_1_	0,2,8	, , 5,0	0,3,0,.	,50		-		
	0,2.00	L, m, 5 5, K	N			1	N	1	_	- 1 - 1	0,2,8	0,0,50	0,3,0,.	, 5		-	- 1-	-
1 1 1 1	0,0,.0,0	L, m, 5	E				A	1	_	1.1	0,3,0	1.5.6	0,3,3,.	5	2		1	
	0,2,.8,5	2, 11, 5					N		_		0,3,0	0, 0, 5,0	0,3,3,.	13				- 1
	1.1.1.1.1		1					1.1.0		1 1		1. 1. 1	1 1 1 1	1				1
	MISCELL	ANFOLIS		RC	OCK TYPE	ABBR	EVI	ATIONS	S	STRUCT	URE TYP	E ABBR	EVIATIONS	FIL	LING	ABE	BREVI	ATIONS
	"+" FOR TOP EN	D OF CORF "-" F	DR BOTTOM	MRI.	Morble				SJ	SINGLE	JOINT	FO FOL	JATION	N	NONE .		P SER	PENTINE
T/		FND OF FRACTURE		IMS	Limpstone	1.5		-	VN	VEIN	1	100		x	OXIDE		T CAL	CITE
N/W	N-NON ORIENTAB	LE W-WHOLE COR	E	PBA	14 trusive	-			BD	BEDDING	;			s	SULPHID	E		1000
SUC	SLICKENSIDES -	YES OR NO		PPB	Introsive			A the second	СТ	CONTACT	Г			L	CHLORIT	E	-	-
FRAC	1-Natural 2-Maybe	(Natural or Mech.)	5-Mechanical	HFL	Hornfells		-	N.C. S.M.	FT	FAULT	3			Q	QUARTZ		-	-
CONF	CONFIDENCE - 1	-Poor 4-Exc	ellent	ESK	Skarn				FC	FAULT C	CONTACT		· · · · · · · · · · · · · · · · · · ·	C	CLAY	-		
DIFF. ANGLE	ANGULAR DIFFERE	NCE BETWEEN TOP	LINES	CSS	Fill				SZ	SHEAR 2	ZONE		A 44	A	ANHYDR	ITE		
CALL &	NICHOLAS. I	NC.	file: o	core_for	m_toro11-m.	dwa		1. 1. 1.		Canal I							ARA	N747U

PROJECT LOCATION				ITE	0 00		EAF			SHI	EET	(M DATE	ET.) 6/6/17	PA	(GE	<u>ද</u> Bi	0 / A	F ZAO HQ3
HOLE NO. REF. ANGLE (REF. LINE TO	DEPTH FROM START OF RUN	ROCK TYP	HING	S	TRUCTURE		N /	FILL		G		DRILL F	RUN DEPTHS COLLAR (M)		S L	F ( R ( A I		FF.
TOP OF HOLE LINE)	(M) 1	2	3	TYPE	B CIRC. ANG.	DIP	W.	(cm)	╇	ITPE	FF	ROM	10	11 1		CI		GLE INTES
	0,	5			1 1	1	N		╀	1 1	0,35	• 51.	5036.	<u>9</u> 07		-		<u> </u>
1 1 1	0,3,0,0,5 L,M,	5	1 1	1		í.	N	1 1 • 1	+		0, 3, 3	<u>•   S P</u>	00360	7	<	-	-	
	0,0,0,0 L, m,	5 11	1 1	27			AL.		+	1 1-	0,5,6		0027	1 1	2	-		
	0, 1, . , 3, 5 L, M,	5			1 1	1	$\mathcal{N}_{i}$	1 1 • 1	+	1 1	0,5,6	7 7	5029	7 2	2		-	1
	0.0, ., 0, 0 L, M,	5	1_1_			1	N	1 I.I.	+	1	031	1.1	5030	121	~			1
	0,1,.,60 L,M,	5				1	VV A	1 1 • 1			030	1 - 1 / 1	$e \cap U \cap$	0	5			
	0,0,0,0,0 L,M	5 11	1 1	1.5	<u> </u>	1	N	1 1 1 1	ł	1 1	0,3,	<u>1 • 12 1</u> 9	5040	10 1	<		-	
<u></u>	0,1,.,5,0 L,M,	5					IV.		+	11	041	$1 \circ 10$	< 04 2	8	$\overline{\boldsymbol{\zeta}}$		-	
· · · · ·	0.0, . 0.0 Lim,	5 1 1	1				N	1 1 1	+			$\frac{1 \cdot 1 \cdot 2 \cdot 1}{2}$	2011	0	2			
	0,2,0,0,0,1,M,	5 1 1	1			1			9	1.1	0,1,0	2 0	< 04 B	18	3		-	
	QC. 0,0 L.M.	5		1	<u> </u>	1	N		+		U. q.	<u> 1 • 1 × 1</u>		10		- ner	200	
<u> </u>	0,1,.,3,5 L,M,	5	- I I				K	00	h	<u></u>	1 1	/·•···			N	1	1	
+,2,0,0	0,1,.,3,7			SD	BRID	122		000	×1	>		· · · · · ·		-	N	1	1	1941
N. K	0, 1, 4, 4, 4, 4,		<u> </u>	22	5280	171			2	21	my -	2 8	5049	6	ON	(	1	
+,2,0,0	D.1.592m	SIL		5,3	10,3,8	5.6		0,0,0,0	4	5101	0114	2.0	0046	12	0		1	
11	0,0,0,0 L,M,	5	11		1 1		XV	1 1.1.1		L L	O U U	1.10	0 0 4 6	1	0			
- I_I_I	0,0,.5,01,M.	5				1		1 1 1 1 1		1 A	041	1.0	0048	1	0		. 1	
·	0,0, ,00 L WI	5	and the second				1	1 1 • 1	-	- L - I	046		0048	1	0			
·	0,2.00 L.M.	3	T.L				<u> </u>	1	+	1 1	04	7 1	0 0 5 0	1	0		-	
1	90,.00 L,M,	35, K, N		1			N	1 1 1	-		0,1,2	2 1	0050	}	0			
	0,2,0,0 L,m,	55.K.N.				- 1	N	1-1-1	+	<u> </u>	0,1,0		1 1 5 3	1	0			
	0,0,0,0,0,4,6,	LSKN				1		1 1.01	-	1 2	AEC		1053	1	0			
1	0,3.,00M,B,	LS, K,N	i L	1			1	/	-	1 1	10,30		0651	2	0			
	0,0,.,0,D m, B,			1.1			N	•	-	1 1	000	$\frac{2}{1}$	00,36	2	0			1
·	Q3 1.0 m.B.	11,1		1	1 1	1	N				0,5,	21.01						
	MISCELLANEO	US		RO	CK TYPE	ABBR	EVI	ATIONS	S	STRUCT	URE TY	PE ABE	BREVIATIONS	FI	LLING	AE	BBR	EVIATIONS
REF. ANGLE	"+" FOR TOP END OF CO	RE, "-" FOR	BOTTOM						SJ	SINGLE	JOINT	FO F	FOLIATION	N	NONE	-	P	SERPENTINE
The	TOP OR BOTTOM END OF	FRACTURE							VN	VEIN		5 N		X	OXIDE		Т	CALCITE
N/W	N-NON ORIENTABLE W-N	WHOLE CORE	2						BD	BEDDING	g ·	1		S	SULPH	IDE		
S⊔C	SLICKENSIDES - YES OR	NO							СТ	CONTAC	· · ·		Aco.	L	CHLOR	ITE		2
FRAC	1-Natural 2-Maybe (Natural	or Mech.) 3-M	echanical					1	FT	FAULT	l.		1.1	Q	QUART	Z		-
CONF	CONFIDENCE - 1-Poor .	4-Excelle	nt						FC	FAULT (	CONTACT	2		C	CLAY			
DIFF. ANGLE	ANGULAR DIFFERENCE BET	TWEEN TOP LIN	IES						SZ	SHEAR	ZONE			A	ANHYD	RITE		
CALL &	NICHOLAS. INC.	1.2	file: o	core_for	n_toro11-m.	dwa									60		A	RAN/A/L

PROJECT	Aranza	zu	0	RIEN	ITE	D	CO	RE		DAT	A	SH	EET		ET.)	PA	GE	<u>3</u> PY	OF	A0-58
LOCATION	GHP- GINV-OL		INCLI				1.4	_ B _ F	LAH AST	RING FING		,			ON			DIA	H	IQ3
HULE NU.	<u>Bu ony oc</u>		NORT				OTUD					0					S	FC		
REF. ANGLE	DEPTH FROM START OF RUN	RC	OCK TYP	E		SIRU	CIURE	_	/			6		FROM (	OLLAR (M)			R O A N	DIFF	
TOP OF HOLE LINE)	(M)	1	2	3	TYPE		RC. ANG.	DIP	Ŵ	(cm)	.33	TYPE	FF	ROM	ТО		ċ	CF	ANGL	EINITLS
	0,0,0,0,0	mBL			1	N	1 1	1	N,		1	1 -1	0,5,6	5 2.0	0,5,9,	<u>3</u>	2			JG
1 1 1	0,2,.50			1 1	1	N	1 1	1	N		1		0,5,6	· • · ~ (	10,5,1,	3,4		1 2	1	+ + +
-166	0,2.5,5	1.1			VN	1 2	41,2	3,2		0,1,.	0	1		1.	1 1	• 1	N	20		+
	0,2,.,6,6	N.	6.4.2		55	BI	88	65	Ļ	0,0,.	P	<u>L</u>	· · · ·			·V	M	1 2	1	
-,1,6,6	0,2,.87	M, B, L	1 1	11	55	BC	7,6	6,5	0.1	0,0,.	0	T	0,3,6		051	• 1 ) !		10	+	1
1 I I	0,0,.,0,0	14	· · · · ·	1 1	1	•	1 - 1	-	N.		-		95,9	1.56	0,6,1,	· <u>~</u>				
	6,1,.,9,0	m, B, L	1 1	1 1	- 1		1 1	1	N	•	-		0,5,0	1, 0, 0,0	0,0,1				• 1	
	0,0,.,0,0	1 Vi					1	1	N			- 1 - 1	0,6,1	1. 1.	) 0, 6, 2,	• 5	0	-	1	
	0,0,.30	MBL	I I					1	N		4			1.1		•		12		
- 0,0,6	0,0,0,3,5		1	1 . 1	SJ	To	259	2.4		$\mathcal{O}_{\mathcal{O}_{1}}$	0	7		1	1 1 1	•	N	12	1 ·	-
	0,0,.,5,2	N		1 1	53	B	1,3,2	49		$C_{1}O_{1}$	Ø			1.1		•	N	20		
- ,0,0,6	0,1,.1,3	m, BR	1.1		5,5	TC	15.4	6,6		0.0.	0	T	061	1.0.2.0	0,6,2,	• 1>	O M E	000		
	0,0,0,0,0	, V,	1.1	1 1	1				N			1_1_	0,6,0	2.5	00,6,5,	• 5			+ -	1 - 1
	0,2,.8,5	m, B, L				1. St	1_1_	1	<u>V</u> V		1	1 1	0,6,0	4	50,6,7,	• 5	2		1	
1 1 1	0,0,•,0,0	1.	1.1	1.1.		-	1 h	1 C	N	· · · ·	-		0,6,5	$\gamma_{1} \bullet_{1} S_{1}$	50,6,8,	• 1	0		-	1
	0,3,0,5	M, B, L	1 1	1 - 1 -					N	1 1.			0.6	> • 5	> 0,6,0,	• •	C	-		
	0,0,0,0,0	m,B,L	SKN	1 1					M				0,6,8	<u> </u>		• 1 4	2			
	0,2,0,0,5	M.B.L	S, K, N	<sup></sup>			1		V	1 1		. I. I.	0,0,2	$2 \cdot	0,7,0	• 1 4			-	
	$0, 0, \bullet, 0, 0$	5.K.N	1 1		1		1		N	10.00	-		0,7,0	$) \bullet , 4$		•,1	5		-	
	0,1,.,3,0	5.K.N	1 1		1		1 1		N		-		0,7,0	<u> </u>	5011	• 1	2			
	0,0,.,0,0	.V.	1				1 - L_	1	N		•		0,1	1.0,1,	50,14	• <u>1</u>	2		1	
	0,2,.,7,0	S,K,N	1	1_1_			1_1_			1 1	- î	1 1	0,1,	<u>h e / </u>	50,1,9,	• 4	2		1	
I I I	0,0,.,0,0	1 K	111	1 1	1.1			1	/ \	7	• ï	<u> </u>	0,1,4		20,10,	1	2	-	-	
L L L	02.00	S,K,N						í	$\mathbb{N}$		•		0, 4	<u>4. • . 4.</u>	>0,1,6,	• 1 ~ 1	2		-	
		1 1	1	3.0			1 1	0		1 1 1	•			. •		• 1			1.1	
	MISCEL	LANEOUS	5		RC	CK -	TYPE	ABBR	EVI/	ATIONS		STRUCT	URE TY	PE ABE	REVIATIONS	FI	LLING	ABE	BREV	ATIONS
REF. ANGLE	"+" FOR TOP EN	D OF CORE	, "" FOR	BOTTOM							SJ	SINGLE	JOINT	FO F	OLIATION	N	NONE		P SE	RPENTINE
T/B	TOP OR BOTTOM	END OF FR	ACTURE								VN	VEIN	5	1		X	OXIDE		T CA	LCITE
N/W	N-NON ORIENTAB	LE W-WHO	DLE CORE								BD	BEDDING				S	SULPHI	DE		
SLIC	SLICKENSIDES -	YES OR NO	)				1				СТ	CONTAC	г			L	CHLOR	TE	_	_
FRAC	1-Natural 2-Maybe	(Natural or	Mech.) 3-M	echanical							ित	FAULT			*	Q	QUART	<u> </u>		
CONF	CONFIDENCE - 1	-Poor	. 4-Excelle	nt							FC	FAULT C	CONTACT			C	CLAY		-	
DIFF. ANGLE	ANGULAR DIFFERE		EN TOP LIN	IES				4)).			SZ	SHEAR 2	ZONE			A	ANHYD	RITE		
CALL &	NICHOLAS. 1	NC.		file: or	core_for	m_tor	o11-m.o	dwa											ARA	N/A/U

PROJECT LOCATION	Aranza	zu		RIEN	NTED	CC		EAF	DATA		SHI	<u>-</u> EI		. <b>  . )</b>	PA	GE _	9 BY	_ OF Z	AO 1Q3
HOLE NO.	GHF-GMX-06		NORT	HING			_ t	ASI	I ING				ELEVAIR	JN	_	IS	FIC		
REF. ANGLE	DEPTH FROM	RO	CK TYP	Έ	ST	RUCTURI	E	N	FILL	.IN	G		DRILL RU	IN DEPTHS		L	RC		
(REF. LINE TO TOP OF HOLE LINE)	(M)	1	2	3	TYPE B	CIRC. ANG	DIP	w	THICKNESS (cm)		TYPE	F	ROM	ТО		- ċ	C F	ANGL	E INITLS
	00.00	S.K.N	1 1	1.1	[5]		1.5	N		Τ	I	0,7,6	. 45	0,7,7.	9	5		1	
	0,1,.,50	SKN			N	1 - 1		N			Do a st	0,7,6	6, 45	0, 7, 1,.	90	5	_	-	
	00.00		1 1		. N	1.1	1	N	1.41.			0,7,7	. 15	0,78.	9 -	5	_		
	0,1,.00	S.K.N	1 1	- D - 210	N	1		N				0,7;	7.0.9.5	0,7,8,.	17	5			
	00.00	1 de	12 1	1.1	N	E. L.		N				0,7,8	1.95	0,8,0,.	11:	5	_		
	0,2,00	SKN		1 1	N		2.1	N	• ·		1 1	0,7,8	9,5	0,8,0,.	9	5			
	0.0.00	I.J.	1.1.1		1	1	1	N		4		0,8,0	995	081.	9 2				
	0100	S.K.N		1 1	N N		1	N	1 1 1 1	4	1 1	0,8,0	0, . 9,5	0,8,1,.	19 2	5		1	
	0.0.00		A		1		1	N				0,81	. 95	0,8,4,.	, 9,	5	_	1	
	0.3.0.0	SKN			1			N			I I	0,8,	1.95	0,8,4,.	91	5		-	·
	0.0.0.0	. V.					1	N	•		1	0,8,0	1, 9,5	0,8,6,.	,6,	5		-	1
	01.70	C.K.N		7 7				N			i i	0,8 1	4. 9 5	0,8,6,.	16:	5		1	-1
	00.00							N			1 1	0,8,0	6, ., 6,5	0,8,8,.	0	0	-	1	1
	01 35	KKN						N			1 1	0,8,0	665	0,8,8,.	0 ¢				
	00.00		- I - I					N	1		1 1	0,8,9	8.00	0,8,9,.	8	5		1	1
	01.85	SKN						W	30 r • r			0,8,9	8.00	0,8,9,.	,8,	5			
	00 00							D				0,80	1.85	0,9,1.	0	5		1	1
<u> </u>	01 20		<u> </u>					N				0,8,0	9.85	091.	0	5			
- Party - I	00 00							N				0,9	1.09	0,9,4,.	,1 6	0		1	
	07.05			1.1.				N				0,9,	105	50,9,4,.	14	)			
- I I	0.0.00	5 WAI	11 5.1				-	N	1	1		09	4.10	097.	1	5		1	
·	0,0,0,0,0	SV NIV	HIFI					N		1		0.9.	4 1.0	0,9,7.	1	5		-	
	0,3,0,0,0	DIN IN	HITL			1 1		1A)	/			09	7 1.5	3099.	. 2	0			
<u></u>	<u> </u>		<u> </u>			4-1		A				09	7.15	0.9.9.	3	0			
	0,4,0,15		1.1	1 1			1	ť	1 1.	-					101				
·	1 1 • 1 1			1 1		1 1		_		_					Leu	1.11.10	AD		ATIONS
	MISCEL	LANEOUS	25		ROCK	< TYPE	ABBR	EVI/	ATIONS	S	STRUCT	URE IY	PE ABBI	REVIATIONS	FIL	LING	AB	BREV	ATIONS
REF. ANGLE	"+" FOR TOP EN	D OF CORE,	"" FOR	BOTTOM			diama -			SJ	SINGLE	JOINT	FO FO	LIATION	N	NONE		P SE	
Т⁄в	TOP OR BOTTOM	END OF FRA	CTURE				-			VN	VEIN	-	1		X	OXIDE	-	I CA	
N/W	N-NON ORIENTAE	BLE W-WHO	LE CORE				12			BD	BEDDING	•			S	SULPH			
S⊔C	SLICKENSIDES -	YES OR NO					1			СТ	CONTAC	F				CHLOR			
FRAC	1-Natural 2-Maybe	e (Natural or	Mech.) 3—M	lechanical				_		FT	FAULT				Q	QUART	4		-
CONF	CONFIDENCE - 1	Poor	4-Excelle	nt			Sec. 1			FC	FAULT C	ONTACT			C	CLAY			
DIFF. ANGLE	ANGULAR DIFFERE	ENCE BETWEE	N TOP LI	NES		1.03				SZ	SHEAR	ZONE			A	ANHYD	RITE	4.5.4	NIZA 711
CALL & .	NICHOLAS. 1	INC.		file: o	core_form_	toro11-m.	.dwa											ARA	INTATU

PROJECT LOCATION HOLE NO.	Aranza GHP-GPIX-06	<u>zu</u>		RIEN	ITE	C C		EAF	DAT RING	ΓA	SHI	EET		ET.) ///// ON	PA	AGE	5 BY DIA	_ OF	 ZAO HQ3
REF. ANGLE (REF. LINE TO TOP OF	DEPTH FROM START OF RUN (M)	RC 1	OCK TYF	PE 3	S <sup>T</sup>		JRE ang. dip	N/W	THICKN (crr	FILLIN NESS 1)	IG TYPE	FF	DRILL R FROM ( ROM	UN DEPTHS COLLAR (M)		S L 	F C R O A N C F	DIF	F. LE INITLS
HOLE LINE)	00.00	HEI						N		•	1 1	0,9,9	. 30	10,2.	3	5			
	03.05	H.F.L						N		•	1 1	0,9,9	. 3 7	1,0,2.	,3,	5		1	
	(), (), (0, 0)					1		N		•	1.1	1,0,2	5.3	51,0,5,.	0	5	1.		
	0.220	HEL				1.1		N	1 . 1	• 1		1,0,2	7.3,5	51,0,5,.	0	5		1	
	0.0.0.0	. 1.						N		•		1,0,5		\$1,0,8,.	0	5		1	1
	00.91					1	1	N		• .	1.1	N. I.	1	1.1.	i.	14			1
- 2.0.6	0.1. 2.3				5,5	T 1,8	061		0,0	.0	45,	N. I			1	N	2	-	1-
	0.137				55	102	4 6,9		0,0,	.0	L,5,	1	1	1.	1	N	21	-	12
	0.15.5	N/			VN	B 3,3	8 3,5		0,2	.5	S.L.	1.12	1	· W		N	10	4	
- 2.0.6	0.1. 7.4	HFL			5,5	TO,6	063		0,0	.0	N.	1,0,5	5,0,0	51,0,8,	p	SN	21	1	· 294
	0,0,0,0	11	1 1 -		Contra la contra			N		• .	1 1	108		1,1,0,	,0	,5			1
	0.2.00		1				1	N		•		10,8		5 1, 1, 0,	,0	5		-	
	0,0,0,0			1 1				N		•	1.1	1,1,0	0.000	5 1,1,1,1	, 5	S.			1
	0,1,,3,0				-	i	1	V		•	1 1	1,1,0	$), \bullet, O,$	5 1, 1, 1, 1,	, 3	2			
	0.0.00							N		•	1 1	1.1.1		5 1:1, 4,	,2	0		-	
	0,2,.8,5		1	1 1				N	1.1	• 7		4.1	1	5 1,1,4,.	12	,0	1	10.5	
1	0,0,.,0,0		1 1	1 1				N		•	1_1_	t, l, 4	1.0,21	> 1,1,5,	.6	0			
	0,1,.,4,0		1					N		•			1	5 1,1,5,	6,6	0		1	
	0,0,0,0		1 E					N		•					,5	0		0.06	
	0,1,0,0					1		N		•	1 1	1,1,5			15	0			E . I
	0,0,.,0,0		1.1.2			14	1 1	N		•	1 1	(,)	1.5	0 1, 2, 0,	.5	,5		-	Carlo Carlo
	0,2,.7,5			1.1			1 1	_∧		• •	<u> </u>		/	1, 2, 0, -	.5	5		1	r I
	0,0,0,0,0	N.	1 1	1 1			1	N		•	1.1	1,2,(	)	51,34	. 8	2	1	18 19 19 19 19 19 19 19 19 19 19 19 19 19	
	0,2,.,6,0	HEL		1 1	1	-		N				1,2,0	95	51,49	.,8	2			
			1		1 - 1 -	1				. • .					•			-	1
	MISCEL	ANFOUS			ROO	CK TYP	E ABBR	EVI	ATIONS	S	STRUCT	URE TYP	PE ABE	REVIATIONS	FI	LLING	AB	BRE\	/IATIONS
REF ANGLE	"+" FOR TOP EN	D OF CORE	"-" FOR	BOTTOM				-		S	SINGLE	JOINT	FO F	NOITALIO	N	NONE		P S	ERPENTINE
T/D	TOP OR BOTTOM	END OF FR	ACTURE			-	100			V	VEIN	2-1	4		X	OXIDE	-	ТС	ALCITE
N/W	N-NON ORIENTAB	LE W-WHO	DLE CORE							BC	BEDDING	;			S	SULPH	IDE	-10	
SUC	SLICKENSIDES -	YES OR NO	-	(25) A. A.	100					СТ	CONTAC	Т			L	CHLOR	ITE	17	1
FRAC	1-Natural 2-Maybe	(Natural or	Mech.) 3-1	lechanical			1.1			F	FAULT			1.22.20	Q	QUART	z	1.1	1.1.1.1
CONF	CONFIDENCE - 1	-Poor	4-Excelle	ent		a dal 1				FC	FAULT C	CONTACT			С	CLAY		1	. 3
DIFF. ANGLE	ANGULAR DIFFERE	INCE BETWE	EN TOP LI	NES			1			SZ	SHEAR	ZONE		1	A	ANHYD	RITE	-	
CALL &	NICHOLAS. I	NC.		file: or	core_form	n_toro11-	-m.dwa				*	1	1.22.24					AR	AN7A7U

