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TECHNICAL MEMORANDUM

DATE: February 28, 2012 **Project 605.411**

TO: Greg Ghidotti
RESOLUTION COPPER MINING LLC

FROM: Janis Blainer-Fleming, Kate Duke, and Todd Keay
MONTGOMERY & ASSOCIATES

SUBJECT: RESULTS OF DRILLING AND CONSTRUCTION AT HYDROLOGIC TEST WELLS PHRES-01, PHRES-02, PHRES-03, AND PHRES-04, RESOLUTION COPPER MINING, PINAL COUNTY, ARIZONA

In accordance with a request from Mr. Greg Ghidotti, Resolution Copper Mining LLC (RCM), Montgomery & Associates (M&A) has prepared this Technical Memorandum to summarize results of drilling and construction at hydrologic test wells PHRES-01, PHRES-02, PHRES-03, and PHRES-04. The wells were installed to provide observation wells during the long-term pumping test at well HRES-09, and to provide locations for characterization of fracture distribution and hydraulic conductivity in the Apache Leap Tuff (ALT) aquifer in the vicinity of hydrologic test well HRES-09.

PHRES-01 SUMMARY

A summary of drilling and construction of PHRES-01 is provided below:

1. Hydrologic test well PHRES-01 (ADWR #55-913050) is located east-northeast of well HRES-09 on land owned by the State of Arizona, in Township 2 South, Range 13 East, in the SW ¼ of the NE ¼ of the SW ¼ of Section 5 ((D-2-13)05cac), adjacent to ephemeral Rancho Rio Creek.
2. Well PHRES-01 was drilled during the period March 22 through 31, 2011.

3. Total drilled depth is 353.6 meters below land surface (bls).
4. Geologic units encountered during drilling from land surface to total depth include Apache Leap Tuff (Tal; 0 to 347.3 meters) and Whitetail Conglomerate (Tw; 347.3 to 353.6 meters).
5. Non-pumping water level was 74.75 meters bls on August 15, 2011.
6. Three grouted vibrating-wire piezometers were installed on August 16, 2011; piezometers are installed in the Tal at 47.2, 96.0, and 121.9 meters bls.
7. The uppermost piezometer at PHRES-01 is not in grout due to loss of grout to formation fractures during installation.

PHRES-02 SUMMARY

A summary of drilling and construction of PHRES-02 is provided below:

1. Hydrologic test well PHRES-02 (ADWR #55-913051) is located due east of well HRES-09 on land owned by the State of Arizona, in Township 2 South, Range 13 East, in the SE ¼ of the NW ¼ of the SW ¼ of Section 5 ((D-2-13)05cbd), adjacent to ephemeral Rancho Rio Creek.
2. Well PHRES-02 was drilled during the period March 31 through April 5, 2011.
3. Total drilled depth is 335.3 meters bls.
4. Geologic units encountered during drilling from land surface to total depth include Tal (0 to 328.4 meters) and Tw (328.4 to 335.3 meters).
5. Non-pumping water level was 75.44 meters bls on August 15, 2011.
6. Three grouted vibrating-wire piezometers were installed on August 17, 2011; piezometers are installed in the Tal at 114.3, 254.6, and 276.3 meters bls.
7. None of the piezometers at PHRES-02 is in grout due to loss of grout to formation fractures during installation.

PHRES-03 SUMMARY

A summary of drilling and construction of PHRES-03 is provided below:

1. Hydrologic test well PHRES-03 (ADWR #55-913052) is located due south of well HRES-09 on land owned by the State of Arizona, in Township 2 South, Range 13 East, in the SE ¼ of the NE ¼ of the SW ¼ of Section 5 ((D-2-13)05cbd).
2. Well PHRES-03 was drilled during the period April 12 through 16, 2011.
3. Total drilled depth is 330.7 meters bls.
4. Geologic units encountered during drilling from land surface to total depth include Tal (0 to 323.7 meters) and Tw (323.7 to 330.7 meters).
5. Non-pumping water level was 83.45 meters bls on August 15, 2011.
6. Three vibrating-wire piezometers were installed on August 17 and 18, 2011; piezometers are installed at 152.5, 229.6, and 256.3 meters bls.
7. The uppermost two piezometers at PHRES-03 are not in grout due to loss of grout to formation fractures during installation.