PROJECT	Aranza	zu De			ITED	CO		EAF AST			SĻE	ET	(M DATE -		$()_{10}$	PA	GE _	<u>د</u> B۲	0	F <u>7</u> ZAO HQ3
REF. ANGLE (REF. LINE TO TOP OF	DEPTH FROM START OF RUN	RC	OCK TYP	PE	STF	RUCTURE		N /	FILL		G		DRILL FROM	RUN COL	DEPTHS LAR (M)		S L I	F C R C		FF. GLE INITLS
HOLE LINE)	(M)		Z	3	TYPE B	CIRC. ANG.	DIP		(cm)	+		1 2 2		0	125	93	5			
	0,0,0,0,0	H, F, L			1	1 1	1	$\overline{\mathbb{N}}$	1.1.	t	1	1,0,0	1.0		1	• • • • •		2		
1 24 0	02.00			1 1 -	CTR	221	42		00.0	1	1 6				- J		N	1 .	3	
0,9,0	0.0.0.1.2			1 1	SJU STT	003	51		00.0	1	L	12	2.8	S	1.2.5	. 7 :	SN	23	2	
-10,7,8	0,2,0,8,3	PDD	1-1-1	1 1	2,21			N				12.	5.9	5	1.2.9.	.05			-	
	00.00	PPP	I	. L. L.		1 1	1	N		$^{+}$		1.2	5 9	5	1,2,9,	. 05				
- 291	0,5,0,0	V, F, IS		1 1	STR	271	61		00.5			1.2.9		5	1.3.2.	. 1.0	5 N	2.0	2	1
0.6	001.00	. 1 1		1 1	VNB	142	20	-	00.2	Ŧ	5.4.		1			• • • •	N	10	f	
	00.00	- 1 (1	<u> </u>		VNT	006	47		0.1.0	)	5.					• • •	N	1	3	
<u> </u>	01 27				NNB	13.6	33		00.5		5.		/		· VI	• 1 1	N	1	3	1
- 3 3 (	0224	PPR			STT	0.5.6	3.3		0.0.0		L.S.	1,2,0	1.0	,5	1,3,2,	.,15	N	2	2	1 1
12 12 10	00.00		1.50-1		12101			N		T		1,3,5	2.1	O	1,3,5,	• , 4. 5	3		-	
	00.30		<u></u>					N			1 1		(1.1	1		•			-	1 1 1 -
-284	01.05				5.5-	10.5.4	5.8		0,0,.0	3	SL		1.	1		•	N	2	3	1 1
	01.35		- Sector		5.5 B	1.6.8	6,2		6,0,.0	C	SL	E 1	1			•	N	1	4	
	0.1. 44			1	SJB	1,5,2	456		00.0	5	N		1			• 1 1	N	11	3	1
	0.1.46				SJA	0,5,0	5,8		00.0		5			1		• 1 1	N	1	2	1
	0.1.49				SJB	134	58		00,00	Ð	N		1.1	1		•	N	1.	3	1 1
	01.50		and r	4 1	8			N	1 1.				1.	_		•			100	1
	0.1.58		-					N	1.1.		1 1	1 1		1	1 1	• 1. 1			-	1 Para and
	01.59	Erlin			SJ7	0,9,0	3,3.		0,0,0	2	OLS	1 ale	1.4.3	1	1 1	•	Y		2	1 1
	0,2,.,21	1 de	1.13		SJT	10,9,2	48	1.	0,0,0,0	)	S.L.		/1 • 1	130	1 1	•	N	1	5	1 1
V	0,2,.65			i sa	VNK	0,8,8	44		0,0,.5	5	6,5,	1	1	1	170	(hing)	P		5	<u>r 1</u>
-254	0,2.,8,5	P,P,B		E I	5,5 6	3 1,6,2	-6,3		0,0,0	)	54	1,5,	2.1	0	1,3,5	• 4	500		5	
:			1 1	1 1		1					<u> </u>	1 1	11.01	ć.	1_1	•	1		8	
	MISCEL	ANFOUS			ROCH	( TYPE	ABBR	EVIA	ATIONS	S	TRUCT	JRE TY	PE AE	BRE	VIATION	S FIL	LING	AE	BRE	VIATIONS
REF ANGLE	"+" FOR TOP EN	D OF CORE.	"" FOR	BOTTOM				10		SJ	SINGLE	JOINT	FO	FOLIA	TION	NI	NONE	x	P	SERPENTINE
T/6	TOP OR BOTTOM	END OF FR	ACTURE						N	VN	VEIN	14	2	1	,	X	OXIDE	10	T	CALCITE
N/W	N-NON ORIENTAB	LE W-WHO	LE CORE	- pa				4	E	BD	BEDDING	•	-			S	SULPH	IDE		
S⊔C	SLICKENSIDES -	YES OR NO	1		1. C.					СТ	CONTACT	6				L	CHLOR	ITE		
FRAC	1-Natural 2-Maybe	(Natural or	Mech.) 3-1	lechanical						FT	FAULT				2.	Q	QUART	Z		2.1
CONF	CONFIDENCE - 1	-Poor	4-Excelle	ent	1.1	÷				FC	FAULT C	ONTACT		1		С	CLAY	1		1
DIFF. ANGLE	ANGULAR DIFFERE	NCE BETWE	EN TOP LI	NES			-		1	SZ	SHEAR Z	ONE	1		alla a	A	ANHYD	RITE	-	87. 
CALL &	NICHOLAS. I	NC.		file: o	core_form_	toro11-m.	dwa				- · · 24	1.1.4			-		1		A	RAN7A7()

PROJECT	Aranza	zu	0	RIEN	ITE	D CO	RE		DATA	SHI	EET (I	ME	T.)	PAG	E	7 BY	OF . Z	7 AO
LOCATION .	GHP-GMX-	06	INCLI NORT	NATION_ 'HING			_ D	LAI AS	TING			VATIO	N			DIA.	Н	Q3
REF. ANGLE	DEPTH FROM	RO	CK TYP	Έ	S	STRUCTURE	Ξ	N	FILLI	NG	DRIL		DEPTHS		S L	FCR0		
(REF. LINE TO TOP OF HOLE LINE)	START OF RUN (M)	1	2	3	TYPE	B CIRC. ANG	DIP	w	THICKNESS (cm)	TYPE	FROM				c	A N C F	ANGLE	INITLS
	0.00.0	P.P.B				1.1		N			1,3,5,.,	15	1,3,5,.,	65			1	1
	00.50	1						$\mathcal{N}$	1 1 1	1 1	135.	1,5	135.01	6,5		_	1	
	0.000		1 1 -	1 1		1 1	E.	W	- 	1 1	1,3,5,.,	6,5	1,36,.,	45				
	0.0. 8.0		1 1					M		1.1	1,3,5,.,	6,5	1,3,6,.,	45	+	-		
	0.0.00							$\sim$	1.1.•1	1.1.	1,3,6,.,	45	1,3,8,.,	80			1	
	0.2.35		1				1	N			1,3,6,.,	45	2,5,8,.,	80		-	ī	
	0.000						1	N	1 1 • 1		1,3,8,.,	80	1,3,9,	85			1	
	01.05		1			1 I I	1	N			1,3,8,.	86	1,3,9,.,	8,5			1	
	0.000		1 1			1.1	1	N			1,3,9,.	\$5	1,4,2,.	85			1	
	0.3.00		1. 12	1 1				N		- <u>-</u> -	139.	85	1,9,2.	8.5				
	0.0.00						1	N			1,4,2,0	85	145.	85		-		
	6.3.00		1 1	1 - 1				N			1.1.2.	85	1,4,5,0	85				
	0.0.00			1.1	1. C.			N			1,4,5,.	85	1,4,8,0	90	, I I I			- 1-2
	0.3.10	1.1			1.			N	1		145.	85	1,4,8,.	9.0		-	1	
	00.00	· V.	-					N	1.1.	1 1	1,4,8,0	90	1,5,0,0	40		_	1	
	01.50	PPB	1 1	i	1			$\lambda$	1	1.1	1,4,8,0	9 P	1,5,0,.	,4,0			1	
			1 1						1. I.I.I.	1 1		Î	•	1				1
		1	1.1.1	1.				Ľ	· · · ·				· · · · ·	1 1	-	-	1	
				1.1.1					1 1 • 1					<u> </u>			1	• 1
								1	1.1.		•	<u> </u>		L		-	1	
							6		1 10.01	1 1		1 1	1 1	1 1		13	1	1
				1						1.1				1	-			
				1.1.1.1					1	1.1				1_1_	-		1	
		1.1	10 11	I I	1.								·····	<u> </u>	-		1	
1 1 1			i i	1.1.13					the real				<u> </u>	1 1				
	MISCELL				RO	CK TYPE	ARBR	FVI	ATIONS	STRUCT	URE TYPE	ABBR	EVIATIONS	FIL	LING	ABE	REVI	ATIONS
	THE FOR TOP EN		"_" FOR	BOTTOM					s	J SINGLE	JOINT FO	FOL	ATION	N N	IONE		P SEF	PENTINE
TL		END OF FR		DOTTOM					. v	N VEIN	- "x 1			x o	XIDE		T CAL	CITE
N/W	N-NON ORIENTAB	LINE W-WHO	DLE CORE						В	D BEDDING				S S	ULPHI	DE	_	
SUC	SLICKENSIDES -	YES OR NO			1				C	T CONTAC	т			LC	HLORI	TE	_	
FRAC	1-Natural 2-Mavbe	(Natural or	Mech.) 3-N	lechanical				•	F	T FAULT		+		QC	UARTZ	<u> </u>	-	
CONF	CONFIDENCE - 1	-Poor	4-Excelle	ent					F	C FAULT (	CONTACT			CC	CLAY			<u> </u>
DIFE. ANGLE	ANGULAR DIFFERE	NCE BETWE	EN TOP LI	NES					5	Z SHEAR	ZONE			AA	NHYDF	RITE		
CALL &	NICHOLAS I	INC		file: o	core_for	m_toro11-m.	dwa	ē									ARA	N7A7U

# **ORIENTED CORE DATA SHEETS**

DRILL HOLE GHP\_GMX07



PROJECT LOCATION HOLE NO.	Aranza:	zu	O INCLII NORT	RIEN	ITEC	0 00	RE B	EAF AST		4	SHE			T.) //2/17 N	PA		) BY DIA	0	F 14 ZAO HQ3
REF. ANGLE (REF. LINE TO TOP OF	DEPTH FROM START OF RUN	RC	CK TYP	Έ	ST			N / W	FIL	LIN SS	G TYPE	DF F	RILL RU	N DEPTHS DLLAR (M) TO	*		R C A N C F	DI AN	FF. GLE INITLS
HOLE LINE)		1 110	L		IYPE B	CIRC. ANG.	. DIP	N	(0111)	+		$\Delta 0 0$	0.0	008.	75	5			
	0.0.00	LMIS	1 1	1 1	- 1			A)		+		000	. 00	008	7.	5	14		
	0,8,.,12		1 1		VIIC	727	00	ľ.	10	E	TIS	008	. 75	011	7.	SN	27	-	
0.0.0	0,0,.,16	- 1 - 1				1 41	51		00		15					N	21		
	0,0,.50				CTR	171	US		$O_{0}$	0	25					N	13		
	0,1,.,,,,		1-1-5-2		JNT	200	3)		0101	0	1. ST					N	14	1	
			1 1	Ser La	STR	261	80		00.	$\circ$	N					N	23	-	
	07 19	<u>~ 1   1</u>	1		VINT	246	20		02	$\overline{O}$	L.T.	1				N	1 4	1	1
	02 34	1 1			STI	758	57	1	00	U	N		• • •	2.		N	13	3	
000	02 49				VVI	198	30		0.0	0	L.5.	0.0.8	.75	0,1,1,.	7.	5N	1	3	
				2	0,00			N				0,11	.75	0,1,5,.	, 8,0	2			
	DU DE	INS	l. l					N				0,1,1,	.7,5	0,1,5,.	,84	7			
	0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,							N			1	G1,5,	. 80	018.	3 (	2			
1	02 50							N				Q1,5,	. 89	0,1,8,.	,34	2		1	1
- 3 30	0015				551	326	3.6	T	0.0.	6	N	018	.30	0,20.	86	2 N		3	1 1
7 7 0	00.45	LMS	25	-	VN	- 347	28		01	5	T	Q1.8.	.30	0,20.	,8	ON	1.	3	
-13010								N				0,20,	. 80	0,2,1,.	,89	0	3		1 1
. <u> </u>								N		1		0,2,0	. 80	021.	84	)	· · · ·		1 1-
· · · · · · · · · · · · · · · · · · ·	00.60	LMS						N			-	0,31	.80	0,2,3,.	,4,	5		- 5	1 21
	00.45							N		1			• 0 - 0		1 1				1
0000	00 58		-		5.51	3 2,80	65	T	Ô,ũ,.	0	N	V	• 1 1	i. l.		N	1	3	1
000	01.21				NNE	3092	4,8		0,0,.	5	T	0,2,1	. 80	0,2,3,.	,4	SN	1	5	
	0.0.0.0							N		1		0,2,3	. 4,5	0,2,5.	15	5		2	135
	0.2.10	LMS				T. F.	1	N		1		0,23	. 45	0,2,5,0	5	5			
	-								1.	1		1 1 1 3	•	1 1 1 •	1				
	MISOFU	ANEOUS			ROC	K TYPE	ARRR	FVL	ATIONS		STRUCT	JRE TYPE	ABBR	EVIATIONS	FIL	LING	AB	BRE	VIATIONS
	MISCELI	ANEUUS	7 7 FOR	POTTOM			ADDI			SJ	SINGLE		O FOL	JATION	N	NONE		P	SERPENTINE
REF. ANGLE	+ FOR TOP EN	END OF CORE,		BOTTOM				22	-	VN	VEIN	1	.2		x	OXIDE		Т	CALCITE
	IOP OR BUITOM		ACTORE						-	BD	BEDDING	· · · · ·	2		s	SULPHI	DE		
N/W	N-NON ORIENTAD		DLE CORE		200					ст	CONTACT	1			L	CHLOR	τε		-
	1 Nature 2 Martin	Natural ca	Mach \ 3.	(echapical					5	FT	FAULT				Q	QUARTZ	2		T's
CONE			4-Evcelle	nt		4	-			FC	FAULT C	ONTACT			С	CLAY			and the second
	ANGULAR DIELEPE	NCE BETWE		NES						SZ	SHEAR 2	ZONE	2		A	ANHYD	RITE		1. A.
CALL &	NICHOLAS. 1	NC.		file: or	core_form	toro11-m.	dwa			1	the .							A	RAN7A7U

PROJECT	Aranza	zu		RIEN	ITE	D	CC		FAF		7	SHE	EET	(N DATE	1E	6/13/17	PA	GE	R BY	_ OF	ZAO
HOLE NO.	GHP-GMX-07	7	NORT	HING				E	AST				[	ELEV	IOITA	۰			D!/		HQ3
	DEPTH FROM	R	OCK TYP	E	9	STRU	CTUR	E	N	FIL	LIN	G		DRILL	RUN	DEPTHS		S L	F C R C		1
(REF. LINE TO TOP OF	START OF RUN (M)	1	2	3	TYPE		C. ANG	DIP	w	THICKNES (cm)	SS	TYPE	FR	ROM		LAR (M) TO		-   c	A N C F	ANG	E INITLS
HOLE LINE)	00.00	LMS				-	1 1		N				0,2,5	. • . <sup>2</sup>	5	0,2,6,.	80	)	-		
·	0.1	Lms	PPB				1	1	$\sim$	1 1 <b>•</b> 1		1 3	0,2,5	. 5	5	0,26.	89		-		· · · ·
	0,0,.,0,0.		. 1	1 1			1 1	1	N	• .		1 1	0,26	8	0	0,2,9,.	,96	7	_		
	0.07.3		1 li		1		1 1		N		_	1 1		1.	-		11		1 2	+ -	
10,0,0	0,1,.3,0	, V.	V	E E	VN	BO	13,4	23		0.0.0	2	TL	1.1.1	/ • •				N	15	1	
0,0,0	0,2,0,5,8	LMS	PPB	1	SJ	TU	,0,6	4,1	2	00.	0	T <sub>1</sub>	0,2,6	<u>, • 18</u>	9	0,2,7,0	110		1 0		9
1.1.	0,0,.,6,9	PP.B	L, M, S	-	VN	TI	73	6,1		0		4,5,5	0,2,9	• 9	0	0:5,7	1,1	U N	0 0		
	01:12	ili	1.11	1 7	VN	ß	17,2	72,7	1	0,4,	Ø	THE		1.01	-	<u> </u>	1		1 0		
	0,1,.,2,7				5,5	Tr	104	6.0	_	0,0,.	0	N		1.	-		1_1	V	00	4	
	61 44			1	VN	B 1	1313	121		03.	2	C, L /		· • ·			1	- K	2	2	
	0,1,.,5,3	The state			SJ	TI	15,6	5,1	1	0,0,.0	2	N		1.01			1_1		27	21	
V,	01.85	V	1 VI		5,5	BC	10	4,3		0,0,0	0	N	4111	1		070	9	O AL	21	Q	9
000	0,2,1,3	P,P,B	LIMS	1 1	5:5	TI	7,3	4,5		60.	0	5	220	<u>), • , ĭ</u>	7 0	026.	11	2	~ 1		1
1 11	0,0,.,0,0	L,M,S				1	1 1		N			1 1	0,5,0	4	1.0	0,3,2,0	69				
3. 14	0,1,.7,5			1.1		1k					-	<u>.                                    </u>	1	1.01					2		. 1
	0,1,.8,8	-		1.1	53	1	13.6	245		$0_{0}$	U	N		1.	1	<u> </u>	1 -1	N	2	2 1	
	0,2,.13	1Vi			5,5	15 (	1,5,2	- 65		0,0,.	0	N	0.2-	2	10	035	6	0	6	2 .	5 1
0,0,0	0,2,0,2,6	LM 5			VN	T	2.20	- 6,8	5	0,1,.	0	LCS	0,5,	<u> </u>	10	021			1	2	1
	0,0,0,0,0	MBL	the i		1		1		N	•	-	<u> </u>	0.513	> • • •	00	2,5,6,0	6	0	1	1	
	0,1:0,00	MBL		1			11		N	1	-	F	0,5,5	1.01	5.0	0,5,6,	16	0			
	00,0,00	MBL					1	1	N	· · · ·	i.	1 - 1	0,5,6	01.01	60	0,3,1,.	17	0	.5.04		81
1 1 1	0,2,.,8,0	MBL		122			1		A	1.1.	1	1-1-	0,7,6		210	047	17	0		2	
	0,0,0,0	MBL	1 . 1 .	Trane.	1		1 1	-	Λ.	1	1		0,5,9	C1 • 1	40	0,1,0,0	14	2		120	
	0.2.80	MOL	·	1.1	1		1.1.		· 1	j 1 4 •	1	I F	0, 2	/	10	0, 1, 6,	10	P			
	• • •				1		1 1	L 1			1	1.1.1	1	1.01	1		-				
Contraction of the second	MISCEL	LANEOUS	S		RC	CK	TYPE	ABBR	EVI	ATIONS	5	STRUCT	URE TY	PE A	BBRI	EVIATIONS	FI	LLING	AB	BRE	/IATIONS
REF. ANGLE	"+" FOR TOP EN	D OF CORE	, "-" FOR	BOTTOM							SJ	SINGLE	JOINT	FO	FOLI	ATION	N	NONE	Ч., , ,	PS	ERPENTINE
The	TOP OR BOTTOM	END OF FR	ACTURE	1			1080 3				٧N	VEIN		-		.a	X	OXIDE		ТС	ALCITE
N/W	N-NON ORIENTAE	BLE W-WH	OLE CORE			<i>e</i>		10			BD	BEDDING	-				S	SULPH	IDE		
S⊔C	SLICKENSIDES -	YES OR NO	)	100	*		8 9 1				СТ	CONTACT	Г					CHLOR	ITE		
FRAC	1-Natural 2-Mayb	e (Natural or	Mech.) 3-N	lechanical				N.			FT	FAULT					Q	QUART	Z		
CONF	CONFIDENCE - 1	-Poor	. 4-Excelle	ent							FC	FAULT C	CONTACT				C	CLAY			
DIFF. ANGLE	ANGULAR DIFFER	ENCE BETWE	EN TOP LI	NES		1.				1	SZ	SHEAR	ZONE				A	ANHYD	RITE		
CALL &	NICHOLAS.	INC.		file: o	core_for	rm_tor	o11-m.	.dwa												AR	AN/A/U

PROJECT LOCATION	Aranza	Aranzazu ORIE INCLINATION INORTHING					RE	 EAR			SHE		(ME	ET.) 6/14/1	РА 7	GE	己 BY	_ 0	F <u></u> ZAO HQ3	<u> </u>
HOLE NO.	GHP-GA	18-07	NORT	THING			_ E/	AST	-ING				LEVAI	ON			DIA			
REF. ANGLE	DEPTH FROM	RO	CK TYF	ΡĒ	st St	RUCTURE	*	N /	FILLI		3		DRILL R FROM C	UN DEPTHS COLLAR (M)			FC RO AN	DI	FF.	
TOP OF HOLE LINE)	(M)	1	2	3	TYPE B	CIRC. ANG.	DIP	Ŵ	(cm)		TYPE	FF	ROM	TO	•	Ċ	CF	AN	GLE IN	TLS
	0.000	MBL	а. т.:-	r 3			1	$\mathcal{N}$	· · · · ·	L	Ĉ.	0,4,2	10,2016	20,4,4,.	0	5		-	15	P
	.4. 8.5	MBL	1 1 -					N		L	1	0,4,2	· · Zac	2014.4.	0	5	- 7			
+1:54	6.54	MBL	1 1		STT	1,5,6	.6.8			4	S.T.	0,4,4	1.05	045.	Br	ON	42	-	-	<u> </u>
	.0. 7.8	. 1 .	1 1		BBT	0,1.8	26		6,0,0	L		1.1			1	N	12	-	1   ·	-
	1.0.3			1 1	5,51	1,4,6	59		0,0,0	2	5:4	SCL		- · · · · ·	1	N	25	>	-	
	1.10	T			55 F	262	32		0,0,00	4				•	0	Y.	1 2	-	1	
4154	160	MBL	15.1	1.1	5,51	0,7,8	66		0,0,.,0	1	VI	04.4		50,45.		ON	1 2	>		
1190	.04.1	X/AK/5		1 1	BDF	334,0	24		1.0	1	C.L.	0.4.5	1.86	0,4,7,.	4	5ĭ		2	1	-
FILLER	.0. 4.6				SJT	- 334	5,3			)	N.		4.			N	4 2	>	1	1
41.9.0	.0 7.8	1.1.1.1	1 - 1		5,51	31,0,8	4,2						1.	Y.	1	N	15	>		
1.0.0.0	1. 6.5						1	N	•		1 1	0,4,5		0.4.7.	14	5	-	-	-	
	.000		I	1.1.	55	3130	64	N				0,4,7		5048.	1	0		-	1	
	1.45			211	50	10,9,4	-7-	N			1 1	6,4,7	7 4.	50,4,8,0	. 7	0			-	1
	0.000					2.5		N		1		0,4,8	3 9 1	0,5,0,.	,3	0		-	1	
15000	0.13			-	557	51,30	64			>	Tin	- 15 - 51			1	N	1	2	1	
1	0.73		-		5.51	509.4	7,2		0		r,L,	1 1	• • •	- Li-	1	N	2	5	1.2	1
	6 37				457	0.50	6.8			)	T,L,	·		1.1.	1	N	4	>	1	1
	0.84		-		BDF	52.3.8	20	>		27	ALL.		· · · ·		1	N	1.	5	1	1
7	0.97				8.01	329.0	30		0	2	ALL	1 1	1.	1	1	N	1	3	-	1
150 20	1.10				STR	529.6	8.0		1. 1. 0	21	N.	0,4,8	3 9.	00,5,0.	3	ON	3	3	-	
101010	0.54				557	1294	16.4			>i	N	0,5,0	7. 5.	00,511.	14	SN	1	3	1	-
<u> </u>	0.71				4.77	6030	7.9			>	N	0,5,0	)	00,511.	4	SN	2	3	1	
	0 94				5.5	0.06	, 6.6	,			NI	0,5,0	1. 34	20,5,1,.	14	5N	2	3	1	1.
- I - I - I	1.02				651	5260	7.6		0	2	Tra	0,5,0	1 3.	0651.	,4	5N	2	1	1	
	00.00	5						W				05	4.	50,51.	,6	5			1	
		1 20	-							0	TPUCT	IPE TY		REVIATIONS	FI	LUNG	AB	BRE	VIATI	ONS
- 14 Sec	MISCEL	LANEOUS	S		RUC	KITPE	ADDRI		ATIONS	1	SINCLE		EO E		N	NONE		P	SERPEN	TINE
REF. ANGLE	"+" FOR TOP EN	D OF CORE,	"-" FOR	BOTTOM					J	70 701	VEIN				X	OXIDE		т	CALCITE	E
1/8	TOP OR BOTTOM	END OF FR	ACTURE	2					B		BEDDING	• •	-		s	SULPH	DE			
N/W	N-NON ORIENTAE	ILE W-WHO	LE CORE			*				יד	CONTACI	, г			L	CHLOR	TE			
SLIC	SLICKENSIDES -	YES OR NO						-			FALIET				0	QUART	2		S. Cal	
FRAC	1-Natural 2-Maybe (Natural or Mech.) 3-Mechanical											ONTACT			с	CLAY			1.	
CONF	CONFIDENCE - 1	-Poor	4-Excell	ent						27	SHEAD	ZONE			A	ANHYD	RITE		Sec	-
DIFF. ANGLE	ANGULAR DIFFERE	ENCE BETWEI	EN TOP LI	NES		tere11	dwa	1	]	1	STIDAX .		1		de la	12		A	RAN7	A71
CALL &	NICHULAS. I	IVC.		TILE: O	core_torm.		uwu													

PROJECT LOCATION HOLE NO.	Aranza	zu x- 07	O INCLI NORT	RIEN	ITED	0 CC	DRE	EAF AST	DATA RING TING	4	SHE	EET	( M DATE _ ELEVA		5/14/	PA(	GE	9 BY DIA	_ OF	ZAO 5 HQ3	in r
REF. ANGLE (REF. LINE TO TOP OF	DEPTH FROM START OF RUN (M)	RO 1	CK TYF	PE 3			E G. DIP	N / W	FILI THICKNES (cm)	LIN s	G TYPE	F	DRILL FROM ROM		DEPTHS LAR (M) TO		S L - C	FC RO AN CF	DIF ANG	F. LE INITL	_S
HOLE LINE)	00 70				inc o	1.61	1	N			1 1	0,5	4	5	0.51.	161	5		1		_
-228	00.00	M.B.L	1.1.1	1 per p	VNT	51.4.2	274		00.	2"	Τ	0,5	1.6	50	2,5,4,.	,7,0	NC	13			-
	0.0. 4.7			· · · ·	SJT	0-1,6	54.1	۲.	0,0,.0	0	R		4.		· · · · ·	1. 1	N	1			-
	00. 56	1.1.1.1.1	1	· · · · · ·	VNT	1.8.	13,6		0.0	2	TL	i i	<u></u>	-			N	45	2		-
V	01.94	1.1			VNE	51,8,0	03,5		91	0	Til		( • · ·	-	000	22	10	2 3	>		-
- 228	0,2,.,80	MBL		1 1	SJE	2101	275		00.01	$\mathcal{O}($		0,5,1	16	S	0.2.4.	36	2	43	2 1		6
	00.00	1).	i		1	11	1	M		A	1 1	0.7	1. • · ]	0	077.	21			-	-	-
	6.0.60		1 1	1 1			211	~	1 1 1		T	0.5	· · · ·	0	457	8	100	1 3	2		
-1,10	00.90			- I - I	507	5.40	149		0,0,•,	0			1.01	Y	asili	1010	N	1 3	3		
	0095				SDE	1.50	221	-	<u> </u>			1 1	1.	-		4.1	1	1 3			
<u> </u>	0,1,.3,5		1_1_1	1 1	6,0	51,20	024	-	•	2		1_1_1		-			N	1 -	2		
<u> </u>	01		1	1 1	120	21,00	2 4 7			X.	30	1 1	•				N	12	-		
	91	1.4	I	1 1 1-	001	1.6.0	2 2 2		1	X							N	7 7	3		
	0,15.3		1	1 1	BUT	2 24	2 72			0	$\sim$	. 1 1					N	3	5	1 34	
110	0, 4. 9,7	MIL	1 1	1 1	ROI	09	0 22		1 1 1	0	AC	05	5.3	0	0.57	8.0	SNC	13	3		
-, 1, 1, 0	0.6.00	1150	<u> </u>	1 1	1/1/1					~		05	7. 9	0.0	660	. 8	0		1		
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	0.90.0			<u> </u>				N				060	2 8	0	063	10	2	-			
	07 20	UFL	<u> </u>				-	Ň				0.6	0. 8	30	063	. 1.	0				
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	00 16	FUL						N			1 1	1 1		1		• 1 1					-
	00 40				CTP	51.6.	459		00.	0	N	E I		1		•	N	Z-	3	1 1	
	0.0. 4.1							~	)		11	1 1		1		•	_				_
	0.0. 5.5						- 1 C - 12	$\wedge$	-		1 1	0.6	31	,0	0,6,4,	. 7.	S.				
	NICOEL				POCI		ABBR	EV/L	ATIONS		STRUCT	URF TY	PE AB	BRE	VIATIONS	FIL	LING	AB	BRE\	VIATION	NS.
·	MISCEL	LAINEUUS	" <sup>®</sup> 500	POTTON	ROCI	K III L	ADDIN		mono	SJ	SINGLE	JOINT	FO	FOLIA	TION	NI	ONE		P S	ERPENTI	NE
REF. ANGLE	"+" FOR TOP EN	D OF CORE,		BUILOW			- 4			VN	VEIN	17	2			X	DXIDE		тС	ALCITE	
	TOP OR BOTTOM		IE COPE							BD	BEDDING	;				S S	SULPH	DE			
		YES OP NO	LE CORE			61 m	11			ст	CONTACT	г		8		L	CHLOR	ΠE			
	1_Natural 2_Maubi	Natural or	Mech ) 3-4	Mechanical						FT	FAULT					Q	QUART	Z			
CONE	CONFIDENCE - 1	-Poor	4-Excelle	ent			V.		25.00	FU	FAULT C	CONTACT			a - 12	C	CLAY	10		+	
	ANGULAR DIFFER	ENCE BETWEE	IN TOP LI	NES					1	sz	SHEAR	ZONE				A	ANHYD	RITE			
CALL &	NICHOLAS	INC.		file: or	core_form_	_toro11-rr	n.dwa		2										AR	AN7A7	7[]

PROJECT LOCATION	Aranzazu		ITE	D CO	RE BEA		DATA		SH		(M DATE	ET.)	PA(	GE	BY	_ OF Z	14 AO Sur 1Q3
REF. ANGLE (REF. LINE TO	DEPTH FROM START OF RUN	ROCK TYPE					FILLI		G		DRILL F	RUN DEPTHS COLLAR (M)		S L I	F C R O A N	DIFF	EINITLS
HOLE LINE)	(M) 1	2 3	TYPE	B CIRC. ANG.	DIP	Y	(cm)			5/ Z		20 24	70	SM	13		SD
-0.8.8	00: 56 HIFL		VIN	11P1, 60	30	0	2.0.0	2		0.6.2	1.1.1	0.04.	1 10	N	12		1011-
<u> </u>	00.85		VIN	DUL	24	6	$\frac{1}{00}$	1	6		1 • I _ I			N	1 -	2	71
. V .	0.09.1		30	1 CO 1	30			21	10	· · · · ×	3.1.1		1 1	N	1 :		
	0101		SD	7771	24	- 13		5	44	0.62	· · · ·	0064	22	5 NJ	1	<	1/10
-0.8.9	OI. II HFI		PD	1619	47	1	00.0	4	<u>L</u>	064		5066	50	5	1		
- I I	0.00.0	· !!		1 1	1			+	1 1	A1 4	- 7	5062	5	5			1
	0,1,.,0,0,,,		- 1	1 1 1			1 1 1 1	Ŧ	1 1 -	066	- 5	5068	40	5	1	1	
	0.0.0.0		1			N		+		066	5	5060	4	0		1./.	
· · · · · · ·	01.05		1.1	R117	00	~	000	2.	T	060	) 4	0070	0.0	SN	17	3	
	00.34 H.F.		VN	TITH	EQ	-			1 .	068	1 4	0070	01	N	13	5	
	00.54		510	RAUD	50			5	<u> </u>	0,0,0			1 N	N	1 3	3	
	00.11		23	2032	76				A)					U	13		
	00.01		27	DULLO	43			5	N					Ň	27		in and
	0.0 9.6		27	2757	FQ		0000	5	T					N	2-	3 20	1.47
	01.77		23	6010	20		00.00				7	the second secon	7	N	13		
	01 40 4		23	- 0734	60		00.00	0	A	06 1	3.4	007.0.	.0.	ON	1	3	
	0,1,.7,2,4,1,		27	0434	21	3	0.0	~		070		0071.	30	0	24	The second	
-1-1-	00.00				1	N		+		070	2.0	0071	20	0			
	01.30					A)		+		071	3	0073	.0.	5			1
	00.00	1 1 1				N		+		071	5	0073	0	5			
	0,1,.15							+	1 1	07.	3 0	5073	8	5			
- 1 - 1 - 1 1 1 1 1 1 1	00.00	<u> </u>		1 1	1	2		-		07	3 0	5073	8	5		1	· Valer in
	90.00		1			1		+		073	3 Q	5075	8	5			
I I	V. 0.0. 00				1.	N	•	-		073	8	5075	9	5			-
	02.00		1					-	Lt. L	14			Leu		4.0		ATIONIC
	MISCELLANEO	US	R	OCK TYPE A	ABBRE	<b>VIAT</b>	TIONS	S	STRUCT	URE TYP	PE ABE	BREVIATIONS		LING	AB	BREV	ATIONS
REF. ANGLE	"+" FOR TOP END OF CO	RE, "" FOR BOTTOM					9	SJ	SINGLE	JOINT	FO I	OLIATION	N	NONE	1	P SE	RPENTINE
T/B	TOP OR BOTTOM END OF	FRACTURE		Similar			1-1-1	VN	VEIN	1			X	OXIDE		T CA	
N/W	N-NON ORIENTABLE W-W	WHOLE CORE	1			100	E	BD	BEDDING				S	SULPHI	DE		
SLIC	SLICKENSIDES - YES OR	NO			1.17		(	СТ	CONTACT		1		L	CHLORI	IE	_	
FRAC	1-Natural 2-Maybe (Natural	or Mech.) 3—Mechanical					1	FT	FAULT				Q	QUARTZ			<u></u>
CONF	CONFIDENCE - 1-Poor .	4-Excellent		• .				FC	FAULT C	ONTACT	1		C	CLAY			
DIFF. ANGLE	ANGULAR DIFFERENCE BET	WEEN TOP LINES			10.00		2	SZ	SHEAR 2	ZONE		1	A	ANHYDF	RITE	4.5.4	AIZA 717
CALL &	NICHOLAS. INC.	file: o	core_fo	orm_toro11-m.d	bw						1					ARA	AN/A/U

PROJECT LOCATION	Aranzaz	20 		RIEN NATION_ THING	ITE	D	CO	RE BI	EAR AST	DATA RING		SHE	EET	(N DATE ELEVA		Г.) 6/16/	PAG	E 	6 By Dia	OF Z	11-1 AO SAV
REF. ANGLE (REF. LINE TO	DEPTH FROM START OF RUN	RO	CK TYF	ΡĒ	S		CTURE	-	N /	FILL		3		DRILL FROM	RUN COL	DEPTHS LAR (M)		S L I	F C R O A N	DIFF	E INITI S
TOP OF HOLE LINE)	(M)	1	2	3	TYPE		RC. ANG.	DIP	W	(cm)	+	TYPE	Fi	ROM	-	TC	)	C	CF	ANGL	
	00.000	HF.LI	LMS	1			t I	1	2		+	1	075	5. • . 8	5	0,7,6	· 155	$\vdash$	-		>0
	00:00	11.		1.12			1.1.		N	( ) • I	-	1 1	07.5	1 . 10	5	0,7,6,	· >>>			1	
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	01 20		, li	1 1		_	1 1	1	N	<b>_</b>	+	<u> </u>	0,1,6	21.1.2	2	070	• 4 0				
	00.00			- I I			<u> </u>	1	N	1 1 • 1	+	1.1	07	1. • 11	12	0,10	• <u> </u>		-		
	00 65	1hi	1	i i			1_1	1	N				0,1,	2 1	15	179	• 70			-	
	0,0,0,0	V	V				1		N	P	Æ	1 1	0,1,0	0 1	10	17 9	- 20			1	
	00 90	HFL	Lms	1	- i	-	1 -1		N		4	1 1	0.1	<u>a •                                    </u>	10:	000	- 50		-	-	
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	01.20						1		~		4	1	0,1	<u>1</u> ••••	50	000	- 70				
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	0,1,.20			1 -1	1	_	11		14		+		00	<u>9.</u>	70	000	- 110 UH 2	-		-	
	00.00		1 1-				1 1			· ·	┡		00	1	20	121	. 5	-	1		
	07.85		L				1 1			1	-	- 1 - I -	00	1.	10	007	• 31	2			
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-230	0,0,.43	HFL			5,3	5-	231	50		90.	0	N-	0,8	7.00	12	0000	• 1413	-	13	2 1	
- 2,3,0	50,0,.50	1.1.1.	1.1	1 1	VN	IF C	20,4	1 20	1	91.	0	EI	08	21.13	r.D	0,0,2	· . 0.		-	1	22 1
	0.051		11		1				-		-	- î - î -	06	* · ·	a -	280	1	-		-	
	07.70	HFL	1 1	1.1	1		1 1		1		-	1 1	00	1 · · ·	22	0,0,0	+ G			1	
	00.00		L.M.S	1 1			1 1 -	1 1	N		-		081	01+1	01	991	• 0,0	-		1	
8 1 I I I	01.07						1		N	100.0	-	<u> </u>	11	1.	1		1 • 1 1	A )	7 1	2	
-275	5 2.00			1.1	55		94.8	981	-	00	0	N	1 1	11.	_i	1.1	. •	10	2	1	
	2.15				5,5	B	1,5,4	17.	1	00.	0	N	10	0.	10	061	•	201	7		
-27	5 2.52	, V, .	· V.		155	TI	0,6,6	10.8	3	00	$\mathcal{O}$	N	00	U, · L	6,7	0,7,1		10	-	11	1
	MISCELL	ANFOLIS	111		RO	CK -	TYPE	ABBR	EVI	ATIONS	S	TRUCT	URE TY	'PE Al	BBR	EVIATION	S FILL	ING	AB	BREV	IATIONS
	"+" FOR TOP END		"" FOR	BOTTOM		1 Save	-	-			SJ	SINGLE	JOINT	FO	FOLI	ATION	N N	ONE		P SE	RPENTINE
T/o	TOP OR BOTTOM	END OF FR	ACTURE				· · · ·		1		VN	VEIN	5 . T	2			X O	XIDE		T CA	LCITE
N/W	N-NON ORIENTARI	E W-WHO	LE CORF				4	we tail	15		BD	BEDDING	;			and have	S S	ULPH	IDE		
SUC	SUCKENSIDES -	YES OR NO		1911			191				СТ	CONTAC	т				LC	HLOR	ПЕ		
FRAC	1-Natural 2-Maybe	(Natural or	Mech.) 3-1	Mechanical	-	1.1					FT	FAULT	S. S. S.				99	UART	z	_	
CONE	CONFIDENCE - 1-	-Poor	4-Excelle	ent							FC	FAULT (	CONTACT				C C	LAY	1.1		
DIFE ANCIE	ANGULAR DIFFERE	NCE BETWE	EN TOP LI	NES		11			10		SZ	SHEAR	ZONE			A Street of	AA	NHYD	RITE		
CALL &	NICHOLAS. I.	NC.		file: o	core_for	n_tor	o11-m.c	dwa	-											ARA	N7A7U