PHRES-04 SUMMARY

A summary of drilling and construction of PHRES-04 is provided below:

1. Hydrologic test well PHRES-04 (ADWR #55-913053) is located southwest of HRES-09 on land owned by the State of Arizona, in Township 2 South, Range 13 East, in the NE ¼ of the SW ¼ of the SW ¼ of Section 5 ((D-2-13)05cca).
2. Well PHRES-04 was drilled during the period April 17 through 22, 2011.
3. Total drilled depth is 349.0 meters bls.
4. Geologic units encountered during drilling from land surface to total depth include Tal (0 to 340.8 meters) and Tw (340.8 to 349.0 meters).
5. Non-pumping water level was 106.08 meters bls on August 15, 2011.
6. Three vibrating-wire piezometers were installed on August 18 and 19, 2011; piezometers are installed at 193.4, 207.8, and 305.9 meters bls.
7. The uppermost piezometer at PHRES-04 is not in grout due to loss of grout to formation fractures during installation.

INTRODUCTION

Hydrologic test wells PHRES-01, PHRES-02, PHRES-03, and PHRES-04 were drilled during the period March 22 through April 22, 2011. The wells were drilled to:

- provide observation wells during the long-term pumping test at well HRES-09
- provide locations for characterization of fracture distribution and hydraulic conductivity in the ALT aquifer in the vicinity of hydrologic test well HRES-09 using hydrophysical and geophysical logging methods.
- provide locations for monitoring long term trends in pore pressure at discrete depths within the ALT aquifer

The wells were drilled into the Tw to fully penetrate and permit testing within the Tal. Following drilling, the boreholes remained open for geophysical and hydrophysical logging. The wells were completed with grouted vibrating-wire piezometer arrays following testing. The wells are located on land owned by the State of Arizona, in Township 2 South, Range 13 East, in Section 5. **Figure 1** shows the locations for PHRES-01 through PHRES-04. **Figures 2 through 5** are schematic diagrams of well construction for the test wells. Other data summarized on the schematic diagrams include: hydrogeologic units, drilling penetration rate, fracture summary, water production rate during drilling operations, and borehole geophysical logs. Detailed lithologic logs for the test wells are provided in **Appendix A**. Site layout during drilling operations for PHRES-01 through PHRES-04 is shown on **Photographs 1 through 4**, respectively.

Photograph 1. Site layout at PHRES-01 during drilling operations

Photograph 2. Site layout at PHRES-02 during drilling operations

Photograph 3. Site layout at PHRES-03 during drilling operations

Photograph 4. Site layout at PHRES-04 during drilling operations

DRILLING OPERATIONS

Hydrologic test wells PHRES-01, PHRES-02, PHRES-03, and PHRES-04 were drilled by Yellow Jacket Drilling (YJD) of Phoenix, Arizona, using a Speedstar 110K top-head drive rotary drill rig. The wells were drilled in accordance with technical specifications prepared by M&A. RCM personnel coordinated drilling contractor activities and purchase of well construction materials. Daily drilling reports were prepared by YJD personnel and were submitted to RCM for review. M&A personnel described drill cuttings samples and provided on-site monitoring during critical phases of drilling and construction of the wells. RCM provided daily summaries of drilling progress. Daily summary data are provided in **Appendix B**.

The boreholes were advanced to approximately 6 meters below the contact between the Tal and Tw. After the long-term test at HRES-09 the PHRES-series wells were completed as grouted piezometer arrays. Final completion of the wells was designed by M&A based on review of lithologic and hydrologic conditions encountered during drilling operations and results of borehole geophysical and hydrophysical logging. Drilled depths are given in **Table 1**.

TABLE 1. SUMMARY OF DRILLED DEPTHS OF HYDROLOGIC TEST WELLS PHRES-01, PHRES-02, PHRES-03, AND PHRES-04

Well	Depth Drilled (meters)
PHRES-01	353.6
PHRES-02	335.3
PHRES-03	330.7
PHRES-04	349.0

Drilling Method

The surface boreholes for PHRES-01 and PHRES-02 were drilled using a 10-inch diameter hammer bit and the conventional air percussion method. The boreholes were reamed using a 12-1/4-inch diameter tricone bit and the conventional air rotary method. The surface boreholes for PHRES-03 and PHRES-04 were drilled using a 12-inch diameter hammer bit and the conventional air percussion method. The interval from the bottom of the surface casing to total depth was drilled using the dual-wall air reverse circulation and air-assisted flooded reverse circulation methods. Depths, drilling methods, and bit types and sizes are summarized in **Table 2**.

Following drilling of the 12-inch diameter surface boreholes, 8-5/8-inch diameter blank steel surface casing was installed and cemented in place. The surface casing was installed to 12.2 meters bls at all locations except for PHRES-02 where casing was installed to 18.3 meters bls (**Figures 2 through 5**).