PROJECT LOCATION HOLE NO.	Aranza	zu 4-07		RIEN NATION _ THING	ITED		EAF AST	DATA RING		SH		(N DATE ELEV/		6/18	PA	GE -	7 BY DIA	_ OF	<u></u> <u>ZAO</u> -IQ 3	0
REF. ANGLE (REF. LINE TO TOP OF HOLE LINE)	DEPTH FROM START OF RUN (M)	RC	DCK TYF 2	PE   3		UCTURE	N / W	FILL THICKNESS (cm)		G TYPE	FR	DRILL FROM	RUN 1 COL	DEPTHS LAR (M) TC	ġ.	C	R O A N C F	DIFF ANGI		123 M
+000	n (1 . 1 D	UEL	IMS		557	29068		000	1 (	J	092	7	15	094	40	ON	23		SL	) 4
	00 47	TTT T			SJB	2.6.4 33		00.0	01	-		•			•	N	13	-	1	
1 1	00 <u>5</u> U				5大桥	06752		0.0 0	) 1	N		•			• 1 1	N	13		12	
<u> </u>	00.63				STB	258 71		0.0.0	21	V	1 1		1	1 1 1	•	D.N	23	>	-	
	00.87				STB	070 50		00.0	21	NA ·		•	1		•	N	13	5 1	1	
<u> </u>	00.91		11-1-		STT	27243		0,0,0	2	5. 1.	1 1	•				N	13	-		
<u>-      </u>	61 15		8		STB	27.024		(20 - 9	21		1 1		1	The last	<u> </u>	1	11	3 .		
	61 70				SJB	35847		00	1	L	1 1		56		-		113	1	1	-
	01 78				STT	7.7.4 4.2		00.00	>I	N.	Contraction 1	4.			Y.	1	1 2	5 1	1	
1.0.0.2	61 37				STT	15478		00.9	2.	J	09.2	++17	15	09.9	. 4	ON	33	1		
FI QI DI U	00 74		1 1					•		1.15	0.9.4		4,0	09,6	• 7	0			1	1
	00.73	7									0,9,0	1	40	0,9,6,	.7	0			1.	-
-094	00.24	651			5.5B	18654		00.0	0	N	0,9,6	. • .	70	0,9,8;	.5	A.A	11		50 Sec.	
	06 73	1-51 /in			VNT	30464		00.01	7	T			1		• ( <sup>27</sup> 4)	A	121	1	1	_
	60.94				5.5 B	280 75		00	01	V .	1 1 3	4.		1	•	A	121		1	
1 1	61 60				SJB	1.0.3 71		00	0	N.		V	1	V	•	N	12	1	1	
1 1 135.)	01.24				573	01476	2	00 1	0	N	046	2	7.0	0,9,8	. 5	ON	131	- 1		
	01 57	1000			LTB	182 43		0.0.0	0	N		4		4	•	1	121		· 6.45	
- 094	61 64	1 1	A		GTT	0.7.87.3		00	Õ	N	09,6	. • .	70	0,9,8	. 5	Dr	31	-		
-150	0 05	1 F			STB	2127.4	1	00	0	N,	09.8	5	50	8,4,9,	. 8	5 1	JZI	3	T	
	0 37				STB	1.4.0 8.0	2	00	0	N			1		•	$\wedge$	155	5	1	23
1 1 1	0.72		<u></u>		STB	21.06.8	3	00	C	N		1.1	1		•	1	51	3		
	0 79				557	09864	1	40	0	N	T IS	a • 1	1	1.1.	• 1	$\wedge$	B	3		
. 9 .	0.84				STT	0.2.464	·	0.0.	0	N		V.	1		• 15	(Take	VZ_	5		
-158	1 06	VAX			SJB	23075		0.0	0	N	09.9	3,	50	09.9	.,8	51	12	3		
131714					DOOK				C	TRUCT		DF A	BBRF		FI		AB	BREV	ATION	S
×	MISCEL	LANEOUS	5		RUCK	ITPE ABOR		ATIONS	2	SINCLE		FO	FOLK		N	NONE	1	P SI	RPENTIN	E
REF. ANGLE	"+" FOR TOP EN	D OF CORE	, "—" FOR	BOTTOM					VN	VEIN			1020		X	OXIDE	1.1	T C/	ALCITE	_
/B	TOP OR BOTTOM	END OF FR	RACTURE	N											S	SULPI	IDE	1	1.1	-
N/W	N-NON ORIENTAE	BLE W-WHO	OLE CORE					×.	CT	CONTACT	, T				L	CHIO	RITE			_
SLIC	SLICKENSIDES -	YES OR NO	)							FALLET	1			2 	0	QUAR	rz i	2	1.14	
FRAC	1-Natural 2-Maybe	e (Natural or	Mech.) 3-I	Mechanical						FAULT /	ONTACT				С	CLAY	-			_
CONF	CONFIDENCE - 1	-Poor	. 4-Excelle	ent			_		67		70NF		~		A	ANHY	ORITE			
DIFF. ANGLE	ANGULAR DIFFERE	ENCE BETWE	EN TOP LI	NES			N	- (117m	52	O.7	75.	101	10	RIDA	745	1		AR	AN7A7	Ū
CALL & .	NICHULAS. I	IVC.		tile: o	core_torm_to	Dwp.m-m.awa	X	. 71.10		76.	17 1	2011	10	VIEN	IN	4				

PROJECT	Aranzazu ORIE				ITED	) CC		FAF			SHE	EET	(ME	6/18/	PAGE	EE	<u> </u>	OF	19 10 SAD
LOCATION -	GHP-GM.	1-07	NORT	HING			E	AST			*		ELEVATI	ON		_ [	)IA.	HG	13
REF. ANGLE	DEPTH FROM	RO	CK TYP	Έ	ST	RUCTUR	E	N Z	FILLI	NG	;		DRILL RI FROM C	JN DEPTHS OLLAR (M)		S F L R I A	C O N	DIFF.	
(REF. LINE TO TOP OF HOLE LINE)	(M)	1	2	3	TYPE B	CIRC. AND	. DIP	ŵ	(cm)		TYPE	F	ROM	TO	0.2	CC	F	ANGLE	SID
-158	01.125	ERK		1 1	SIJB	1.4.2	10		0,0,0,0	N		0,7,8	21.126	- 09 9	95	NL	-		10
+000	0,0,,0,0		1 1	1				N		⊢	1 1	0,9,9	1.017	- 09 G	95				
	01.00		1		1			N	1 1 • 1	⊢	1 1	0,9,0	11.01	<u>- 100</u>	15				
	00.00		1 - 1	1 1		<u> </u>	-	N	1 1 • 1	┢	1 1	0,7,	6 6/	100	15				
1 1	90,020	i l		1 1	1			N			1	10	0 15	107	00	NI	3		
	60.10				551	208	11		0,0,.0	12		101	•		10 4	NI	3		
	0,0.96	1 1	_ 1		VNB	5.2.	43,1		01.0	Ł	1	i la							
	0.0. 97			1.1		1 1		N		╀			<u> </u>				1		
1 1	01.21			1 1			10	10	110 5			1 I				NI	3		
	01.22		<u></u>	1 1	VNT	15	1 27	+		Ł						NZ	3		1
V.	01.50		1 1		531	5 4 9	6 35	-	0000		1.	()	0.10	5107	00	17	12	1.1	
+000	61.76	N.	1 1	1 1	551	5 47	961	1.1	UPY	f	- I	10	1.01	1.0.4	.85				
+0,00	0,0,0,0	EGK		1 1			I	1	1.1.1	╀							1		
	00.40	MBL	1	L	1	e o o	- 72	Ĩ	001	1	U L					NI	3	1	
¥	0.2.07	11		, 1	321	2 7 1	LAN C	2	00 0		-	10	7.0	01.04	85	NI	3		day .
1000	0.2.6.7	1 1		1-1-1	5,31	2211	7,7,0	2	0.0.0.0	Ŧ		10	4.8	5107	75	-			1
	00.00		1	1 1			-	R		$^{+}$		1-1			• • •				1
1 1 . 1	01.04	N.	<u> </u>	1 1 - 1 -	10	2 12	VID	F	00 /	0	.)				• • •	NZ	23		
-0.22	0,1,.14	MBL			201		70	+	00.0	5	2				• • •	NE	33		T.
1.1.1	01.35	1.1			511	BOL	4 51	5	00 7	21					• 1 1	41	13		
	0,1,.,01		ES K		120	TOB	17	2	00.0	5					• 1 1	NI	3	>	1.
	0.2.11	<u> </u>	Enk	<u> </u>	ET	217	2 27	-	61.0	5					•	N	140	2	
	6, 2, 9, 7		1.1.1		P. P	110	2 43	>	/	T			V	2	Y			-	1
	0, 4. , 0, 0		1.1	1 1				1	V	+		10	4.0	5107	70	-			
-0,6,6	0, 4. 60	MPL	<u> </u>					_			TOUOT				<b>E</b> ILI	ING	ARR	REVI	ATIONS
	MISCEL	LANEOUS	5	•	ROC	K TYPE	ABBR	EV	ATIONS	5	TRUCT	URE T						P SEF	PENTINE
REF. ANGLE	"+" FOR TOP EN	ID OF CORE	, "" FOR	BOTTOM						SJ	SINGLE	JOINT	FU F	OLIATION				T CAL	CITE
Т/в	TOP OR BOTTOM	END OF FR	ACTURE	NY.				-		VN	VEIN				IS S		E		
N/W	N-NON ORIENTAE	BLE W-WHO	OLE CORE							30	BEDDING	э Т	-		LC				
SLIC	SLICKENSIDES -	YES OR NO									CUNIAC	•1			0 0	UARTZ		1	
FRAC	1-Natural 2-Maybe	e (Natural or	Mech.) 3-	Mechanical							FAULI	CONTACT		1	C C	LAY			
CONF	CONFIDENCE -	1-Poor	. 4-Excell	ent								ZONE	-		AA	NHYDR	TE		
DIFF. ANGLE	ANGULAR DIFFER	ENCE BETWE	EEN TOP L	INES		1	-			52	SHEAR	ZUNE		GF A				ARA	N7A711
CALL &	NICHOLAS.	INC.		file: c	ocore_form	_toro11-r	n.dwa												

PROJECT LOCATION HOLE NO.	Aranza	zu mx-o-	O INCLIN NORT	RIEN NATION_ HING	ITED	CO	RE B	EAF AST	DATA RING FING		SHE	ET [	(M DATE LEVAT	ET.) 6/19/ TION	PA 7	GE _	9 BY DIA	0	F ZAC	<u>4</u> ) <u>SM</u> D 3
REF. ANGLE	DEPTH FROM	RO	СК ТҮР	E	STI	RUCTURE	8	N Z	FILL		G		)rill í From	RUN DEPTHS COLLAR (M)		L	RC		FF.	
(REF. LINE TO TOP OF HOLE LINE)	(M)	1	2	3	TYPE B	CIRC. ANG.	DIP	ŵ	THICKNESS (cm)	s l	TYPE	FR	ОМ	ТО			ĈF	AN	GLE	NITLS
-0.2.2	02 67	MBL	1 1		SITT	1,51	78		00.	11	<u> </u>	1.0.4	· 8	5107.	73	50	1	5	-	20
-0.22	DZ 84	MBL	1 1	1 1	SJB	0,1,8	34		0,0,0,0	20	J	10,4	.0	5107.	1	SN	. C	5		<u> </u>
	00.00	MBL	1	1	1	1 1	1	N			1. 1.	1,0,7	• 7	5108.	1.	2	-		-	
	01 15	MBL		1 1				N			1.1	10.7	• 7	5100	1	2		-	-	1
0	00.00	)		т. р. (			1	N	1 1 • 1			10,8	• 9	0110.	ili	2		-		
-	(21.7.0					1.1	1	N				1.08	• 7	0110.	1	0			1	
	00 00			1 1		l a a	T.	2			1 1	11,0	• 1	0 112.	11	0			1	<u> </u>
	02.00					i ana		N		4	1 1	LLC	.1	0112.	1	0			1	<u></u>
	0.0.00							N				1,1,2	r.l	0115.	0	0		-	1	1
	07.90							N	1.1		1 - 1	41,2	- 1	0115	0	0		_	-	
	00.00							N	•		1	115	1.0	0116.	, 2,	0		-		
<u> </u>	61 270							N		1	1 1	1,1,5	.0	01,1,6.	12	0			1	1
	00.00							N			1	1,1,6	. 2	0119.	2	5			1	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	03 05				1			N			1 1	1,1,6	. 2	0119.	2	5	-		1	
	00 00		<u> </u>	- 1 - 1				N				1,1,9	. 2	51,21,.	is	5			14	
<u> </u>	07 20							N				1,1,9	. T	51,21.	5	5	1		1	1
<u>_</u>	0 9 00							N				121	5	5123.	,8	5			1	
<u>, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,</u>	00.00				1							121	. 5	5123.	8	5			1	2
	01 08	1	<u> </u>	1 1										4	1 -				1	
	01.00	NA BI						$\Lambda$		1		1.71	. 5	5123	8	5			1	State 1
1 1	01.00	MUL			5-4-1	034	50	1	00.	6	N	122	. 8	51.25	.5	ON	11	3	1	1
=, L, O, L	01.07			1 1	2	27.04	41	12	00	7	4	11012	1	1.1.	1 12	0	11	3.	4.3	
- UT	0			I	N. IM	7777	5-7		00	5	T		V	*	1	~	11	3		1
	0.1.03	1.	1	1 1 -	VAN	2050	77	1	01	Ň	The start	123	8	517.5	5	Or	JI	3		
-10,0	01.50		1_1_		170		150	-	00	Ň	~)	120	5.0	0178	5	51	10	3		
- 66	0.0	IN112C	1 1		5)1	7 21 1	/ 91-		0.0.							1.15.14		DDD		TIONIC
1.1	MISCEL	LANEOUS		1. J. C. Martin	ROC	K TYPE	ABBR	EVI	ATIONS	S	STRUCTL	JRE TYF	E AB	BREVIATIONS	FI		; AE	BRE		IUNS
REF. ANGLE	"+" FOR TOP EN	D OF CORE,	"" FOR	BOTTOM						SJ	SINGLE	JOINT	FO	FOLIATION	Ν	NONE	1.	P	SERP	
T/B	TOP OR BOTTOM	END OF FRA	ACTURE	N. 14		1.1		+		VN	VEIN	r 13			X	OXIDE		T	CALCI	TE
N/W	N-NON ORIENTAE	LE W-WHO	LE CORE			2.1.67				BD	BEDDING	•			S	SULPI	HIDE			
SLIC	SLICKENSIDES -	YES OR NO	1.1		10					СТ	CONTACT				L	CHLO	RITE		14	
FRAC	1-Natural 2-Maybe	e (Natural or	Mech.) 3-M	lechanical	11 . J. 10	12				ਸ	FAULT		1		Q	QUAR	TZ .			
CONF	CONFIDENCE - 1	-Poor	4-Excelle	nt			, v			FC	FAULT C	ONTACT			С	CLAY				
DIFF. ANGLE	ANGULAR DIFFERE	ENCE BETWEE	EN TOP LIN	NES		240				SZ	SHEAR Z	ZONE		<u>11</u>	A	ANHY	DRITE			
CALL &	NICHOLAS.	INC.		file: o	core_form_	_toro11-m.e	dwa		2									Α	RAN	7470

PROJECT	Aranza	zu		RIEN	ITED	CC		EAF			SHE			T.) 6/20	PAG	GE 7	BÝ DIA	_ OF	ZAO HQ3
HOLE NO.	5-HV-G	MX-0	NORT	HING			E	ASI							-				
REF. ANGLE	DEPTH FROM	RO	CK TYP	Έ	STI	RUCTUR	E	N /	FILL		G	D F	RILL RUI	N DEPTHS LLAR (M)				DIF	F.
TOP OF HOLE LINE)	(M)	1	2	3	TYPE B	CIRC: ANG	. DIP	Ŵ	(cm)		TYPE	FRO	M	TO		С	CF	ANG	LEINITLS
-7.62	0.2.4	MBL	1 1		VNB	03.8	48		00.5		T	1.2.5.	.50	1,2,8,.,	55	N	12	2	SD
	00.30				SJT	0,8,4	144		0,0,.,1	1	U.	1.1	•	· · · · ·	1	N.	14		
	00.72		1 1		SJT	26,2	- 55		00.00	1	5	1 1	• 1 1		1	N	1	4	- 1
	00.92		3. 1	r r	SJB	232	182		.00. 7	2-	T.		• 1 1			N	1	2	
	01 91	V	9.1		SJT	117	-72		00.0	>1	U_	1.9	•		-	N	6	2	1
-7.67	02 07	M.13.L	1		SSB	26.2	58		0,0,.0	51	V.	1,2,5	.50	1,2,8,.	5.5	N	1	5	SU
	00.00				4513	PQE &	177	N	00.05	1	1 1	1,28,	. 55	1.29.	4	SNT	5	5	
21.24	00.40				- and			N	LIAI	4	1 1	1,2,8,	. 55	1.29.	4	5	-	-	
1100	00.00							N	1.1.			1:29	.45	1,3,1,.	0	5 .		-	1
	02 40				11-	Here -		N	1.1.1		i i	1,29	.45	131	8:4	5	_	_	
	00.00				1.18			N		4	1	131	.8,5	134.	6,	5	-	-	
	01 97						-	N				1,31	. 85	134.	6	5		1	
	07.16				551	0.66	77	-	90.0		N		•		L	N	2	5	
	07.37				STR	51.10	8		100.00	2 1	N,		• 1	1	L	N	3	3	
	02 67			1.1	STR		85		0.0.	2	N	1,31	. 8,5	134	6	5 N	3	3	1951
	00.00	+						N			1 1	1:34	.65	136.	8	5	11.5		
	01.10	NBI						N			- 10	134	. 65	136.	8	5			
le le	120 00	MUNIC					-	N			10.01	136	. 85	137.	7:	5			
F. L. L.	00 00		<u> </u>	1 1				N		1		136	. 85	137.	7	5_	_		
	00.00		1 1					N		1		138	. 55	139	76	5			
	0,0,0,0,0		1 1					N		1		1.3.8	. 55	139	,7	6		-	
	6 67		1	1 1		1		1		1	÷ .	139	70	140	6	5		1	
	0.000			1.5.15		1 1	-	N				1.39	.70	1.40	6	5			
	0.01.15	1 1	1	1 1						1		1.40	.65	141.	, 7,	0 .	Y		
<u> </u>	0.0.00	- 17-1-	1 1	1 1	1			N				140	65	141	Z	0			
- الم	00.00				-	1 1		1.0							E11	LINIC		DDE	ZIATIONS
<u>.</u>	MISCELI	LANEOUS	-	24	ROCI	K TYPE	ABBR	EVI/	ATIONS	5	STRUCT	JRE TYP	F ABBK	EVIATIONS	FIL	LING	AB	BRE	VIATIONS
REF. ANGLE	"+" FOR TOP EN	D OF CORE,	"" FOR	BOTTOM			(ii)	8		SJ	SINGLE	JOINT	FO FOL	JATION	N	NONE	-	PS	ERPENTINE
Т/в	TOP OR BOTTOM	END OF FRA	ACTURE	s	- Jones -	S ale to an				VN	VEIN	1			X	OXIDE			ALCITE
N/W	N-NON ORIENTAB	LE W-WHO	LE CORE							BD	BEDDING				S	SULPHI	DE		
SLIC	SLICKENSIDES -	YES OR NO								СТ	CONTACT		2			CHLORI	TE		
FRAC	1-Natural 2-Maybe	(Natural or	Mech.) 3-M	lechanical						FT	FAULT	and the second s	-		Q	QUARTZ	<u> </u>		10-11-11-12
CONF	CONFIDENCE - 1	Poor	4-Excelle	ent						FC	FAULT C	ONTACT	1	- 11 - C	С	CLAY	1.	++	Non- aller
DIFF. ANGLE	ANGULAR DIFFERE	NCE BETWE	EN TOP LI	NES						SZ	SHEAR 2	ZONE			A	ANHYD	RITE		
CALL &	NICHOLAS. I	NC.		file: o	core_form_	_toro11-m	.dwa		* 1	3	7.75-	-0 138.	55.0	N 0.	.00	2	2.8	O AR	AN/A/U

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# **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. <u>Remolded Direct-Shear Test</u>

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 (v). These parameters are calculated in the following manner:

> Young's Modulus (E) = Axial Stress / Axial Strain Poisson's Ratio (v) = 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 ( $\sigma_1$ ). Each triaxial compression test provides data for two stresses: vertical stress at failure ( $\sigma_1$ ) and confining stress ( $\sigma_3$ ).

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 ( $\sigma_3$ ) 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. <u>Lab Characterization (Gradation (wet-sieve), Hydrometer, and Atterberg Limits</u> <u>Tests)</u>

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. Moisture Content and Density

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.








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# UNIAXIAL COMPRESSION TEST RESULTS



CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



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 #	175	08-GHP_GMX0	2-0159	



17508-GHP\_GMX02-0159 Pre Test



17508-GHP\_GMX02-0159 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



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 #	175	08-GHP_GMX0	2-0196	





17508-GHP\_GMX02-0196 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



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	Fail Load	57,330	lbs
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 #	175	08-GHP_GMX0	2-0224	



17508-GHP\_GMX02-0224 Pre Test



17508-GHP\_GMX02-0224 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



NOTES: Strata

Dia. 1	2.399	Ht. 1	5.117			
Dia. 2	2.405	Ht. 2	5.109	Fail Load	25,820	lbs
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 #	175	08-GHP_GMX0	4-0017	



17508-GHP\_GMX04-0017 Pre Test



17508-GHP\_GMX04-0017 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



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 #	175	08-GHP_GMX0	4-0040	



17508-GHP\_GMX04-0040 Pre Test



17508-GHP\_GMX04-0040 Post Test

GEOMECHANICAL LABORATORY

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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 #	175	08-GHP_GMX0	4-0112	





17508-GHP\_GMX04-0112 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



NOTES: Heavy sulfides.

Dia. 1	2.402	Ht. 1	4.867			
Dia. 2	2.402	Ht. 2	4.869	Fail Load	39,430	lbs
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 #	175	08-GHP_GMX0	4-0222	



17508-GHP\_GMX04-0222 Pre Test



17508-GHP\_GMX04-0222 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



NOTES: Heavy sulfides. Conical failure

Dia. 1	2.386	Ht. 1	4.897			
Dia. 2	2.389	Ht. 2	4.899	Fail Load	80,600	lbs
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 #	175	08-GHP_GMX0	4-0224	



17508-GHP\_GMX04-0224 Pre Test



17508-GHP\_GMX04-0224 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



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 #	175	08-GHP_GMX0	4-0253	]



17508-GHP\_GMX04-0253 Pre Test



17508-GHP\_GMX04-0253 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



NOTES:

Dia. 1	2.402	Ht. 1	5.071			
Dia. 2	2.402	Ht. 2	5.072	Fail Load	179,900	lbs
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 #	175	08-GHP_GMX0	04-0257	



17508-GHP\_GMX04-0257 Pre Test



17508-GHP\_GMX04-0257 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



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 #	175	08-GHP_GMX0	5-0086	



17508-GHP\_GMX05-0086 Pre Test



17508-GHP\_GMX05-0086 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



NOTES:

Dia. 1	2.402	Ht. 1	5.069			
Dia. 2	2.403	Ht. 2	5.069	Fail Load	54,900	lbs
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 #	175	08-GHP_GMX0	5-0148	



17508-GHP\_GMX05-0148 Pre Test



17508-GHP\_GMX05-0148 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



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 #	175			



17508-GHP\_GMX05-0195 Pre Test



17508-GHP\_GMX05-0195 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



NOTES: Sandstone. Heavy sulfides. Voids and gouges.

Dia. 1	2.427	Ht. 1	3.909			
Dia. 2	2.424	Ht. 2	3.908	Fail Load	4,960	lbs
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 #	1750	8-GHP_GMX05	5-0203-A	



17508-GHP\_GMX05-0203-A Pre Test



17508-GHP\_GMX05-0203-A Post Test

GEOMECHANICAL LABORATORY

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NOTES: Strata

Dia. 1	2.405	Ht. 1	4.992			
Dia. 2	2.406	Ht. 2	4.992	Fail Load	190,029	lbs
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 #	175			



17508-GHP\_GMX06-0025 Pre Test



17508-GHP\_GMX06-0025 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



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 #	175			



17508-GHP\_GMX07-0044 Pre Test



17508-GHP\_GMX07-0044 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



NOTES: Quartz banding

Dia. 1	2.398	Ht. 1	5.015			
Dia. 2	2.399	Ht. 2	5.014	Fail Load	27,840	lbs
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 #	175			


17508-GHP\_GMX07-0128 Pre Test



17508-GHP\_GMX07-0128 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



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 #	1750	17508-GHP_GMX07-0168-A			



17508-GHP\_GMX07-0168-A Pre Test



17508-GHP\_GMX07-0168-A Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



NOTES: Sandstone. Heavy sulfides.

Dia. 1	2.377	Ht. 1	4.301			
Dia. 2	2.397	Ht. 2	4.298	Fail Load	3,720	lbs
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 #	1750	8-GHP_GMX07		



17508-GHP\_GMX07-0172-A Pre Test



17508-GHP\_GMX07-0172-A Post Test

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Dia. 1	2.403	Ht. 1	5.173			
Dia. 2	2.402	Ht. 2	5.177	Fail Load	85,180	lbs
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 #	175	08-GHP_GMX0		



17508-GHP\_GMX07-0189 Pre Test



17508-GHP\_GMX07-0189 Post Test

#### TRIAXIAL COMPRESSION TEST RESULTS



CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

FIOJECI #	17508	Triavial Com	nroccion T	c	Client	Aura Minerais	
Date	8/7/2017	Thakial Compression Test Results				Location	Aranzazu, Zacatecas Mexico
Technician	EK	Failure Data:				Sample #	17508-GHP_GMX01-0006
		Sample #	17508-GH	IP_GMX01-	0006	Rock Type	Marble
		U.S. S	tandard			Density :	169.5 (pcf)
		Sigma 3	Sigma 1				2,714.3 (kg/m <sup>3</sup> )
		(psi)	(psi)		_		
Sa	mple Data :	750	14,422	Peak		Test	Data:
Sample # :	17508-GHP_GMX01-0006	0	0	~		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Marble	0	0	'es:		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX01	0	0	dus,		Gage Reading :	(lbs)
Depth :	6.8 - 7.1	0	0	ъ,		Mode of Failure :	Both
Alterations:						Test Duration :	(sec)
Diameter :	2.407 (in)						
Height :	4.912 (in)	Metric	Standard				
Weight :	994.41 (gm)	Sigma 3	Sigma 1				
Area :	4.551 (in <sup>2</sup> )	(MPa)	(MPa)				
Volume :	22.356 (in <sup>3</sup> )	5.17	99.5	Peak			
		0.00	0.0				
Rock Code:		0.00	0.0	105.			
Hardness:		0.00	0.0	· dual			
		0.00	0.0	D'			
Pre	-Failure Sketch	Wo	rksheet		Pos	st-Failure Sketch	
	Mode of Failure :						
		Fracture Intact Both			$\sum$		

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

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Compression Test Results				Client	Aura Minerals
Date	7/28/2017	Thakial Compression Test Results			Location	Aranzazu, Zacatecas Mexico	
Technician	EK	Failure Data:				Sample #	17508-GHP_GMX01-0018
		Sample #	17508-GH	IP_GMX01-	0018	Rock Type	Marble
		U.S. S	tandard			Density :	169.9 (pcf)
		Sigma 3	Sigma 1				2,721.0 (kg/m <sup>3</sup> )
		(psi)	(psi)				
Sa	mple Data :	2,400	19,749	Peak		Test	t Data:
Sample # :	17508-GHP_GMX01-0018	0	0	A.		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Marble	0	0	<sup>e</sup> si,		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX01	0	0	4 <sub>U</sub> al		Gage Reading :	(lbs)
Depth :	18.6 - 19.0	0	0	Ъ.		Mode of Failure :	Fracture
Alterations:	0.405.(1.)					Test Duration :	(sec)
Diameter :	2.405 (in)		04				
Height :	4.880 (in)	Metric	Standard				
vveight :	988.49 (gm)	Sigma 3	Sigma 1				
Area :	4.542 (in <sup>-</sup> )	(MPa)	(MPa)				
Volume :	22.168 (in <sup>°</sup> )	16.55	136.2	Peak			
	<b></b>	0.00	0.0	₽.			
Rock Code:		0.00	0.0	esid.			
Hardness:		0.00	0.0	<sup>tu</sup> al.			
		0.00	0.0				
Bro	Egiluro Skotoh	Wc	orksheet			et Epiluro Skotob	
Pie			JIKSHEEL	-	190	SI-Fallure Skelch	
				,	<i></i>	Ī	
				ĺ			
	\ /						
		Mode of F	ailure :				
	$H \rightarrow$						
		Fracture	XX				
		Intact					
			1	, l	~	J	
		Both		I	· · · · ·		

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	Fail Load
(psi)	gage (lbs)
2,400	89,710



17508-GHP\_GMX01-0018 Pre Test



17508-GHP\_GMX01-0018 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Compression Test Results					Client	Aura Minerals
Date	7/28/2017					Location	Aranzazu, Zacatecas Mexico	
Technician	EK	Failure Data:				Sample #	17508-GHP_GMX01-0035	
		S	Sample #	17508-GH	IP_GMX01-	0035	Rock Type	Contact
			U.S. St	andard			Density :	188.8 (pcf)
			Sigma 3	Sigma 1				$3,024.0 \ (kg/m^3)$
			(psi)	(psi)				
Sa	mple Data :		1,200	10,817	Peak		Test	Data:
Sample # :	17508-GHP_GMX01-0035		0	0	<b>\$</b>		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Contact		0	0	105.		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX01		0	0	- Olys		Gage Reading :	(lbs)
Depth :	35.9 - 36.1		0	0	Ś		Mode of Failure :	Fracture
Alterations:							Test Duration :	(sec)
Diameter :	2.410 (in)							
Height :	4.893 (in)		Metric S	standard				
Weight :	1105.67 (gm)		Sigma 3	Sigma 1				
Area :	4.560 (in <sup>2</sup> )		(MPa)	(MPa)				
Volume :	22.312 (in <sup>3</sup> )		8.28	74.6	Peak			
			0.00	0.0	\$			
Rock Code:			0.00	0.0	105.			
Hardness:			0.00	0.0	dual			
			0.00	0.0	S.			
Pre	-Failure Sketch		Wo	rksheet		Po	st-Failure Sketch	
					1	$\langle \rangle$		
			Mode of Es	ailuro :				
	$[ \land \land \checkmark ]$		Mode of 1 a	andre .				
						$\frown$		
			Fracture	XX				
			radiard	701				
	N )		Intact					
	$  \rangle \land$						$\mathbf{X}$	
							N	
			Both					
					-			

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

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Compression Test Posults					Client	Aura Minerals
Date	7/28/2017	Thakial Complession Test Results				Location	Aranzazu, Zacatecas Mexico	
Technician	EK		Failure Data:				Sample #	17508-GHP_GMX02-0037
		Sample # 17508-GHP_GMX02-0037					Rock Type	Hornfels
U.S. Standard						Density :	163.7 (pcf)	
Sigma 3 Sigma 1							2,622.9 (kg/m <sup>3</sup> )	
			(psi)	(psi)		L.		
Sa	mple Data :		1,200	16,765	Peak		Test	t Data:
Sample # :	17508-GHP_GMX02-0037		0	0	\$		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Hornfels		0	0	10S		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX02		0	0	, dus,		Gage Reading :	(lbs)
Depth :	37.9 - 38.3		0	0	́с,		Mode of Failure :	Both
Alterations:							Test Duration :	(sec)
Diameter :	2.390 (in)	-			_			
Height :	4.852 (in)		Metric S	Standard				
Weight :	935.62 (gm)		Sigma 3	Sigma 1				
Area :	4.486 (in <sup>2</sup> )		(MPa)	(MPa)				
Volume :	21.768 (in <sup>3</sup> )		8.28	115.6	Peak			
			0.00	0.0				
Rock Code:			0.00	0.0	Tes.			
Hardness:			0.00	0.0	· 0/1/3/			
			0.00	0.0	15			
	, <b>-</b> ,-							
Pre	-Failure Sketch		Wo	rksheet		Po	st-Failure Sketch	
					1	$\subset$	+	
	$  \setminus \setminus /  $							
						\		
			Mode of E	oiluro :				
				allule.				
			Fracture		1	$  \rangle$		
	$X \land 1/$		radiare		J	$  \rangle$		
			Intact					
	$\mathbb{N} \longrightarrow \mathcal{H} / \mathcal{I}$			۱ <u>ــــــ</u>				
	NX / V/I							
			Both	XX	]			
					-			

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

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Compression Test Results				Client	Aura Minerals	
Date	7/28/2017	Thakial Compression Test Results				Location	Aranzazu, Zacatecas Mexico	
Technician	EK	Failure Data:			Sample #	17508-GHP_GMX02-0056		
	Sample # 17508-GHP_GMX02-0056					Rock Type	Intrusive	
			U.S. St	andard			Density :	165.5 (pcf)
			Sigma 3	Sigma 1				2,650.7 (kg/m <sup>3</sup> )
			(psi)	(psi)				
Sa	mple Data :		1,200	19,603	Peak		Test	t Data:
Sample # :	17508-GHP_GMX02-0056		0	0	\$		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Intrusive		0	0	esi,		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX02		0	0	alla,		Gage Reading :	(lbs)
Depth :	56.1 - 56.4		0	0	Ś		Mode of Failure :	Fracture
Alterations:							Test Duration :	(sec)
Diameter :	2.399 (in)							
Height :	4.941 (in)		Metric S	Standard				
Weight :	969.97 (gm)		Sigma 3	Sigma 1				
Area :	4.519 (in <sup>2</sup> )		(MPa)	(MPa)				
Volume :	22.330 (in <sup>3</sup> )		8.28	135.2	Peak			
			0.00	0.0	Ø			
Rock Code:			0.00	0.0	105			
Hardness:			0.00	0.0	·dual			
			0.00	0.0	15			
								,
Pre	-Failure Sketch		Woi	rksheet		Po	st-Failure Sketch	
	$\mathbf{K} \mathbf{E}(\mathbf{k})$					Ć	+	
			Mode of Fa	ailure :				
							/	
			Fracture	XX				
	/ X /\	Ť	late et					
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	// X					$\sim$	/	
	$\chi$ / $\downarrow$		Roth	[				
			DOIN		I	-		
	NOTES:							

Dia. 1 2.396 4.941 Ht. 1 Dia. 2 2.395 4.939 Ht. 2 Dia. 3 2.400 Ht. 3 4.940 Dia. 4 2.401 Ht. 4 4.946 Dia. 5 2.401 969.97 Weight (gm) 2.400 Dia. 6 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

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Comprossion Test Posults				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					Intrusive
U.S. Standard						Density :	155.3 (pcf)
		Sigma 3	Sigma 1				$2,487.0 \ (kg/m^3)$
		(psi)	(psi)				
Sa	mple Data :	2,400	22,875	Peak		Test	t Data:
Sample # :	17508-GHP_GMX02-0083	0	0	A		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Intrusive	0	0	esi,		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX02	0	0	4 <sub>U</sub> al		Gage Reading :	(lbs)
Depth :	83.3 - 83.6	0	0	ъ.		Mode of Failure :	Fracture
Alterations:						Test Duration :	(sec)
Diameter :	2.408 (in)						
Height :	4.081 (in)	Metric	Standard				
Weight :	757.78 (gm)	Sigma 3	Sigma 1				
Area :	4.556 (in <sup>2</sup> )	(MPa)	(MPa)		1		
Volume :	18.593 (in <sup>3</sup> )	16.55	157.8	Peak			
		0.00	0.0	<i>₽</i>			
Rock Code:		0.00	0.0	.esica			
Hardness:		0.00	0.0	4431			
		0.00	0.0	U.			
			arkak a at				
Pre	-Failure Sketch	VVC	orksneet	-	Po	st-Failure Sketch	
						+	
	$\lambda = \lambda $						
	$\searrow$ $\times$						
		Mode of F	ailure :				
	$r \rightarrow$						
		Fracture	XX				
				- -		$\checkmark$ $\land \mid$	
		Intact				N	
			·			J	
	$\sim$	Both			~~~		

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

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Compression Test Results				Client	Aura Minerals	
Date	7/28/2017	Thatial Compression Test Results				Location	Aranzazu, Zacatecas Mexico	
Technician	EK		Failure	e Data:			Sample #	17508-GHP_GMX02-0171
		S	Sample #	17508-GH	IP_GMX02-	0171	Rock Type	Intrusive
U.S. Standard						Density :	157.3 (pcf)	
			Sigma 3	Sigma 1				2,519.5 (kg/m <sup>3</sup> )
			(psi)	(psi)				
Sa	mple Data :		750	15,735	Peak		Test	t Data:
Sample # :	17508-GHP_GMX02-0171		0	0	<b>A</b>		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Intrusive		0	0	'esi		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX02		0	0	4 <sub>URI</sub>		Gage Reading :	(lbs)
Depth :	171.1 - 171.4		0	0	Ъ.		Mode of Failure :	Fracture
Alterations:							Test Duration :	(sec)
Diameter :	2.394 (in)							
Height :	5.074 (in)		Metric S	Standard				
Weight :	943.47 (gm)		Sigma 3	Sigma 1	, i i i			
Area :	4.503 (in <sup>2</sup> )		(MPa)	(MPa)				
Volume :	22.851 (in <sup>3</sup> )		5.17	108.5	Peak			
			0.00	0.0	<i>₽</i>			
Rock Code:			0.00	0.0	.esi			
Hardness:			0.00	0.0	JUBI			
			0.00	0.0	.0.			
	<u> </u>							
Pre	-Failure Sketch		VVOI	rksneet	-	Po	st-Failure Sketch	
					ĺ			
	$r \sim 1$							
							/	
			Mode of Fa	ailure :				
			Fracture	XX				
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	$  \setminus /  $							
	$\mid X \mid \lambda$		Intact					
	$\vdash$ $\rightarrow$							
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			Both		l	~~		

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

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Compression Test Posults					Client	Aura Minerals
Date	7/28/2017	Thakial Compression Test Results				Location	Aranzazu, Zacatecas Mexico	
Technician	EK		Failure	e Data:			Sample #	17508-GHP_GMX02-0200
	Sample # 17508-GHP_GMX02-0200						Rock Type	Skarn
U.S. Standard						Density :	251.5 (pcf)	
	Sigma 3 Sigma 1							4,027.8 (kg/m <sup>3</sup> )
			(psi)	(psi)				
Sa	mple Data :		2,400	30,372	Peak		Test	Data:
Sample # :	17508-GHP_GMX02-0200		0	0	\$		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Skarn		0	0	'es.		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX02		0	0	- CILIZI		Gage Reading :	(lbs)
Depth :	200.7 - 200.9		0	0	Ъ,		Mode of Failure :	Fracture
Alterations:							Test Duration :	(sec)
Diameter :	2.387 (in)	-						
Height :	5.002 (in)		Metric S	Standard				
Weight :	1478.06 (gm)		Sigma 3	Sigma 1				
Area :	4.477 (in <sup>2</sup> )		(MPa)	(MPa)				
Volume :	22.393 (in <sup>3</sup> )		16.55	209.5	Peak			
			0.00	0.0				
Rock Code:			0.00	0.0	'es.			
Hardness:			0.00	0.0	. dual			
			0.00	0.0	5.			
Pre	-Failure Sketch		Woi	rksheet		Po	st-Failure Sketch	
						_		
	F				ĥ		+	
	$\sim$							
			Mode of Fa	ailure :				
				XX				
	$\land$		racture	**		$\backslash$		
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	$\downarrow \chi$ ]							
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	$\sim$	L	boun		l			

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	Fail Load
(psi)	gage (lbs)
2,400	135,970



17508-GHP\_GMX02-0200 Pre Test



17508-GHP\_GMX02-0200 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Compression Test Results					Client	Aura Minerals
Date	7/28/2017						Location	Aranzazu, Zacatecas Mexico
Technician	EK		Failure	e Data:			Sample #	17508-GHP_GMX02-0218
		5	Sample #	17508-GH	IP_GMX02-	·0218	Rock Type	Skarn
			U.S. St	andard			Density :	184.9 (pcf)
			Sigma 3	Sigma 1				2,961.4 (kg/m <sup>3</sup> )
			(psi)	(psi)		_		
Sa	mple Data :		1,200	18,380	Peak		Test	Data:
Sample # :	17508-GHP_GMX02-0218		0	0	\$		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Skarn		0	0	<sup>e</sup> s.		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX02		0	0	<sup>a</sup> u <sub>a</sub> ,		Gage Reading :	(lbs)
Depth :	218.8 - 219.4		0	0	Ъ,		Mode of Failure :	Fracture
Alterations:							Test Duration :	(sec)
Diameter :	2.388 (in)							
Height :	5.060 (in)		Metric S	standard				
Weight :	1099.76 (gm)		Sigma 3	Sigma 1				
Area :	4.479 (in <sup>2</sup> )		(MPa)	(MPa)		_		
Volume :	22.662 (in <sup>3</sup> )		8.28	126.8	Peak			
	· · · · · · · · · · · · · · · · · · ·		0.00	0.0		1		
Rock Code:			0.00	0.0	Pes.			
Hardness:			0.00	0.0	'dua.			
			0.00	0.0	15			
	1							
Pre	-Failure Sketch		Wo	rksheet		Po	st-Failure Sketch	
						_		
							+	
			Mode of Fa	ailure :				
			Fracture	XX				
							/	
					1			
	N ZN		Intact					
	L\ / / ]		<b>D</b> (1		1	l I		
			Both		J	-16-		
	NOTES: Sulfides							

Dia. 1 2.388 5.060 Ht. 1 Dia. 2 2.388 5.064 Ht. 2 Dia. 3 2.389 Ht. 3 5.060 Dia. 4 2.387 Ht. 4 5.056 Dia. 5 2.388 1099.76 Weight (gm) 2.389 Dia. 6 Sample # 17508-GHP\_GMX02-0218

Sigma 3	Fail Load
(psi)	gage (lbs)
1,200	82,320



17508-GHP\_GMX02-0218 Pre Test



17508-GHP\_GMX02-0218 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Tria	vial Com	prossion T	Client	Aura Minerals		
Date	7/28/2017	ma		16331011 1	Location	Aranzazu, Zacatecas Mexico		
Technician	EK		Failure	e Data:	Sample #	17508-GHP_GMX02-0245		
		S	Sample #	17508-GH	IP_GMX02-	0245	Rock Type	Intrusive
			U.S. St	andard			Density :	168.2 (pcf)
			Sigma 3	Sigma 1				2,694.8 (kg/m <sup>3</sup> )
			(psi)	(psi)				
Sa	mple Data :		2,400	29,498	Peak		Test	Data:
Sample # :	17508-GHP_GMX02-0245		0	0	<b>\$</b>		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Intrusive		0	0	105.		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX02		0	0	- Olys		Gage Reading :	(lbs)
Depth :	245.8 - 246.1		0	0	Ś		Mode of Failure :	Fracture
Alterations:							Test Duration :	(sec)
Diameter :	2.397 (in)	i						
Height :	5.058 (in)		Metric S	Standard				
Weight :	1008.01 (gm)		Sigma 3	Sigma 1				
Area :	4.513 (in²)		(MPa)	(MPa)				
Volume :	22.826 (in <sup>3</sup> )		16.55	203.4	Peak			
			0.00	0.0	\$			
Rock Code:			0.00	0.0	105			
Hardness:			0.00	0.0	Olla			
			0.00	0.0	S.			
Pre	-Failure Sketch		Wo	rksheet		Po	st-Failure Sketch	
					1			
	$\sim$ \					$\frown$		
			Mode of Fa	ailure ·			$\backslash$	
				andre .				
	/ X N		Fracture	XX				
			Intact				$\langle \rangle$	
				•	•			
							\	
	$\checkmark$		Both					

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

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Com	nression T	c	Client	Aura Minerals	
Date	7/28/2017		pression	Location	Aranzazu, Zacatecas Mexico		
Technician	EK	Failur	e Data:	Sample #	17508-GHP_GMX04-0045		
		Sample #	Rock Type	Marble			
		U.S. S	tandard			Density :	169.1 (pcf)
		Sigma 3	Sigma 1				2,709.2 (kg/m <sup>3</sup> )
-		(psi)	(psi)				
Sa	mple Data :	1,200	19,193	Peak		Test	Data:
Sample # :	17508-GHP_GMX04-0045	0	0	<b>A</b>		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Marble	0	0	'esi		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX04	0	0	4 <sub>U</sub> ar		Gage Reading :	(lbs)
Depth :	45.8 - 46.2	0	0	Ъ.		Mode of Failure :	Both
Alterations:						Test Duration :	(sec)
Diameter :	2.401 (in)						
Height :	4.885 (in)	Metric	Standard				
Weight :	982.07 (gm)	Sigma 3	Sigma 1				
Area :	4.528 (in <sup>2</sup> )	(MPa)	(MPa)				
Volume :	22.121 (in <sup>3</sup> )	8.28	132.4	Peak			
		0.00	0.0	<i>₽</i>			
Rock Code:		0.00	0.0	.esi			
Hardness:		0.00	0.0	4Ual			
		0.00	0.0	0.			
		\\/_	rlach e st				
Pre	-Failure Sketch	WC	orksneet	-	Pos	st-Failure Sketch	
		Mode of F	ailure :	t I		+	
		Fracture Intact Both					