TABLE 2. SUMMARY OF DRILLING METHODS AND BOREHOLE DIAMETERS HYDROLOGIC TEST WELLS PHRES-01, PHRES-02, PHRES-03, AND PHRES-04				
Well	**Depth Interval (meters)**	**Drilling Method**	**Bit Type**	**Borehole Diameter (inches)**
PHRES-01	0 – 12.2	conventional air rotary	tricone	12-1/4
	12.2 – 268.2	reverse circulation air percussion	hammer	6-1/4
	268.2 – 272.2	air-assisted reverse circulation	tricone	5-7/8
	272.2 – 353.6	air-assisted reverse circulation	tricone	5-5/8
PHRES-02	0 – 18.3	conventional air rotary	tricone	12-1/4
	18.3 – 282.9	reverse circulation air percussion	hammer	6-1/4
	282.9 – 335.3	air-assisted reverse circulation	tricone	5-5/8
PHRES-03	0 – 12.2	conventional air percussion	hammer	12
	12.2 – 224.3	reverse circulation air percussion	hammer	6-1/4
	224.3 – 285.0	air-assisted reverse circulation	tricone	6-1/8
	285.0 – 330.7	air-assisted flooded reverse circulation	tricone	6
PHRES-04	0 – 12.2	conventional air percussion	hammer	12
	12.2 – 248.4	reverse circulation air percussion	hammer	6-1/4
	248.4 – 349.0	air-assisted flooded reverse circulation	tricone	6-1/8

The dual-wall air reverse circulation method was used to allow for measurement of groundwater production during drilling. At PHRES-03, at a depth of 285.0 meters bls, and at PHRES-04, at a depth of 248.4 meters bls, slow drilling progress necessitated change to the air-assisted flooded reverse drilling method for the remainder of each borehole.

Drilling Fluid and Drill Cuttings Management

Air and water were used during drilling of the boreholes. When air methods were used, the drilling fluids were discharged to a cyclone to separate air from the fluid stream. All fluids were contained in portable tanks then removed from the site using vacuum trucks and deposited at a designated storage facility at the RCM West Plant Site.

Monitoring of Drilling Conditions

During drilling operations, drill penetration rate was monitored by YJD by recording drill start and stop times for each 6.1-meter drill rod. A summary of drill penetration rate data for each well is shown on **Figures 2 through 5**. The field data recorded by YJD are on file at M&A.

Monitoring of Lithologic Conditions

Drill cuttings samples were collected at 3-meter (10-foot) intervals and placed in labeled bags. Lithologic descriptions for each sample were prepared in the field by M&A personnel. Splits of each sample were placed in plastic chip trays and were provided to RCM. Detailed lithologic descriptions are given in **Appendix A**.

Monitoring of Groundwater Conditions

When the dual-wall air reverse circulation method was used, it was possible to monitor for the presence of groundwater and to determine approximately where groundwater inflow zones were encountered. Observations of groundwater production were made after drilling out each 6.1-meter drill rod. Prior to measurement of production rate, injection water was cut off from the airstream and air circulation was continued for 10 to 15 minutes. When discharge stabilized, discharge rate was measured using a 5-gallon bucket and a stop watch or a calibrated storage tank. Water production could not be monitored during air-assisted flooded reverse circulation drilling at PHRES-03 and PHRES-04. Water production measurements are provided on **Figures 2 through 5**.

At PHRES-01, makeup water was injected during drilling of the interval from 12.2 to 201.3 meters bls. Groundwater production rate was measured for the depth interval from 12.2 to 347.5 meters bls; data are presented on **Figure 2**. Groundwater production rate was less than 0.1 liter per second (L/s) for the depth interval from 79.2 to 152.4 meters bls. First measurable groundwater production rate at PHRES-01 was 0.3 L/s at a depth of 158.5 meters bls. The production rate was somewhat variable for the depth interval from 158.5 to 268.2 meters bls and ranged between 0.1 and 0.7 L/s; maximum production rate for this interval was 0.7 L/s at a depth of 237.7 meters bls. The production rate increased for the interval from 269.8 to 347.5 and ranged between 0.9 and 1.2 L/s; maximum production rate for this interval was 1.2 L/s at 269.8 and 272.8 meters bls. Water quality parameters were measured for the depth interval from 79.2 to 347.5 meters bls, and were relatively stable for the interval from 170.7 to 347.5 meters bls. Water quality parameters for this interval are summarized in **Table 3**.

At PHRES-02, makeup water was injected during drilling of the interval from 18.3 to 274.3 meters bls. Groundwater production rate was measured for the depth interval from 18.3 to 334.4 meters bls; data are presented on **Figure 3**. Groundwater production rate was less than 0.1 L/s for the depth interval from 73.2 to 274.3 meters bls. First measurable groundwater production rate at PHRES-02 was 2.9 L/s at a depth of 280.4 meters bls. Production rate increased from 2.9 to 7.9 L/s for the depth interval from 280.4 to 310.9 meters bls, and then decreased to about 3 to 4 L/s for the remainder of drilling. Maximum production rate of 7.9 L/s was measured at 310.9 meters bls. Water quality parameters were measured for the depth interval from 85.3 to 334.4 meters bls, and were relatively stable for the interval from 280.4 to 334.4 meters bls. Water quality parameters for this interval are summarized in **Table 3**.

At PHRES-03, makeup water was injected during drilling of the interval from 12.2 to 224.3 meters bls. Groundwater production rate was measured for the depth interval from 12.2 to 243.8 meters bls; data are presented on **Figure 4**. Groundwater production rate was less than 0.1 L/s for the depth interval from 85.3 to 201.2 meters bls. First measurable groundwater production rate at PHRES-03 was 0.1 L/s at a depth of 207.3 meters bls. Production rate increased substantially for the interval from 224.3 to 243.8 meters bls; maximum production rate for this interval was 4.2 L/s at a depth of 243.8 meters bls. Water quality parameters were measured for the depth interval from 85.3 to 243.8 meters bls, and were relatively stable for the interval from 224.3 to 243.8 meters bls. Water quality parameters for this interval are summarized in **Table 3**. At PHRES-03, the interval from 243.8 to 330.7 meters bls was drilled using air-assisted flooded reverse drilling methods and it was not possible to obtain groundwater production measurements. A production measurement was taken at total drilled depth of 330.7 meters bls following 20 minutes of airlifting. The measured production rate was 5.7 L/s. Water quality parameters are summarized in **Table 3**.

At PHRES-04, makeup water was injected during drilling of the interval from 12.2 to 195.1 meters bls. Groundwater production rate was measured for the depth interval from 12.2 to 248.4 meters bls; data are presented on **Figure 5**. Groundwater production rate was less than 0.1 L/s for the depth interval from 103.6 to 170.7 meters bls. First measurable groundwater production rate at PHRES-04 was 0.1 L/s at a depth of 176.8 meters bls. Production rate increased substantially for the interval from 195.1 to 249.9 meters bls; maximum production rate for this interval was 4.0 L/s at 243.8 and 249.9 meters bls. Water quality parameters were measured for the depth interval from 103.6 to 249.9 meters bls, and were relatively stable for the interval from 189.0 to 249.9 meters bls. Water quality parameters for this interval are summarized in **Table 3**. At PHRES-04, the interval from 249.9 to 349.0 meters bls was drilled using air-assisted flooded reverse drilling methods and it was not possible to obtain groundwater production measurements.

TABLE 3. SUMMARY OF WATER QUALITY PARAMETERS DURING DRILLING FOR HYDROLOGIC TEST WELLS PHRES-01, PHRES-02, PHRES-03, AND PHRES-04

WELL IDENTIFIER	DEPTH INTERVAL	TEMPERATURE (degrees Celsius)	pH (standard units)	SPECIFIC CONDUCTANCE (microsiemens/cm)
PHRES-01	170.7 - 347.5	22.2 - 27.6	7.78 - 8.74	290 - 326
PHRES-02	280.4 - 334.4	24.2 - 26.2	8.13 - 8.28	327 - 343
PHRES-03	224.3 - 243.8	23.7 - 26.1	7.95 - 8.19	355 - 362
PHRES-03 (total depth)	330.7	26.8	7.88	356
PHRES-04	189.0 - 249.9	20.8 - 24.6	7.65 - 8.18	288 - 338

BOREHOLE GEOPHYSICAL LOGGING

Borehole geophysical logging was conducted when the boreholes for PHRES-01 through PHRES-04 reached total depth. Borehole geophysical logging services were provided by Southwest Exploration Services, LLC (SWE) of Gilbert, Arizona. Borehole geophysical logging was conducted at PHRES-01 on April 1, at PHRES-02 on April 6, at PHRES-03 on April 18, and at PHRES-04 on April 22, 2011. The suite of geophysical logs obtained included: electrical resistivity (E-log), spontaneous potential, natural gamma ray, sonic, temperature, fluid resistivity, and acoustic borehole imaging (ABI). Optical borehole imaging logs (OBI) were obtained at all of the holes for the unsaturated part of the Tal. At PHRES-01, an OBI log was obtained for the entire borehole interval. SWE submitted field and final logs in digital format to RCM. Summary geophysical logs for PHRES-01, PHRES-02, PHRES-03, and PHRES-04 are provided on **Figures 2, 3, 4, and 5**, respectively.