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
1,200	86,910



17508-GHP\_GMX04-0045 Pre Test



17508-GHP\_GMX04-0045 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavia	al Comr	prossion T	Client	Aura Minerals		
Date	7/28/2017	Παλία		16331011 1	Location	Aranzazu, Zacatecas Mexico		
Technician	EK		Failure	e Data:	Sample #	17508-GHP_GMX04-0064		
		Sa	mple #	17508-GH	IP_GMX04-	0064	Rock Type	Skarn
			U.S. St	andard			Density :	225.2 (pcf)
		S	Sigma 3	Sigma 1				3,607.0 (kg/m <sup>3</sup> )
			(psi)	(psi)				
Sa	mple Data :		2,400	33,277	Peak		Test	Data:
Sample # :	17508-GHP_GMX04-0064		0	0	\$		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Skarn		0	0	10Sin		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX04		0	0	OILS,		Gage Reading :	(lbs)
Depth :	64.3 - 64.6		0	0	Ś		Mode of Failure :	Fracture
Alterations:							Test Duration :	(sec)
Diameter :	2.400 (in)							
Height :	5.125 (in)		Metric S	standard				
Weight :	1370.55 (gm)	S	Sigma 3	Sigma 1	, in the second s			
Area :	4.524 (in <sup>2</sup> )		(MPa)	(MPa)				
Volume :	23.187 (in <sup>3</sup> )		16.55	229.5	Peak			
			0.00	0.0	A			
Rock Code:			0.00	0.0	105.			
Hardness:			0.00	0.0	JUA			
			0.00	0.0	S			
						r1		
Pre	-Failure Sketch		VVO	rksheet		Po	st-Failure Sketch	
	A							
					(		+	
	TOT							
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						$ \mathcal{X} $		
		M	ode of Es	ailura ·		$\langle \rangle$		
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		Fr	acture	XX			$\Lambda$ $\square$	
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		Int	tact			/		
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	Y \							
		Bo	oth					

**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	Fail Load
(psi)	gage (lbs)
2,400	150,560



17508-GHP\_GMX04-0064 Pre Test



17508-GHP\_GMX04-0064 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Compression Test Results					Client	Aura Minerals
Date	8/2/2017	Thaxial Complession Test Results					Location	Aranzazu, Zacatecas Mexico
Technician	EK	Failure Data:				Sample #	17508-GHP_GMX04-0066	
		Sa	mple #	17508-GH	Rock Type	Skarn		
			U.S. St	andard			Density :	226.6 (pcf)
		S	Sigma 3	Sigma 1				3,629.2 (kg/m <sup>3</sup> )
			(psi)	(psi)				
Sa	mple Data :		750	38,518	Peak		Test	Data:
Sample # :	17508-GHP_GMX04-0066		0	0	\$		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Skarn		0	0	'es.		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX04		0	0	CIL3,		Gage Reading :	(lbs)
Depth :	66.7 - 67.0		0	0	Ъ,		Mode of Failure :	Fracture
Alterations:							Test Duration :	(sec)
Diameter :	2.397 (in)							
Height :	5.121 (in)		Metric S	standard				
Weight :	1374.96 (gm)	S	Sigma 3	Sigma 1				
Area :	4.515 (in <sup>2</sup> )		(MPa)	(MPa)				
Volume :	23.119 (in <sup>3</sup> )		5.17	265.6	Peak			
			0.00	0.0				
Rock Code:			0.00	0.0	'es.			
Hardness:			0.00	0.0	. dual			
			0.00	0.0	2.			
Pre	-Failure Sketch		Woi	rksheet		Po	st-Failure Sketch	
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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

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial 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	
			U.S. St	andard			Density :	182.6 (pcf)
		Sig	gma 3	Sigma 1				2,924.2 (kg/m <sup>3</sup> )
		(	psi)	(psi)				
Sa	mple Data :	2	,400	11,931	Peak		Test	Data:
Sample # :	17508-GHP_GMX04-0071		0	0	P.		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Hornfels		0	0	esic.		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX04		0	0	4U3/2		Gage Reading :	(lbs)
Depth :	71.1 - 71.3		0	0	·0·		Mode of Failure :	Fracture
Alterations:							Test Duration :	(sec)
Diameter :	2.381 (in)							
Height :	4.499 (in)	N	letric s	Standard				
vveight :	960.22 (gm)	519	gma 3	Sigma 1				
Area :	4.454 (in <sup>-</sup> )	()	viPa)	(MPa)		I		
Volume :	20.038 (in <sup>°</sup> )	1	6.55	82.3	Peak			
	,	(	0.00	0.0	₽.			
Rock Code:		(	).00	0.0	esid.			
Hardness:			0.00	0.0	tuals.			
			0.00	0.0				
Pro	-Failure Sketch		Wo	rksheet		Po	st-Failure Sketch	
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	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	Fail Load
(psi)	gage (lbs)
2,400	53,140



17508-GHP\_GMX04-0071 Pre Test



17508-GHP\_GMX04-0071 Post Test
GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Compression Test Results					Client	Aura Minerals
Date	7/28/2017					.5	Location	Aranzazu, Zacatecas Mexico
Technician	EK	Failure Data:				Sample #	17508-GHP_GMX04-0081	
		9	Sample #	17508-GH	IP_GMX04-	0081	Rock Type	Hornfels
			U.S. St	andard			Density :	189.9 (pcf)
			Sigma 3	Sigma 1				$3,041.4 \ (kg/m^3)$
			(psi)	(psi)		-		
Sa	mple Data :		750	11,207	Peak		Test	Data:
Sample # :	17508-GHP_GMX04-0081		0	0	A		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Hornfels		0	0	iesia.		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX04		0	0	44ala		Gage Reading :	(lbs)
Depth :	81.0 - 81.4		0	0	5		Mode of Failure :	Both
Alterations:							Test Duration :	(sec)
Diameter :	2.387 (in)							
Height :	4.378 (in)		Metric S	standard				
Weight :	976.86 (gm)		Sigma 3	Sigma 1	· ·			
Area :	4.477 (in <sup>2</sup> )		(MPa)	(MPa)		1		
Volume :	19.599 (in³)		5.17	77.3	Peak			
	<u></u> _		0.00	0.0	Ŷ			
Rock Code:			0.00	0.0	.esica			
Hardness:			0.00	0.0	Aliala			
			0.00	0.0	.0,	l		
Pre	-Failure Sketch		Wo	rksheet		Po	st-Failure Sketch	
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			tono			$\subset$	+	
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Hydrostone>	$[\checkmark ]$	ļ					$\sim$	
		•	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	Fail Load
(psi)	gage (lbs)
750	50,170



17508-GHP\_GMX04-0081 Pre Test



17508-GHP\_GMX04-0081 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Compression Test Results					Client	Aura Minerals
Date	7/28/2017	Thanki Compression Test Results				Location	Aranzazu, Zacatecas Mexico	
Technician	EK	Failure Data:				Sample #	17508-GHP_GMX04-0205	
		S	Sample #	17508-GH	IP_GMX04-	0205	Rock Type	Hornfels
			U.S. St	andard			Density :	167.0 (pcf)
			Sigma 3	Sigma 1				2,674.3 (kg/m <sup>3</sup> )
			(psi)	(psi)				
Sa	mple Data :		2,400	13,004	Peak		Test	Data:
Sample # :	17508-GHP_GMX04-0205		0	0	\$		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Hornfels		0	0	105. in		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX04		0	0	OILS,		Gage Reading :	(lbs)
Depth :	205.7 - 206.0		0	0	Ś		Mode of Failure :	Fracture
Alterations:							Test Duration :	(sec)
Diameter :	2.401 (in)							
Height :	4.854 (in)		Metric S	standard				
Weight :	963.15 (gm)		Sigma 3	Sigma 1				
Area :	4.528 (in <sup>2</sup> )		(MPa)	(MPa)				
Volume :	21.977 (in <sup>3</sup> )		16.55	89.7	Peak			
			0.00	0.0	Ø			
Rock Code:			0.00	0.0	Cos.			
Hardness:			0.00	0.0	·dua			
			0.00	0.0	15			
Pre	-Failure Sketch		Woi	rksheet		Po	st-Failure Sketch	
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	\\ \\ / / /		Mode of Fa	ailure :		$ \rangle$		
	$\land \land $		Fracture	XX				
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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

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Compression Test Results					Client	Aura Minerals
Date	7/28/2017	Thazial Compression Test Results				Location	Aranzazu, Zacatecas Mexico	
Technician	EK	Failure Data:				Sample #	17508-GHP_GMX04-0226	
		S	Sample #	17508-GH	IP_GMX04-	0226	Rock Type	Skarn
			U.S. St	tandard			Density :	248.3 (pcf)
			Sigma 3	Sigma 1				3,977.5 (kg/m <sup>3</sup> )
			(psi)	(psi)				
Sa	mple Data :		1,200	19,329	Peak		Test	t Data:
Sample # :	17508-GHP_GMX04-0226		0	0	\$		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Skarn		0	0	105.		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX04		0	0	QU31		Gage Reading :	(lbs)
Depth :	226.9 - 227.1		0	0	S.		Mode of Failure :	Both
Alterations:							Test Duration :	(sec)
Diameter :	2.399 (in)	1						
Height :	4.771 (in)		Metric S	Standard				
Weight :	1405.45 (gm)		Sigma 3	Sigma 1				
Area :	4.519 (in <sup>2</sup> )		(MPa)	(MPa)				
Volume :	21.562 (in <sup>3</sup> )		8.28	133.3	Peak			
			0.00	0.0	ø			
Rock Code:			0.00	0.0	105.			
Hardness:			0.00	0.0	GILA			
			0.00	0.0	S.			
	] <b>-</b> ]-							
Pre	-Failure Sketch		Wo	rksheet		Po	st-Failure Sketch	
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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

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Compression Test Results					Client	Aura Minerals
Date	7/28/2017	Thakial Complession Test Results				Location	Aranzazu, Zacatecas Mexico	
Technician	EK	Failure Data:				Sample #	17508-GHP_GMX05-0105	
		ę	Sample #	17508-GH	0105	Rock Type	Hornfels	
	_		U.S. St	andard			Density :	159.7 (pcf)
			Sigma 3	Sigma 1				$2,558.0 \ (kg/m^3)$
			(psi)	(psi)				
Sa	mple Data :		750	8,751	Peak		Test	t Data:
Sample # :	17508-GHP_GMX05-0105		0	0	<b>A</b>		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Hornfels		0	0	'esi		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX05		0	0	4 <sub>UN</sub>		Gage Reading :	(lbs)
Depth :	105.8 - 106.3		0	0	С.		Mode of Failure :	Fracture
Alterations:							Test Duration :	(sec)
Diameter :	2.392 (in)							
Height :	4.952 (in)		Metric S	Standard				
Weight :	933.03 (gm)		Sigma 3	Sigma 1	· · ·			
Area :	4.494 (in <sup>2</sup> )		(MPa)	(MPa)				
Volume :	22.258 (in <sup>3</sup> )		5.17	60.4	Peak			
			0.00	0.0	P.			
Rock Code:			0.00	0.0	.esic			
Hardness:			0.00	0.0	4Ual			
			0.00	0.0	0.			
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Pre	-Failure Sketch		VVO	rksneel	-	Po	st-Failure Sketch	
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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

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Compression Test Posults					Client	Aura Minerals
Date	8/19/2017	Thakial Complession Test Results				Location	Aranzazu, Zacatecas Mexico	
Technician	EK		Failure	e Data:			Sample #	17508-GHP_GMX05-0146
		5	Sample #	17508-GH	IP_GMX05-	0146	Rock Type	Hornfels
			U.S. St	andard			Density :	182.8 (pcf)
			Sigma 3	Sigma 1				2,928.0 (kg/m <sup>3</sup> )
			(psi)	(psi)				
Sa	mple Data :		2,400	64,074	Peak		Test	Data:
Sample # :	17508-GHP_GMX05-0146		0	0	<b>A</b>		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Hornfels		0	0	los:		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX05		0	0	'dua,		Gage Reading :	(lbs)
Depth :	146.5 - 146.75		0	0	ъ,		Mode of Failure :	Both
Alterations:							Test Duration :	(sec)
Diameter :	2.400 (in)							
Height :	3.470 (in)		Metric S	Standard				
Weight :	753.65 (gm)		Sigma 3	Sigma 1				
Area :	4.526 (in <sup>2</sup> )		(MPa)	(MPa)				
Volume :	15.707 (in <sup>3</sup> )		16.55	441.9	Peak			
	· · · · · ·		0.00	0.0				
Rock Code:			0.00	0.0	Nos.			
Hardness:			0.00	0.0	10/1/			
			0.00	0.0	ALC: N			
Pre	-Failure Sketch		Wo	rksheet		Po	st-Failure Sketch	
			2					
			Mode of Fa	ailure :	[	<	+	
			Fracture				A	
			Intact					
			Both	XX	l l	<		

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	Fail Load
(psi)	gage (lbs)
2,400	290,000

EEN 3 5 6 7 1,1,1,1,1,1,2 GHP-GM 205 146.5-146.75 F2 2400 3 2 3 17508 - GHP\_ GMX05 - 0146 Hole: GHP\_GMX05 Dept: 146.5 - 146.75 Rock Type: Horn Fels Test: Trax @ 2400p

17508-GHP\_GMX05-0146 Pre Test



17508-GHP\_GMX05-0146 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Compression Test Results					Client	Aura Minerals
Date	7/28/2017	Thakial Complession Test Results				Location	Aranzazu, Zacatecas Mexico	
Technician	EK	Failure Data:				Sample #	17508-GHP_GMX05-0167	
		S	Sample # 17508-GHP_GMX05-0167				Rock Type	Skarn
<u>-</u>			U.S. St	andard			Density :	199.1 (pcf)
			Sigma 3	Sigma 1				3,189.7 (kg/m <sup>3</sup> )
			(psi)	(psi)		_		
Sa	mple Data :		2,400	9,430	Peak		Test	t Data:
Sample # :	17508-GHP_GMX05-0167		0	0	\$		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Skarn		0	0	'esi		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX05		0	0	44an		Gage Reading :	(lbs)
Depth :	168.0 - 168.2		0	0	S.		Mode of Failure :	Both
Alterations:							Test Duration :	(sec)
Diameter :	2.388 (in)	1						
Height :	4.739 (in)		Metric S	Standard				
Weight :	1109.49 (gm)		Sigma 3	Sigma 1				
Area :	4.479 (in <sup>2</sup> )		(MPa)	(MPa)				
Volume :	21.226 (in <sup>3</sup> )		16.55	65.0	Peak			
			0.00	0.0	A			
Rock Code:			0.00	0.0	'es:			
Hardness:			0.00	0.0	<b>AU</b>			
			0.00	0.0	S			
						r1		
Pre	-Failure Sketch		Wo	rksheet		Po	st-Failure Sketch	
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**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	Fail Load
(psi)	gage (lbs)
2,400	42,240



17508-GHP\_GMX05-0167 Pre Test



17508-GHP\_GMX05-0167 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Compression Test Posults				•	Client	Aura Minerals
Date	8/2/2017	Thakial Complession Test Results				Location	Aranzazu, Zacatecas Mexico	
Technician	EK	Failure Data:				Sample #	17508-GHP_GMX05-0179	
	Sample # 17508-GHP_GMX05-0179						Rock Type	Skarn
	_		U.S. St	andard			Density :	175.2 (pcf)
			Sigma 3	Sigma 1				$2,806.2 \ (kg/m^3)$
			(psi)	(psi)				
Sa	mple Data :		750	8,383	Peak		Test	t Data:
Sample # :	17508-GHP_GMX05-0179		0	0	\$		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Skarn		0	0	'esi		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX05		0	0	<sup>4</sup> Uar		Gage Reading :	(lbs)
Depth :	179.9 - 180.1		0	0	Ъ,		Mode of Failure :	Fracture
Alterations:							Test Duration :	(sec)
Diameter :	2.407 (in)							
Height :	5.030 (in)		Metric S	Standard				
Weight :	1052.80 (gm)		Sigma 3	Sigma 1	, i i i i i i i i i i i i i i i i i i i			
Area :	4.552 (in <sup>2</sup> )		(MPa)	(MPa)				
Volume :	22.894 (in <sup>3</sup> )		5.17	57.8	Peak			
			0.00	0.0				
Rock Code:			0.00	0.0	· esi			
Hardness:			0.00	0.0	yual.			
			0.00	0.0	·U			
						1		
Pre	-Failure Sketch		Wo	rksheet		Po	st-Failure Sketch	
					f		+	
							- provi	
	$\nearrow$ $\land$ $\land$							
			Mode of Ea	ailure ·			$\gamma$ (	
						$\sim$		
	XX		Fracture	XX	1			
			Intact		1			
					•			
	A /							
	XX		Both		Ì	~~~		

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

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Compression Test Posults					Client	Aura Minerals
Date	7/28/2017	Thakial Complession Test Results				Location	Aranzazu, Zacatecas Mexico	
Technician	EK	Failure Data:				Sample #	17508-GHP_GMX05-0203-B	
		9	Sample #	17508-GHI	203-B	Rock Type	Fault	
			U.S. St	andard			Density :	162.9 (pcf)
			Sigma 3	Sigma 1				2,608.6 (kg/m <sup>3</sup> )
			(psi)	(psi)				
Sa	imple Data :		750	4,489	Peak		Test	t Data:
Sample # :	17508-GHP_GMX05-0203-B		1,200	4,243	<b>A</b>		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Fault		2,400	5,619	'esi		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX05		0	0	OIL SI		Gage Reading :	(lbs)
Depth :	203.3 - 203.5		0	0	С.		Mode of Failure :	Fracture
Alterations:							Test Duration :	(sec)
Diameter :	2.418 (in)							
Height :	3.769 (in)		Metric S	Standard				
Weight :	740.13 (gm)		Sigma 3	Sigma 1	, i i i i i i i i i i i i i i i i i i i			
Area :	4.593 (in <sup>2</sup> )		(MPa)	(MPa)				
Volume :	17.314 (in <sup>3</sup> )		5.17	31.0	Peak			
2			8.28	29.3	A			
Rock Code:			16.55	38.8	.esi			
Clay:			0.00	0.0	yual.			
			0.00	0.0	.0,			
Pre	-Failure Sketch		Wo	rksheet		Po	st-Failure Sketch	
							_	
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	$\sim$							
	$r \sim x$		Mode of Er	niluro :		_		
				anure.			$\sim$	
							$\mathbf{X}$	
	$  \setminus   $		Fracture	XX				
			radiare					
	$\frown$ / $\lnot$							
			Intact				N	
				l				
	$\leq$		Both					
				<b>-</b>				

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	Fail Load
(psi)	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

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Comprossion Tost Posults				Client	Aura Minerals	
Date	8/7/2017	Thakial Compression Test Results			Location	Aranzazu, Zacatecas Mexico		
Technician	EK	Failure Data:			Sample #	17508-GHP_GMX05-0221		
		Sample # 17508-GHP_GMX05-0221				Rock Type	Intrusive	
			U.S. St	andard			Density :	172.3 (pcf)
			Sigma 3	Sigma 1				2,760.6 (kg/m <sup>3</sup> )
			(psi)	(psi)				
Sa	mple Data :		1,200	36,062	Peak		Test	t Data:
Sample # :	17508-GHP_GMX05-0221		0	0	<b>\$</b>		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Intrusive		0	0	10Si		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX05		0	0	- Olys		Gage Reading :	(lbs)
Depth :	221.8 - 222.1		0	0	Ś		Mode of Failure :	Both
Alterations:							Test Duration :	(sec)
Diameter :	2.404 (in)	i						
Height :	5.109 (in)		Metric S	Standard				
Weight :	1049.02 (gm)		Sigma 3	Sigma 1				
Area :	4.539 (in <sup>2</sup> )		(MPa)	(MPa)				
Volume :	23.188 (in <sup>3</sup> )		8.28	248.7	Peak			
			0.00	0.0				
Rock Code:			0.00	0.0	Co.			
Hardness:			0.00	0.0	·dua			
			0.00	0.0	15			
Pre	-Failure Sketch		Wo	rksheet		Po	st-Failure Sketch	
					1	$\langle \langle \rangle$		
			Mode of Fa	ailure :		/	$\mathbf{n}$	
			Fracture					
	$\bigvee$		Intent		I			
	N /		initaut	L				
			Both	XX		$\geq$		

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
1,200	163,670



17508-GHP\_GMX05-0221 Pre Test



17508-GHP\_GMX05-0221 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Comprossion Test Posults				Client	Aura Minerals	
Date	7/28/2017				Location	Aranzazu, Zacatecas Mexico		
Technician	EK		Failur	e Data:			Sample #	17508-GHP_GMX06-0093
		Ş	Sample #	17508-GH	IP_GMX06-	0093	Rock Type	Skarn
			U.S. St	andard			Density :	184.1 (pcf)
			Sigma 3	Sigma 1				2,948.8 (kg/m <sup>3</sup> )
			(psi)	(psi)				
Sa	mple Data :		1,200	6,110	Peak		Test	Data:
Sample # :	17508-GHP_GMX06-0093		0	0	\$		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Skarn		0	0	105.		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX06		0	0	dua,		Gage Reading :	(lbs)
Depth :	93.0 - 93.2		0	0	Ъ,		Mode of Failure :	Fracture
Alterations:							Test Duration :	(sec)
Diameter :	2.326 (in)							
Height :	4.378 (in)		Metric S	Standard				
Weight :	899.05 (gm)		Sigma 3	Sigma 1				
Area :	4.250 (in <sup>2</sup> )		(MPa)	(MPa)				
Volume :	18.605 (in <sup>3</sup> )		8.28	42.1	Peak			
			0.00	0.0	ø			
Rock Code:			0.00	0.0	. Pos.			
Hardness:			0.00	0.0	.dua			
			0.00	0.0	1/5			
Pre	-Failure Sketch		Wo	rksheet		Po	st-Failure Sketch	
	( + )				(		+	
			Mode of Fa	ailure :				
			Fracture	XX				
	$ \rangle \rangle \rangle / $							
	$\wedge \qquad	*						
			Intact					
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			DOIN			~~~~		