ANALYSIS OF GEOLOGIC CONDITIONS

Geologic Contacts and Degree of Fracturing

Geologic contacts were picked based on analysis of drill cutting samples, geophysical logs, and information obtained during drilling. Detailed lithologic descriptions based on drill cuttings samples are provided in **Appendix A**. Geophysical logs were used to confirm the formation depth intervals given in **Table 4** and shown on **Figures 2, 3, 4, and 5**.

TABLE 4. SUMMARY OF GEOLOGIC UNITS DRILLED FOR HYDROLOGIC TEST WELLS PHRES-01, PHRES-02, PHRES-03, and PHRES-04

Geologic Formation	Depth Interval (meters)			
	PHRES-01	PHRES-02	PHRES-03	PHRES-04
Apache Leap Tuff – White Unit (Talw)	Not present	Not present	Not present	0 – 15.2
Apache Leap Tuff – Gray Unit (Talg)	0 – 155.4	0 – 161.5	0 – 179.8	15.2 – 195.1
Apache Leap Tuff – Brown Unit (Talb)	155.4 – 333.0	161.5 – 314.6	179.8 – 312.5	195.1 – 329.6
Apache Leap Tuff – Vitrophyre (Talv)	333.0 – 344.2	314.6 – 323.9	312.5 - 321.4	329.6 – 338.7
Apache Leap Tuff – Basal tuff (Talbt)	344.2 – 347.3	323.9 – 328.4	321.4 – 323.7	338.7 – 340.8
Whitetail Conglomerate (Tw)	347.3 - 353.6	328.4 – 335.3	323.7 - 330.7	340.8 – 349.0

Apache Leap Tuff (Tal)

At PHRES-01 through PHRES-04, the Tal ranges between 323.7 and 347.3 meters thick and includes White Unit (Talw), Gray Unit (Talg), Brown Unit (Talb), vitrophyre (Talv), and basal tuff (Talbt). The upper 10 to 20 meters of the Tal are weathered. The White Unit is present at PHRES-04 only and is 15.2 meters thick. The Talg ranges between 155.4 and 179.9 meters thick; the Talb ranges between 132.7 and 177.6 meters thick; the Talv ranges between 8.9 and 11.2 meters thick; and the Talbt ranges between 2.1 and 4.5 meters thick (**Table 4**). The Talw, Talg, and Talb are dacite porphyry tuff with phenocrysts of potassium and plagioclase feldspar, quartz, and biotite, and trace amounts of pumice and lithic fragments. The Talw is a non-welded crystal-rich tuff with approximately 60 percent pinkish-white aphanitic groundmass and 40 percent phenocrysts. The Talg is a welded crystal-rich tuff with approximately 50 percent pale pinkish-brown groundmass and 50 percent phenocrysts. The Talb is a densely welded crystal-rich tuff with approximately 50 percent reddish-brown cryptocrystalline groundmass and 50 percent phenocrysts. The Talv is densely welded with a black glassy groundmass and the same phenocryst assemblage as the tuff. The Talbt is a non-welded tuff with approximately 70 percent light brown aphanitic groundmass and 30 percent phenocrysts.

E-logs are typically good indicators of changes in degree of welding in the Tal with higher resistivity values correlating with higher degrees of welding. At PHRES-01 through PHRES-04, the contact between the Talb and Talv is evident on the normal resistivity logs with highest resistivity values associated with the Talv (**Figures 2 through 5**). The contact between the Tal and the Tw was confirmed using the image logs and by decreases in normal resistivity and natural gamma ray activity (**Figures 2 through 5**). Elevation of the contact between the Tal and Tw ranges from 845 meters above mean sea level (amsl) at PHRES-01 to 883 meters amsl at PHRES-04.

Whitetail Conglomerate (Tw)

The uppermost 6 to 8 meters of the Tw was penetrated at PHRES-01 through PHRES-04 and included channel deposit Tw1 and lacustrine unit Tw2. The OBI log for PHRES-01 shows a thin interval of thinly bedded, fine-grained deposits (Tw2) from 347.3 to 347.6 meters bls and conglomerate (Tw1) from 347.6 meters bls to the bottom of the logged interval at 352.5 meters bls. The ABI logs for the PHRES boreholes also show the conglomeratic texture but are not as detailed as the OBI log for PHRES-01. Based on the image log for nearby DHRES-07, the Tw1 is about 13 meters thick in the vicinity (M&A, 2012a). The Tw1 consists of weakly lithified, clast-supported conglomerate with about 70 percent gravel and 30 percent reddish-brown silty sandstone matrix. The gravel fraction contains limestone, diabase, sandstone, and quartzite.

Degree of Fracturing

Evidence of fracturing in the Tal at PHRES-01 through PHRES-04 was noted in drill cuttings by the presence of cut chips of calcite and quartz, calcite and quartz coatings on fracture

surfaces, and mineral staining (iron oxide and manganese oxide) on fracture surfaces. Trace evidence of fracturing was noted in drill cuttings for the entire interval of Tal. Evidence of fracturing in the Tw was not indicated in drill cuttings samples or on the geophysical logs.

Fracture summary logs were prepared using geophysical logs including ABI, OBI, sonic, and E-logs. The ABI or OBI logs were the primary sources for the fracture summary logs. Sonic logs and E-logs were used to confirm fracture zones. Fractures were qualitatively classified as minor, moderate, or major based on inspection of the logs. Minor fractures include joints and flow layer margins with no mineral filling generally less than 2.5 centimeters across. Moderate fractures include joints and faults with mineral filling or open voids ranging from about 2.5 to 15 centimeters across. Major fractures include faults or fault zones with mineral filling or open voids larger than about 15 centimeters across. Fracture summary logs for PHRES-01 through PHRES-04 are shown on **Figures 2 through 5**, respectively.

HYDRAULIC TESTING

Following drilling of the PHRES-series boreholes a 23-day constant-rate pumping test was conducted at well HRES-09 in order to determine aquifer parameters for the ALT aquifer in the vicinity of well HRES-09 and the PHRES-series wells. The constant-rate pumping test at HRES-09 was conducted from June 11 through July 27, 2011. During the test the PHRES wells, together with a wider network of wells and piezometers completed in the ALT aquifer, were used as observation wells; results of this test are provided in a separate report by M&A (M&A, 2012b).

Hydrophysical logging was conducted in the PHRES-series wells both prior to and during the HRES-09 constant rate test. The goal of the hydrophysical logging was to evaluate the distribution of transmissive features in the ALT aquifer in the vicinity of HRES-09 and the PHRES-series wells. Hydrophysical logging was conducted by COLOG, a division of Layne Christensen Company, of Lakewood, Colorado, between April 28 and July 4, 2011. Testing included hydrophysical logging of each open PHRES borehole under ambient conditions, while pumping from each of the PHRES wells separately (stress testing), and during pumping at nearby test well HRES-09 (cross-hole testing). COLOG mobilized on three separate occasions: (1) logging of PHRES-01 through PHRES-04 under ambient conditions and stress testing during the period April 28 through May 8, 2011; (2) logging of PHRES-02, PHRES-03, and PHRES-04 during pumping at HRES-09 over the period June 13 through 16, 2011; and (3) logging of PHRES-01 through PHRES-04 during pumping at HRES-09 over the period June 28 through July 4, 2011. The COLOG work was scoped with two mobilizations; however, drawdown at the PHRES-series wells had not stabilized sufficiently when the first round of cross-hole testing was conducted making it necessary for a later mobilization. Operational details and results of hydrophysical logging at the PHRES holes will be provided in a separate report.

WELL CONSTRUCTION

Following testing operations at HRES-09, the PHRES-series wells were completed as grouted piezometer arrays to monitor pore pressures in the Tal. Tubing (2-3/8-inch outside diameter blank, flush-threaded steel) was installed from land surface to a depth of 348.0 meters bls at PHRES-01, 286.8 meters bls at PHRES-02, 323.9 meters bls at PHRES-03, and 342.0 meters bls at PHRES-04. Three vibrating-wire pressure transducers manufactured by Geokon of Lebanon, New Hampshire, were attached to the outside of the tubing. Details regarding the piezometers installed at PHRES-01 through PHRES-04 are given in **Table 5** and installed depths are shown on **Figures 2 through 5**.

After the instrumentation was installed in the boreholes pressure grout was installed by Halliburton of Farmington, New Mexico on August 19 and 20, 2011. The specialized pressure grout mix consisted of the following ratio by weight: 2.5 parts water: 1 part cement: 0.3 parts bentonite. Details of the Halliburton pressure grouting operation are provided in **Appendix C**.