**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	Fail Load
(psi)	gage (lbs)
1,200	25,970



17508-GHP\_GMX06-0093 Pre Test



17508-GHP\_GMX06-0093 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Comprossion Tost Posults				Client	Aura Minerals
Date	7/28/2017	maxial compression rest results			Location	Aranzazu, Zacatecas Mexico	
Technician	EK	Failure Data:			Sample #	17508-GHP_GMX06-0136	
		Sample # 17508-GHP_GMX06-0136				Rock Type	Intrusive
		U.S. S	Standard			Density :	168.8 (pcf)
		Sigma 3	Sigma 1				2,703.9 (kg/m <sup>3</sup> )
		(psi)	(psi)		_		
Sa	mple Data :	750	14,378	Peak		Test	Data:
Sample # :	17508-GHP_GMX06-0136	0	0	\$		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Intrusive	0	0	'esi		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX06	0	0	44ar		Gage Reading :	(lbs)
Depth :	136.5 - 136.7	0	0	D.		Mode of Failure :	Fracture
Alterations:						Test Duration :	(sec)
Diameter :	2.390 (in)						
Height :	4.669 (in)	Metric	Standard				
Weight :	928.30 (gm)	Sigma 3	Sigma 1				
Area :	4.487 (in <sup>2</sup> )	(MPa)	(MPa)		_		
Volume :	20.950 (in <sup>3</sup> )	5.17	99.2	Peak			
		0.00	0.0		1		
Rock Code:		0.00	0.0	Tes.			
Hardness:		0.00	0.0	I'dly a			
	· · · · · · · · · · · · · · · · · · ·	0.00	0.0	15			
					r1		
Pre	-Failure Sketch	We	orksheet		Po	st-Failure Sketch	
					C	$\mathbf{H}$	
						-F	
	$r \times h$						
	$\sim \mathcal{M}$						
		Mode of F	-ailure :				
	$[\frown] \setminus [$			1			
	$( \lambda )$	Fracture	XX				
	$  \langle / \rangle \rangle   \langle / \rangle \rangle   \langle / \rangle \rangle   \langle / \rangle \rangle   \langle / $						
	$  \times / \times \setminus \vee$			1			
	$K \setminus X$	Intact				/	
	$   \land \checkmark \land   $				/		
	$V \setminus V$	Path	r	1	$\vee$		
		DUII		J	-		
	NOTES:						

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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

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Comprossion Tost Posults			Client	Aura Minerals	
Date	7/28/2017	Thakial Compression Test Results			Location	Aranzazu, Zacatecas Mexico	
Technician	EK	Failure Data:			Sample #	17508-GHP_GMX07-0030	
		Sample a	# 17508-GH	Rock Type	Intrusive		
		U.S. S	Standard			Density :	153.9 (pcf)
		Sigma 3	Sigma 1				2,465.9 (kg/m <sup>3</sup> )
		(psi)	(psi)				
Sa	mple Data :	2,400	15,926	Peak		Test	: Data:
Sample # :	17508-GHP_GMX07-0030	0	0	\$		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Intrusive	0	0	<sup>'e</sup> si.		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX07	0	0	44an		Gage Reading :	(lbs)
Depth :	30.0 - 30.5	0	0	З.		Mode of Failure :	Fracture
Alterations:						Test Duration :	(sec)
Diameter :	2.399 (in)						
Height :	5.040 (in)	Metric	Standard				
Weight :	920.69 (gm)	Sigma 3	Sigma 1				
Area :	4.520 (in <sup>2</sup> )	(MPa)	(MPa)				
Volume :	22.784 (in <sup>3</sup> )	16.55	109.8	Peak			
		0.00	0.0	8			
Rock Code:		0.00	0.0	'es.			
Hardness:		0.00	0.0	·dua			
		0.00	0.0	S.			
					r1		
Pre	-Failure Sketch	W	orksheet		Po	st-Failure Sketch	
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	/						
		INIODE OF F	-allure :				
		Freeture	VV	1			
		Fracture	~^^	J			
					$\lor$		
		Intact	<b></b>	1			
		maci	L	1			
	$\langle \rangle$	Both		1			
		Dour	L	J			

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	Fail Load
2,400	71,990



17508-GHP\_GMX07-0030 Pre Test



17508-GHP\_GMX07-0030 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Compress	ion Tost Rosult	Client	Aura Minerals
Date	7/28/2017	maxial compless		Location	Aranzazu, Zacatecas Mexico
Technician	EK	Failure Data		Sample #	‡ 17508-GHP_GMX07-0032
		Sample # 1750	0032 Rock Typ	be Intrusive	
		U.S. Standar	d	Density :	151.7 (pcf)
		Sigma 3 Sign	na 1		2,429.3 (kg/m <sup>3</sup>
		(psi) (ps	si)		
Sa	mple Data :	1,200 10,6	305 <b>Peak</b>		Test Data:
Sample # :	17508-GHP_GMX07-0032	0 0		Disp. Rat	te: 0.0003 (in/sec)
Rock Type:	Intrusive	0 0	' <sup>e</sup> si.	Load Rat	e: (Ibs/sec)
Hole # :	GHP_GMX07	0 0	u ula	Gage Re	ading : (lbs)
Depth :	32.2 - 32.6	0 0	D I	Mode of	Failure : Fracture
Alterations:				Test Dura	ation : (sec)
Diameter :	2.400 (in)				
Height :	4.973 (in)	Metric Standa	rd		
Weight :	895.63 (gm)	Sigma 3 Sign	na 1		
Area :	4.524 (in <sup>2</sup> )	(MPa) (MF	Pa)		
Volume :	22.498 (in <sup>3</sup> )	8.28 73	.1 Peak		
		0.00 0.			
Rock Code:		0.00 0.	0 '85,		
Hardness:		0.00 0.			
		0.00 0.	0		
				<b>r</b> 1	
Pre	-Failure Sketch	Workshee	ţ	Post-Failure	Sketch
				+	$\rightarrow$
			r		
		Mode of Failure :			
	r / \ 🗲				
					$\gamma_{-}$
	h / h	Fracture X	X		
					N
	$\langle \rangle$	Intact			
	$  \rangle   \rangle$				
		Both			

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

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Comprossion Test Posults					Client	Aura Minerals
Date	7/28/2017	Thakial Compression Test Results				Location	Aranzazu, Zacatecas Mexico	
Technician	EK	Failure Data:				Sample #	17508-GHP_GMX07-0090	
		5	Sample #	17508-GH	Rock Type	Hornfels		
	-		U.S. St	andard			Density :	162.2 (pcf)
			Sigma 3	Sigma 1				$2,598.0 \ (kg/m^3)$
			(psi)	(psi)				
Sa	mple Data :		1,200	15,095	Peak		Test	t Data:
Sample # :	17508-GHP_GMX07-0090		0	0	A		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Hornfels		0	0	iesi,		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX07		0	0	4 <sub>U</sub> al		Gage Reading :	(lbs)
Depth :	90.8 - 91.0		0	0	Ś		Mode of Failure :	Fracture
Alterations:							Test Duration :	(sec)
Diameter :	2.399 (in)							
Height :	4.869 (in)		Metric S	Standard				
Weight :	936.97 (gm)		Sigma 3	Sigma 1	, i i i i i i i i i i i i i i i i i i i			
Area :	4.520 (in <sup>2</sup> )		(MPa)	(MPa)				
Volume :	22.008 (in <sup>3</sup> )		8.28	104.1	Peak			
			0.00	0.0	8			
Rock Code:			0.00	0.0	105 ·			
Hardness:			0.00	0.0	dual			
			0.00	0.0	N'			
						r1		
Pre	-Failure Sketch		Wo	rksheet		Po	st-Failure Sketch	
	atta							
						$\left( \right)$		
	ITTY					1		
	$\mathbb{X}//\mathbb{X}$					/	$\frown$	
	N///X >					/	$\langle \rangle$	
	N / '//XS		Mode of Fa	ailure ·		/		
	///X/////							
			Fracture	XX			/	
			radiard	700			/	
						حر ا		
	M///M/		Intact			ľ		
	MHIIA			L	I			
	V       / ////A							
	VIIIII		Both			<u> </u>		
					1			
	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

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Comprossion Test Posults					Client	Aura Minerals
Date	7/28/2017	Thazial Compression Test Results				Location	Aranzazu, Zacatecas Mexico	
Technician	EK	Failure Data:					Sample #	17508-GHP_GMX07-0148
		5	Sample #	17508-GH	0148	Rock Type	Marble	
			U.S. St	andard			Density :	169.6 (pcf)
			Sigma 3	Sigma 1				2,716.1 (kg/m <sup>3</sup> )
			(psi)	(psi)				
Sa	mple Data :		1,200	10,434	Peak		Test	Data:
Sample # :	17508-GHP_GMX07-0148		0	0	A		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Marble		0	0	'esi		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX07		0	0	4 <sub>U</sub> al		Gage Reading :	(lbs)
Depth :	148.3 - 148.5		0	0	Ъ.		Mode of Failure :	Both
Alterations:							Test Duration :	(sec)
Diameter :	2.399 (in)							
Height :	5.019 (in)		Metric S	Standard				
Weight :	1009.55 (gm)		Sigma 3	Sigma 1	· ·			
Area :	4.519 (in <sup>2</sup> )		(MPa)	(MPa)				
Volume :	22.682 (in <sup>3</sup> )		8.28	72.0	Peak			
			0.00	0.0	<i>₽</i>			
Rock Code:			0.00	0.0	.esic			
Hardness:			0.00	0.0	4Hal			
			0.00	0.0	0.			
			\\/_	rluch e et		1		
Pre	-Failure Sketch		VVO	rksneet	-	Po	st-Failure Sketch	
					f			
	h $N$		Mode of Fa	ailure :				
					-	_		
	$  \setminus /  $		Fracture					
	$  \rangle /  $							
	$\land$							
	$  \rangle / \bigtriangleup  $		Intact					
					l		ļ	
			Both	XX		~		

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

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Compression Test Results					Client	Aura Minerals	
Date	7/28/2017	Thaxial Compression Test Results				Location	Aranzazu, Zacatecas Mex	cico	
Technician	EK		Failure	e Data:			Sample #	17508-GHP_GMX07-01	60
		San	nple #	17508-GH	P_GMX07-	0160	Rock Type	Skarn	
<u>-</u>			U.S. St	andard			Density :	212.8 (pcf)	)
		Si	igma 3	Sigma 1				3,408.2 (kg/m	n <sup>3</sup> )
			(psi)	(psi)					
Sa	mple Data :		1,200	13,101	Peak		Test	Data:	
Sample # :	17508-GHP_GMX07-0160		0	0	A		Disp. Rate :	0.0003 (in/se	÷C)
Rock Type:	Skarn		0	0	I.S.		Load Rate :	(lbs/se	ec)
Hole # :	GHP_GMX07		0	0	SU31		Gage Reading :	(lbs)	)
Depth :	160.6 - 160.8		0	0	Ъ,		Mode of Failure :	Fracture	
Alterations:							Test Duration :	(sec	;)
Diameter :	2.403 (in)								
Height :	5.133 (in)		Metric S	standard					
Weight :	1300.64 (gm)	Si	igma 3	Sigma 1					
Area :	4.537 (in <sup>2</sup> )	(	MPa)	(MPa)					
Volume :	23.288 (in <sup>3</sup> )		8.28	90.4	Peak				
			0.00	0.0					
Rock Code:			0.00	0.0	Tes.				
Hardness:			0.00	0.0	. Olla				
			0.00	0.0	21				
Pre	-Failure Sketch		Wo	rksheet		Po	st-Failure Sketch		
					f	C	+		
	X	IVIO	de or Fa	allure :					
		F		VV					
	/	Fra	acture	~~	,	$\mathcal{N}$			
						M.	ХІ		
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	$\mid$ $\checkmark$ $\mid$ $\lor$	inte	aut				$\checkmark$		
						-	$\sim$		
		Rot	th		ι	~			
		BOI							

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	Fail Load
(psi)	gage (lbs)
1,200	59,440



17508-GHP\_GMX07-0160 Pre Test



17508-GHP\_GMX07-0160 Post Test

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Compression Test Results				Client	Aura Minerals	
Date	8/3/2017	Thaxial Complession Test Results			Location	Aranzazu, Zacatecas Mexico		
Technician	EK	Failure Data:			Sample #	17508-GHP_GMX07-0167		
		Sample # 17508-GHP_GMX07-0167			Rock Type	Skarn		
			U.S. St	andard			Density :	178.1 (pcf)
			Sigma 3	Sigma 1				2,853.0 (kg/m <sup>3</sup> )
			(psi)	(psi)				
Sa	mple Data :		2,400	9,582	Peak		Test	t Data:
Sample # :	17508-GHP_GMX07-0167		750	4,010	\$		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Skarn		1,200	5,745	I'es		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX07		0	0	dus		Gage Reading :	(lbs)
Depth :	167.3 - 167.5		0	0	Ś		Mode of Failure :	Both
Alterations:							Test Duration :	(sec)
Diameter :	2.361 (in)		P					
Height :	3.822 (in)		Metric S	Standard				
Weight :	782.60 (gm)		Sigma 3	Sigma 1				
Area :	4.379 (in <sup>2</sup> )		(MPa)	(MPa)				
Volume :	16.739 (in <sup>3</sup> )		16.55	66.1	Peak			
			5.17	27.7				
Rock Code:			8.28	39.6	Pes.			
Clay:			0.00	0.0	'dua			
			0.00	0.0	TIS .			
Pre	-Failure Sketch		Wo	rksheet		Po	st-Failure Sketch	
						A		
	$ \sim $							
							$\setminus$ /	
			Mode of Fa	ailure :			$\mathbf{X}$	
	$ \land \land$		Fracture					
							$\sim 1$	
			Intact					
	( J		<b>D</b> (1		l I	L	J	
	$\sim$		Both	XX		~~~		

**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	Fail Load
(psi)	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

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Compression Test Results			Client	Aura Minerals		
Date	8/3/2017	Thaxial Complession Test Results			Location	Aranzazu, Zacatecas Mexico		
Technician	EK	Failure Data:			Sample #	17508-GHP_GMX07-0168-B		
		Sample # 17508-GHP_GMX07-0168-B			Rock Type	Skarn		
			U.S. St	andard			Density :	192.4 (pcf)
			Sigma 3	Sigma 1				$3,082.4 \ (kg/m^3)$
			(psi)	(psi)				
Sa	mple Data :		750	4,558	Peak		Test	t Data:
Sample # :	17508-GHP_GMX07-0168-B		1,200	5,890	<b>\$</b>		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Skarn		2,400	9,490	les.		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX07		0	0	, dus,		Gage Reading :	(lbs)
Depth :	168.8 - 169.1		0	0	Ś		Mode of Failure :	Both
Alterations:							Test Duration :	(sec)
Diameter :	2.396 (in)					K		
Height :	4.103 (in)		Metric S	Standard				
Weight :	934.90 (gm)		Sigma 3	Sigma 1				
Area :	4.511 (in <sup>2</sup> )		(MPa)	(MPa)				
Volume :	18.508 (in <sup>3</sup> )		5.17	31.4	Peak			
	• • • • •		8.28	40.6				
Rock Code:			16.55	65.4	Pes.			
Clay:			0.00	0.0	1 dilla			
	<u>.                                    </u>		0.00	0.0	1/5			
Pre	-Failure Sketch		Wo	rksheet		Po	st-Failure Sketch	
						_		
							+	
	$\times$				1	$  \rangle$		
			Mode of Fa	ailure :	1		<	
	A				1	$ /\rangle$		
						7	$\setminus$ $\land$	
			Fracture		I (/			
					Y			
		*			. \		$\square$	
			Intact					
			Dath	VV	1	L	J	
			DUIN	77				

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	Fail Load
(psi)	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
GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17508	Triavial Compression Test Results			c	Client	Aura Minerals	
Date	8/3/2017	ma		516331011 1	estitesuit	.3	Location	Aranzazu, Zacatecas Mexico
Technician	EK		Failur	e Data:			Sample #	17508-GHP_GMX07-0172-B
		S	Sample #	17508-GH	P_GMX07-01	72-B	Rock Type	Skarn
			U.S. St	andard			Density :	154.1 (pcf)
			Sigma 3	Sigma 1				2,468.8 (kg/m <sup>3</sup> )
			(psi)	(psi)				
Sa	mple Data :		1,200	4,977	Peak		Test	Data:
Sample # :	17508-GHP_GMX07-0172-B		2,400	7,984	\$		Disp. Rate :	0.0003 (in/sec)
Rock Type:	Skarn		750	3,399	I OS		Load Rate :	(lbs/sec)
Hole # :	GHP_GMX07		0	0	- Oly		Gage Reading :	(lbs)
Depth :	172.5 - 172.8		0	0	З.		Mode of Failure :	Fracture
Alterations:							Test Duration :	(sec)
Diameter :	2.381 (in)							
Height :	4.319 (in)		Metric S	Standard				
Weight :	778.20 (gm)		Sigma 3	Sigma 1				
Area :	4.454 (in <sup>2</sup> )		(MPa)	(MPa)				
Volume :	19.235 (in <sup>3</sup> )		8.28	34.3	Peak			
	· · · · · ·		16.55	55.1				
Rock Code:			5.17	23.4	Nes.			
Clay:			0.00	0.0	1 dig			
	·		0.00	0.0	Y'S			
		I						
Pre	-Failure Sketch		Wo	rksheet		Po	st-Failure Sketch	
	$\langle \overline{\mathbf{R}} \rangle$				(		+	
					ľ	$\searrow$		
	$\land$							
	$   \langle \rangle \rangle$					)	$\mathbf{A}$	
			Mode of Fa	ailure :	1		A	
			Fracture	XX				
			r				$\Delta$	
	$M \setminus A$							
	$\wedge$ $\succ$		Intact					
					_			
	$\leq$		Both			· · · · · · · · · · · · · · · · · · ·		

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	Fail Load		
(psi)	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



Dia. 2	2.412	Ht. 2	1.239	Fail Load	3,400	lbs Force
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-G	HP_GMX01-0018		

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



D	Dia. 1	2.416	Ht. 1	1.127			
D	Dia. 2	2.415	Ht. 2	1.145	Fail Load	2,830	lbs Force
D	Dia. 3	2.414	Ht. 3	1.139			
D	Dia. 4	2.422	Ht. 4	1.129			
D	Dia. 5	2.418	Weight	246.520			
D	Dia. 6	2.411	Sample #	17508-G	HP_GMX01-0035		

**NOTES:** Sulfides

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 1	2.406	Ht. 1	1.345			
Dia. 2	2.396	Ht. 2	1.344	Fail Load	3,790	lbs Force
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-G	HP_GMX02-0037		

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



NOTES:

Dia. 5

Dia. 6

2.417

2.404

Weight

Sample #

257.750

17508-GHP\_GMX02-0056

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 1	2.397	Ht. 1	1.284				
Dia. 2	2.398	Ht. 2	1.281	Fail Load	5,980	lbs Force	
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-G	HP_GMX02-0159			

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 2	2.405	Ht. 2	1.299	Fail Load	7,130	lbs Force
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-G	HP_GMX02-0171		

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



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-G	HP_GMX02-0196			

NOTES: Heavy sulfides.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 2	2.399	Ht. 2	1.216	Fail Load	2,720	I
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-G	HP_GMX02-0200		

NOTES: Heavy sulfides

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 1	2.397	Ht. 1	1.347				
Dia. 2	2.399	Ht. 2	1.335	Fail Load	2,970	lbs Force	
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-G	HP_GMX02-0218			

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 6	2.406	Sample #	17508-G	HP_GMX02-0224	
Dia. 5	2.402	Weight	307.670		
Dia. 4	2.401	Ht. 4	1.220		
Dia. 3	2.404	Ht. 3	1.242		
Dia. 2	2.401	Ht. 2	1.222	Fail Load	3,670

NOTES: Heavy sulfides.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 6	2.405	Sample #	17508-G	HP_GMX02-0245			
Dia. 5	2.407	Weight	238.530				
Dia. 4	2.404	Ht. 4	1.195				
Dia. 3	2.406	Ht. 3	1.201				
Dia. 2	2.404	Ht. 2	1.201	Fail Load	7,970	lbs Force	
	100		11101				

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



NOTES: Controller error, no data saved.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



NOTES: Controller error, no data saved.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 6	2.421	Sample #	17508-G	HP_GMX04-0045			
Dia. 5	2.414	Weight	234.780				
Dia. 4	2.409	Ht. 4	1.144				
Dia. 3	2.413	Ht. 3	1.142				
Dia. 2	2.410	Ht. 2	1.157	Fail Load	4,750	lbs Force	
Dia. I	2.411		1.143				

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 1	2.409	Ht. 1	1.323			
Dia. 2	2.411	Ht. 2	1.325	Fail Load	8,410	lbs Force
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-G	HP_GMX04-0064		

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 6	2.406	Sample #	17508-GI	HP_GMX04-0066			
Dia. 5	2.413	Weight	324.960				
Dia. 4	2.404	Ht. 4	1.256				
Dia. 3	2.405	Ht. 3	1.270				
Dia. 2	2.404	Ht. 2	1.255	Fail Load	9,590	lbs Force	
Dia. 1	2.409	Ht. 1	1.256				

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 6	2.410	Sample #	17508-G	HP_GMX04-0205			
Dia. 5	2.408	Weight	232.290				
Dia. 4	2.405	Ht. 4	1.198				
Dia. 3	2.408	Ht. 3	1.201				
Dia. 2	2.407	Ht. 2	1.202	Fail Load	2,380	lbs Force	
Dia. 1	2.404	Ht. 1	1.203				

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 6	2.418	Sample #	17508-G	HP_GMX04-0224			
Dia. 5	2.410	Weight	371.400				
Dia. 4	2.406	Ht. 4	1.240				
Dia. 3	2.408	Ht. 3	1.238				
Dia. 2	2.409	Ht. 2	1.232	Fail Load	6,450	lbs Force	
Dia. 1	2.410	Ht. 1	1.233				

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 1	2.409	Ht. 1	1.272			
Dia. 2	2.408	Ht. 2	1.281	Fail Load	1,720	lbs Force
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-G	HP_GMX04-0226		

NOTES: Heavy sulfides

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 2	2.416	Ht. 2	1.269	Fail Load	9,270	lbs l
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-G	HP_GMX04-0253		

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



1.281

259.170

17508-GHP\_GMX04-0257

NOTES:

Dia. 4

Dia. 5

Dia. 6

2.406

2.413

2.418

Ht. 4

Weight

Sample #

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 1	2.418	Ht. 1	1.345				
Dia. 2	2.403	Ht. 2	1.351	Fail Load	7,090	lbs Force	
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-G	HP_GMX05-0086			

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 1	2.399	Ht. 1	1.233			
Dia. 2	2.389	Ht. 2	1.230	Fail Load	1,670	lbs Force
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-G	HP_GMX05-0105		

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



NOTES:

Dia. 5

Dia. 6

2.423

2.409

Weight

Sample #

230.900

17508-GHP\_GMX05-0148

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 2	2.410	Ht. 2	1.270	Fail Load	750	lbs
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-G	HP_GMX05-0167		

NOTES: Heavy sulfides, voids.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 1	2.415	Ht. 1	1.275				
Dia. 2	2.419	Ht. 2	1.288	Fail Load	5,340	lbs Force	
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-G	HP_GMX05-0179			

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. i	2.410		1.201				
Dia. 2	2.414	Ht. 2	1.263	Fail Load	10,360	lbs Force	
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-G	HP_GMX05-0191			

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 5	2.419	Weight	270.050		1		
Dia. 4	2.410	Ht. 4	1.299				
Dia. 3	2.408	Ht. 3	1.299				
Dia. 2	2.409	Ht. 2	1.298	Fail Load	11,730	lbs Force	
	2.111	110.1	1.000				

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 1	2.415	Ht. 1	1.297			
Dia. 2	2.417	Ht. 2	1.303	Fail Load	15,500	lbs Force
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-G	HP_GMX06-0025		

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. Z	2.345	Πι. Ζ	1.200	Fall Load	590
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-G	HP_GMX06-0093	

NOTES: Heavy sulfides, voids.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 1	2.400	Ht. 1	1.035				
Dia. 2	2.406	Ht. 2	1.051	Fail Load	7,190	lbs Force	
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-G	HP_GMX06-0136			

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



NOTES:

Dia. 5

Dia. 6

2.409

2.412

Weight

Sample #

242.260

17508-GHP\_GMX07-0030

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 1	2.407	Ht. 1	1.294				
Dia. 2	2.417	Ht. 2	1.288	Fail Load	4,220	lbs Force	
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-G	HP_GMX07-0032			
GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 2	2.406	Ht. 2	1.235	Fail Load	4,420	lbs Force	
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-G	HP_GMX07-0090			

NOTES: Shallow gouges on front side

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 1	2.410	Ht. 1	1.292			
Dia. 2	2.411	Ht. 2	1.287	Fail Load	2,350	lbs Force
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-G	HP_GMX07-0128		

NOTES:

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 1	2.406	Ht. 1	1.321				
Dia. 2	2.409	Ht. 2	1.318	Fail Load	3,160	lbs Force	
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-G	HP_GMX07-0148			

NOTES:

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 1	2.408	Ht. 1	1.275			
Dia. 2	2.411	Ht. 2	1.281	Fail Load	4,430	lbs Force
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-G	IP_GMX07-0160		

NOTES:

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



Dia. 2	2.404	Ht. 2	1.259	Fail Load	580
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-G	HP_GMX07-0167	

NOTES: Heavy sulfides, voids.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA



1.203

237.170

17508-GHP\_GMX07-0189

NOTES:

Dia. 4

Dia. 5

Dia. 6

2.416

2.418

2.415

Ht. 4

Weight

Sample #

## SMALL-SCALE DIRECT SHEAR TEST RESULTS



CALL & NICHOLAS, INC.

Geomechanical Laboratory

Tucson, Arizona USA



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.

Geomechanical Laboratory

Tucson, Arizona USA



Notes :

JRC = 6-10. Very well mated and very well locked. Sample surface filling is thin, hard, well-attached, olive-green material.

Geomechanical Laboratory

Tucson, Arizona USA



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.

Geomechanical Laboratory

Tucson, Arizona USA



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).

Geomechanical Laboratory

Tucson, Arizona USA



Notes :

JRC = 10-14. Poorly mated and not locked. \*\*Sample does not mate at all.\*\* Sample surface is a thick layer of veryfragile, powderized, unconsolidated material. Much was lost during shipping/prep.

Geomechanical Laboratory

Tucson, Arizona USA



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.

Geomechanical Laboratory

Tucson, Arizona USA



Notes :

JRC = 4-8. Well mated and well locked. Sample surface filling is a trace of white, soft, moderately-attached powder.

Geomechanical Laboratory

Tucson, Arizona USA



Notes :

JRC = 4-8. Very well mated and very well locked. Sample surface filling is a trace of light-green, moderately-attached, powdery material.

Geomechanical Laboratory

Tucson, Arizona USA



Notes :

JRC = 12-16. Very well mated and very well locked. Sample surface filling is a very-thin, well-attached, hard, white material (calcite).

Geomechanical Laboratory

Tucson, Arizona USA



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.

Geomechanical Laboratory

Tucson, Arizona USA



Notes :

JRC = 10-14. Very well mated and very well locked. Sample surface filling is crumbled parent rock that is fragile and granular.

Geomechanical Laboratory

Tucson, Arizona USA



JRC = 8-12. Well mated and moderately locked. Sample surface filling is a fragile, crumbly, soft, olive-green material.

Geomechanical Laboratory

Tucson, Arizona USA



Notes :

JRC = 2-6. Well mated and not locked. Sample surface filling is a white & grey, opaque, hard, well-attached material (calcite?).

Geomechanical Laboratory

Tucson, Arizona USA



Notes :

JRC = 8-12. Well mated and well locked. Sample surface filling is a partial, thin, well-attached, white material.

Geomechanical Laboratory

Tucson, Arizona USA



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?).

Geomechanical Laboratory

Tucson, Arizona USA



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.

Geomechanical Laboratory

Tucson, Arizona USA



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.

Geomechanical Laboratory

Tucson, Arizona USA



Notes :

JRC = 12-16. Well mated and well locked. Sample surface is a dull-yellow, opaque, fragile, moderately-soft filling with sulfides in it.

Geomechanical Laboratory

Tucson, Arizona USA



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.\*\*\*

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Notes :

JRC = 14-18. Very well mated and very well locked. Sample surface has sulfides and a thin, orange-oxide, hard, wellattached filling.

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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.

Geomechanical Laboratory

Tucson, Arizona USA



Notes :

JRC = 16-20. Well mated and well locked. Sample surface filling is a very-thick, soft, fragile, light-green, granular material.

Geomechanical Laboratory

Tucson, Arizona USA



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.

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Notes :

JRC = 16-20. Poorly mated and moderately locked. Sample surface filling is a very fragile, very-soft, granular material. Much was lost in shipping & 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



CALL & NICHOLAS, INC.

				Sieve	e Analysis a	& Soil Cla	ssification				
Siev	e Size	Retained Weight	Retained % of Weight	Cumulative % Retained	Cumulative % Passing	Coarse Gravel %	Fine Gravel	Coarse Sand	Medium Sand %	Fine Sand %	Silt / Clay %
U.S.	- mm	Grams		Coarser	Finer		70	/0	Culla /		
4"	100	0.00	0.00	0.00	100.00	0.00	7.80	11.75	28.27	29.75	22.44
2"	50.0	0.00	0.00	0.00	100.00						-
1.5"	37.5	0.00	0.00	0.00	100.00			Partic	e Size		
1"	25.0	0.00	0.00	0.00	100.00						
3/4"	19.0	0.00	0.00	0.00	100.00		Gravel	Sand	Sil	t Cla	ау
3/8"	9.5	4.08	1.17	1.17	98.83	100.0					
#4	4.75	23.11	6.63	7.80	92.20	90.0	0				
# 10	2.00	40.97	11.75	19.54	80.46	50.0					
# 20	0.850	55.87	16.02	35.56	64.44	80,0	0				
# 40	0.425	42.72	12.25	47.81	52.19						
# 60	0.250	37.56	10.77	58.58	41.42	¥ <sup>70.0</sup>	0				
# 120	0.125	46.16	13.23	71.82	28.18			<b>N</b>			
# 200	0.075	20.04	5.75	77.56	22.44						
P	an	78.25	22.44	100	0	≥ 50.0	0				
Тс	otal	348.75				ert					
Dia	(mm)	Hv	drometer Dat	ta	% Passing	<b>.⊆</b> 40.0	0		₹		
0.04	4500	ily	diometer Dat	la	N/A	~ ~ ~ ~			N		
0.0	3375	Working	Values & Coe	efficients	N/A	30.0	0				
0.0	2500	D10		-	N/A	20.0	0		N		
0.0	1875	D30		-	N/A						
0.0	1400	D60			N/A	10.0	0				
0.0	1000	Cu	N	/A	N/A						
0.0	0750	Cc	N	/A	N/A	0.0					
0.0	0500	Starting Wt.	348	3.75	N/A		100 10	) 1	0.1 0	0.01 0.001	0.0001
0.0	0375				N/A			Grai	in Size (mm)		
0.0	0250	Field U	ISCS	SC	N/A						
0.0	0150	AST	M D 422 Meth	nod	N/A			<b>—</b> 17508	-GHP_GMX01-003	2-0033	
Proj	ject #	175	08		200 Wash	only / No Hy	drometer.	As Received	d Moisture %	N	/A
Но	Hole # GHP_GMX01		Notes:	Sample was	a blend of G	GHP_GMX01	LL	53	PL	14	
De	epth	32.90 -	33.12		(	₪ 32.9-33.12		PI	39	Flow Index	N/A
Client		Aura Mi	nerals		Fine	s classify as	s CL	USCS	SC	Silt/Clay %	22.44
Loc	ation	Aranz	azu		& NICL			Description		Clayey sand	
D	ate	7/28/2	2017	CALL		ULAS,	$\mathbf{I}$				
Tech	nician	CMG	/JM	GEO	OMECHANICAI TUCSON, ARIZ	L LABORATO ONA USA	RY	Sample #	17508-GH	P_GMX01-	0032-0033

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17	508	ATTEDD		Date	8/2/2017	
Hole #	GHP_	GMX01	AIIERD	ERG LIMITS BY CASAGRANDE AS	Tech	CMG	
Depth	32.90	- 33.12		17509 CHP CMV01 0022 0022		Client	Aura Minerals
Estimated USCS		SC		17500-GHF_GIWIA01-0052-0055		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 Mois	sture(g)	5.172	5.789		
Weight of Dry Sample		9.836	11.055		
Moisture Content %		52.6%	52.4%		
No. of Blo	ws	27	28		

#### Plastic limit determination

C	an #	102	332	121	101	Average
Weight	of can (g)	11.155	11.271	11.128	11.198	
WET Sam	nple & 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	f 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	Moisture Content %		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%			
No. of Blows	27	28		53	0.01%
Calculated Liquid Limit	53.1%	53.1%	53.1%		





Flow Index	Liquid Limit	Plastic Limit	Plasticity Index:
N/A	53	14	39

Per ASTM 2487, Fines Classified as: CH

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Sample # 17508-GHP_GMX01-0032-0033
```



	As Ree	ceived		
Project #		17508		
Coordinates	G	GHP_GMX01		
Depth	3	2.90 - 33.12		
USCS	SC	Clayey san	d	

Sieve Analysis & Soil Classification											
Sieve Size		Retained Weight	Retained % of Weight	Cumulative % Retained	Cumulative % Passing	Coarse Gravel %	Fine Gravel	Coarse Sand	Medium Sand %	Fine Sand %	Silt / Clay %
U.S mm		Grams		Coarser	Finer		70	/0	Culla /		
4"	100	0.00	0.00	0.00	100.00	0.00	4.96	5.84	22.02	26.67	40.51
2"	50.0	0.00	0.00	0.00	100.00						
1.5"	37.5	0.00	0.00	0.00	100.00			Particl	e Size		
1"	25.0	0.00	0.00	0.00	100.00						
3/4"	19.0	0.00	0.00	0.00	100.00	400.0	Gravel	Sand	Sil	t Cla	ay
3/8"	9.5	6.65	2.76	2.76	97.24	100.0					
#4	4.75	5.29	2.20	4.96	95.04	90.0	0				
# 10	2.00	14.07	5.84	10.80	89.20	50.0					
# 20	0.850	26.46	10.98	21.78	78.22	80.0	0				
# 40	0.425	26.59	11.04	32.82	67.18						
# 60	0.250	18.46	7.66	40.48	59.52	70.0	0				
# 120	0.125	27.45	11.39	51.87	48.13			N			
# 200	0.075	18.34	7.61	59.49	40.51	<b>Š</b> 00.0					
Pan		97.60	40.51	100	0	\$ 50.0	0				
Total		240.90				erl					
Dia (mm)		Hydrometer Data		% Passing	<b>É</b> 40.0	0					
0.04500		Hydrometer Data			33.79	~ 20.0					
0.03375		Working	Values & Coefficients		31.59	30.0	0		×.		
0.02500		D10	N	/A	28.21	20.0	о —				
0.01875		D30	0.0	296	25.19						
0.01400		D60	0.2	261	23.99	10.0	0				
0.01000		Cu	N	N/A							
0.00750		Cc	N	/A	21.08	0.0			0.1 0	01 0.001	0.0001
0.00500		Starting Wt.	240.90		19.55		100 10	) 1	0.1 0	0.001	0.0001
0.00375				18.17	17			rain Size (mm)			
0.00250		Field USCS SC		16.42							
0.00150		ASTM D 422 Method		14.41	──← 17508-GHP_GMX01-0029-0030						
Project #		17509								/ 0	
Project #					Sample was a blend of GHP_GMX01 @ 29.45-29.6; 29.73-29.80; 30.0-30.07		As Received	a ivioisture %	N	/A	
Hole #		GHP_GMX01		Notes:			; 30.0-30.07.		40	PL	20
Deptn		29.0 - 30.07		Fines		s classify as CL		PI	20	Flow Index	N/A
Client		Aura Minerals						USCS	SC	Silt/Clay %	40.51
Location		Aranzazu		CALL & NICHOLAS INC		INC	Description		Clayey sand		
Date		8/18/2017					o				
Technician		JM/CMG		GEOMECHANICAL LABORATORY TUCSON, ARIZONA USA			Sample #	17508-GH	P_GMX01-	0029-0030	
## CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17	508	ATTEDD			Date	8/1/2017
Hole #	GHP_	GMX01	AIIERD	ERG LIMITS BY CASAGRANDE AS	WI D4310	Tech	CMG
Depth	29.0 ·	- 30.07		17508 CHP CMV01 0020 0020		Client	Aura Minerals
Estimate	ed USCS	SC		17506-GHF_GWAUT-0029-0050		Location	Aranzazu

#### Liquid Limit determination by Casagrande Method (Method A)

Can #		64	212		
Weight of can (g)		30.853	30.988		
WET Samp	ole & 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 I	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 Sam	nple & 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	e 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%		





Flow Index	Liquid Limit	Plastic Limit	Plasticity Index:
N/A	40	20	20

Per ASTM 2487, Fines Classified as: CL

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Sample # 17508-GHP_GMX01-0029-0030
```



	As Received	
Project #	17508	
Coordinates	GHP_GMX01	
Depth	29.0 - 30.07	
USCS	SC Clayey san	d

				Sieve	e Analysis a	& Soil Cla	ssification				
Siev	e Size	Retained Weight	Retained % of Weight	Cumulative % Retained	Cumulative % Passing	Coarse Gravel %	Fine Gravel	Coarse Sand	Medium Sand %	Fine Sand %	Silt / Clay %
U.S.	- mm	Grams		Coarser	Finer		70	70			
4"	100	0.00	0.00	0.00	100.00	0.00	2.94	2.98	18.35	24.85	50.88
2"	50.0	0.00	0.00	0.00	100.00						
1.5"	37.5	0.00	0.00	0.00	100.00			Particl	e Size		
1"	25.0	0.00	0.00	0.00	100.00						
3/4"	19.0	0.00	0.00	0.00	100.00		Gravel	Sand	Sil	lt Cla	ау
3/8"	9.5	4.51	1.68	1.68	98.32	100.0					
#4	4.75	3.40	1.27	2.94	97.06	90.0	0				
# 10	2.00	8.01	2.98	5.92	94.08	50.0					
# 20	0.850	21.49	7.99	13.92	86.08	80.0	0				
# 40	0.425	27.86	10.36	24.28	75.72						
# 60	0.250	18.92	7.04	31.31	68.69	70.0 H	0				
# 120	0.125	28.85	10.73	42.04	57.96		0				
# 200	0.075	19.03	7.08	49.12	50.88	<b>A</b> 00.0					
P	an	136.77	50.88	100	0	\$ 50.0	0				
Тс	otal	268.83				erl			N		
Dia	(mm)	Hv	drometer Dat	ta	% Passing	<b>Ĕ</b> 40.0	0				
0.04	4500	i iy	diometer Dat	la	41.63	~ ~ ~ ~					
0.0	3375	Working	Values & Coe	efficients	38.02	30.0	0				
0.02	2500	D10	N	/A	34.65	20.0	o				
0.0	1875	D30	0.0	146	31.39						
0.0	1400	D60	0.1	488	29.79	10.0	0				
0.0	1000	Cu	N	/A	27.24	0.0					
0.0	0750	Cc	N	/A	25.78	0.0		······	0.1 0	0.001	0.0001
0.0	0500	Starting Wt.	268	3.83	23.46		100 10	) 1	0.1 0	0.001	0.0001
0.0	0375				21.82			Grai	in Size (mm)		
0.0	0250	Field U	ISCS	SC	19.89						
0.0	0150	AST	M D 422 Meth	nod	17.83			<b>—</b> 17508	-GHP_GMX01-003	0-0031	
Proj	ect #	175	08		Sample was	a blend of G	HP GMX01	As Received	d Moisture %	N	/A
Но	le #	GHP_G	MX01	Notes:	@ 30 4	5-30.60: 30 9	-30.99	LL	36	PL	18
De	pth	30.45 -	30.99		Fine	s classify as	CL	PI	18	Flow Index	N/A
CI	ient	Aura Mi	nerals					USCS	CL	Silt/Clay %	50.88
Loc	ation	Aranz	azu	CALL	& NICI			Description		Sandy lean cla	ay
Da	ate	7/28/2	2017	CALL		IULAS,	$\mathbf{IIVC}$ .				
Tech	nician	CMG	/JM	GEO	EOMECHANICAL LABORATORY TUCSON, ARIZONA USA			Sample #	17508-GH	IP_GMX01-	0030-0031

## CALL & NICHOLAS, INC.

GEOMECHANICAL LABORATORY

TUCSON, ARIZONA USA

Project #	17	508	ATTEDD			Date	8/1/2017
Hole #	GHP_	GMX01	AIIERD	ERG LIMITS BY CASAGRANDE AS	W D4310	Tech	CMG
Depth	30.45	- 30.99		17508 CHP CMV01 0020 0021		Client	Aura Minerals
Estimate	ed USCS	SC		17506-GHF_GIWIA01-0050-0051		Location	Aranzazu

#### Liquid Limit determination by Casagrande Method (Method A)

Can #		213	28		
Weight o	of can (g)	30.881	29.505		
WET Samp	ole & 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 Sam	nple & 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	f 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	e 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%			
No. of Blows	23	23		36	0.97%
Calculated Liquid Limit	36.6%	35.7%	36.2%		





Flow Index	Liquid Limit	Plastic Limit	Plasticity Index:
N/A	36	18	18

Per ASTM 2487, Fines Classified as: CL

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Sample # 17508-GHP_GMX01-0030-0031
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As Received		eceived	
Project #		17508	
Coordinates		GHP_GMX01	
Depth		30.45 - 30.99	
USCS	CL	Sandy lean	clay



CALL & NICHOLAS, INC.



12421 W. 49th Avenue, Unit #6 Wheat Ridge, CO 80033 (303) 463-8270

### Semi-Quantitative X-Ray Diffraction Analysis

Page 1 of 2

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	
Bulk Sample				
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 4° to 60 ° 2 $\theta$  Cu K $\alpha$  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

Page 2 of 2

Client: Call & Nicholas, Inc. 2475 N. Coyote Drive Tucson, AZ 85745		Analysis Date: Reporting Date: Receipt Date: Client Job No.: Project Title: DCMSL Project:	8-9-17 8-10-17 8-7-17 None Given 17508 CN24
Client Sample No.:	17508-GHP_	17508-GHP_	
<u>Clay Fraction &lt;2µm</u>	GMX01-0030	GMX01-0032	
Smectite	97	<b>98</b>	
Kaolin	3	2	

An oriented clay mount ( $<2\mu$ m) was prepared for x-ray diffraction analysis and scanned over a range of 3° to 40° 2 $\Theta$  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.

Kon Schoot

Ron Schott, Analyst

# 2678 CN24

# CALL & NICHOLAS, INC.

2475 N. Coyote Drive Tucson, Arizona 85745 U.S.A.

 Tel:
 (520) 670-9774

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 (520) 670-9251

 E-Mail:
 cni@cnitucson.com

TO:	<b>DCM Science Laboratories</b>
FROM:	Mr. Chris Grubb / Call & Nicholas, Inc.
DATE:	Aug 02, 2017
SUBJECT:	XRD Testing Request

Principals P. F. Cicchini, P.E. T. M. Ryan, P.E. R. C. Barkley, P.E. R. Pratt, P.E.

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

Reed 10 Howey 8/7/17 11:15

**Slope Stability** 

**Rock Mechanics**