Grout installation was problematic at all of the sites with no grout returned to the surface, likely due to loss of grout to fractures in the Tal. One or more transducers are above the grout level at every well. **Figures 2 through 5** show the final grout level at each well and the grout status of each piezometer is provided in **Table 5**. Top of grout is uncertain at PHRES-02; the sounding device encountered an obstruction at about 254 meters bls and the depth to grout could not measured.

TABLE 5. DETAILS OF GROUTED PRESSURE TRANSDUCER INSTALLATION FOR HYDROLOGIC TEST WELLS PHRES-01, PHRES-02, PHRES-03, AND PHRES-04

	Identifier*	Serial Number	Installed Depth (meters bls)	Hydrogeologic Unit	Pressure Rating (Mega-Pascals)	In grout?
PHRES-01						
1	PHRES-01_1145	10-36707	47.2	Talg	1	No
2	PHRES-01_1096	10-38567	96.0	Talg	2	Yes
3	PHRES-01_1070	10-37078	121.9	Talg	3	Yes
PHRES-02						
1	PHRES-02_1079	10-41990	114.4	Talg	5	No
2	PHRES-02_939	10-41991	254.6	Talb	5	No
3	PHRES-02_917	10-29630	276.3	Talb	7.5	No
PHRES-03						
1	PHRES-03_1049	10-37076	152.5	Talg	3	No
2	PHRES-03_972	11-09107	229.6	Talb	5	No
3	PHRES-03_945	10-29631	256.3	Talb	7.5	Yes
PHRES-04						
1	PHRES-04_1031	11-09226	193.4	Talg	5	No
2	PHRES-04_1016	11-03296	207.8	Talb	7.5	Yes
3	PHRES-04_918	11-03297	305.9	Talb	7.5	Yes

*Identifier consists of well name and piezometer elevation in meters above mean sea level

Surface completions for the PHRES holes consist of an extension of the 8-5/8-inch surface casing to approximately 1 meter above land surface. The casing extension is welded in place and secured with a locking cap. Horizontal and vertical well coordinates for the top of surface casing and top of the well cap were surveyed by Civiltec Engineering, Inc. of Phoenix, Arizona, on November 21, 2011. Survey data and computed land surface elevations are provided in **Table 6**.

TABLE 6. SUMMARY OF SURVEY RESULTS FOR HYDROLOGIC TEST WELLS PHRES-01, PHRES-02, PHRES-03, AND PHRES-04				
	PHRES-01	**PHRES-02**	**PHRES-03**	**PHRES-04**
	(meters)	**(meters)**	**(meters)**	**(meters)**
Easting	495928.807	495776.282	495718.864	495613.917
Northing	3682627.034	3682551.965	3682465.128	3682377.334
Elevation Top of 8-inch Surface Casing	1193.153	1194.446	1201.657	1225.386
Elevation Land Surface	1192.04	1193.44	1201.51	1224.05

Datum: UTM Zone 12 North (NAD27)-NGVD29

REFERENCES CITED

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R. 13 E.

494,000 495,000 496,000 497,000

T. 1 S. — 3,684,000

32 33 34

1300 1300 1300 1300

DHRES-02
HRES-02
DHRES-01
HRES-04

Upper Queen Creek Watershed

Devils Canyon Watershed

A-06

DHRES-08

06 05 04

Rancho Rio Creek

DHRES-07
HRES-09
PHRES-01
PHRES-02
PHRES-03
PHRES-04
HRES-05

1200 1300 1200 Devils Canyon

T. 2 S. — 3,682,000

1400 1300 1300 1300 1200 1100

HRES-13
HRES-07

Canyon

Hackberry

07 08 09

494,000 495,000 496,000 497,000

R. 12 E. R. 13 E.

EXPLANATION

- Watershed Boundary
- Perennial Reach

Groundwater Monitoring Sites

- Apache Leap Tuff Aquifer Monitor Well
- Apache Leap Tuff Grouted Piezometer Array
- Deep Groundwater System Monitor Well with Apache Leap Tuff Annular Grouted Piezometer

N

0 0.25 0.5
Miles

Resolution Copper Mining

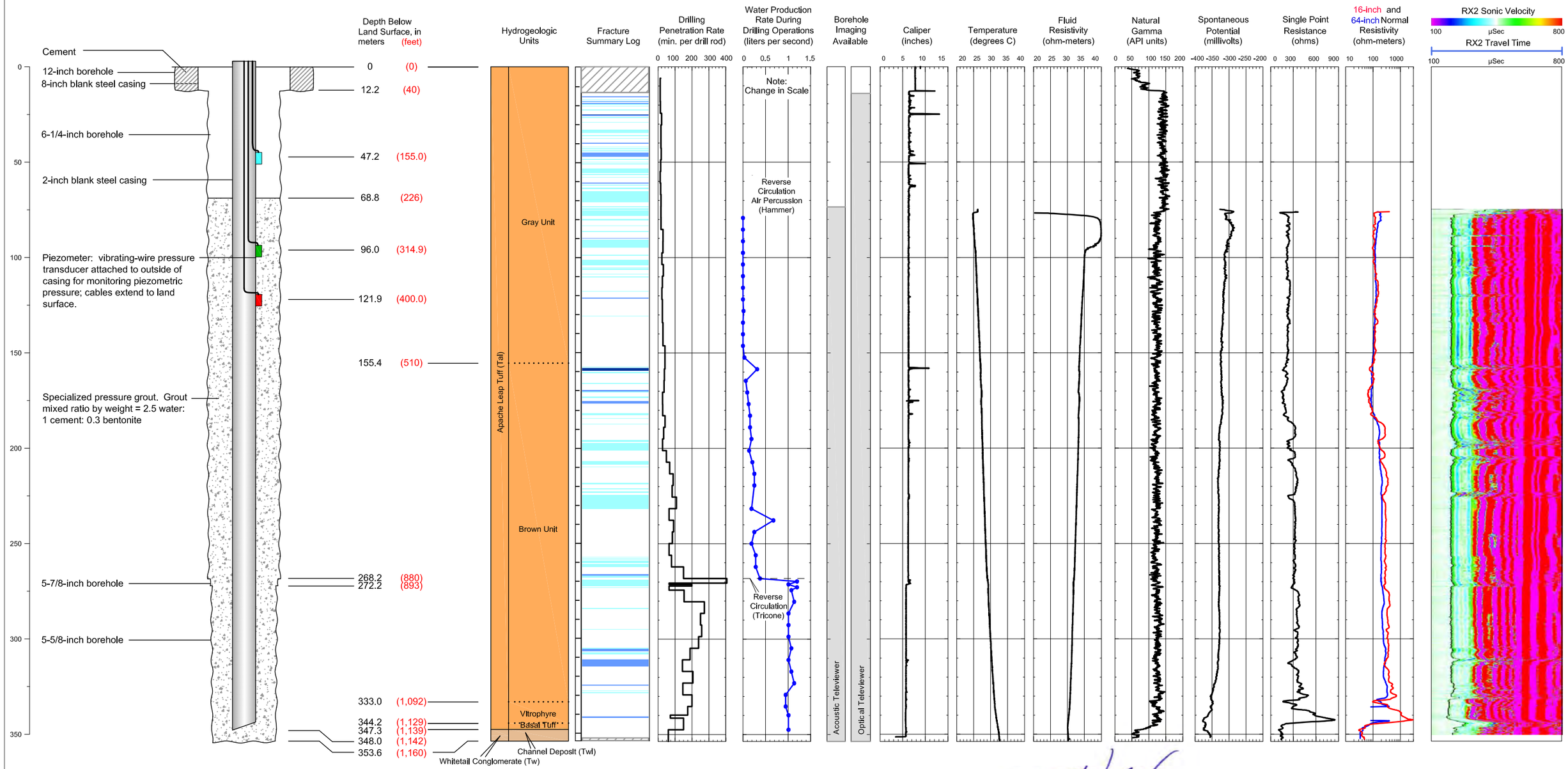
WELL LOCATION MAP

MONTGOMERY & ASSOCIATES
Water Resource Consultants

2012

FIGURE 1

\GIS-Tuc\Projects\605\605.411\PHRES_location_map.mxd\28Feb2012



CADASTRAL: (D-2-13)05cac	ADWR NO: 55-913050
NORTHING: 3682627.034	EASTING: 495928.807
LAND SURFACE ELEVATION: 1192.04	
DATUM: NAD 27 HORIZONTAL: UTM 12 VERTICAL: NGVD 29 METERS	

EXPLANATION

- No Data
- No Fracturing Evident
- Minor Fracturing
- Moderate Fracturing
- Major Fracturing

REGISTERED GEOLOGIST
CERTIFICATE NO.
25063
TODD
KEAY
Date Signed 6/20/2012
ARIZONA U.S.A.
Expires 6/30/2012

Resolution Copper Mining

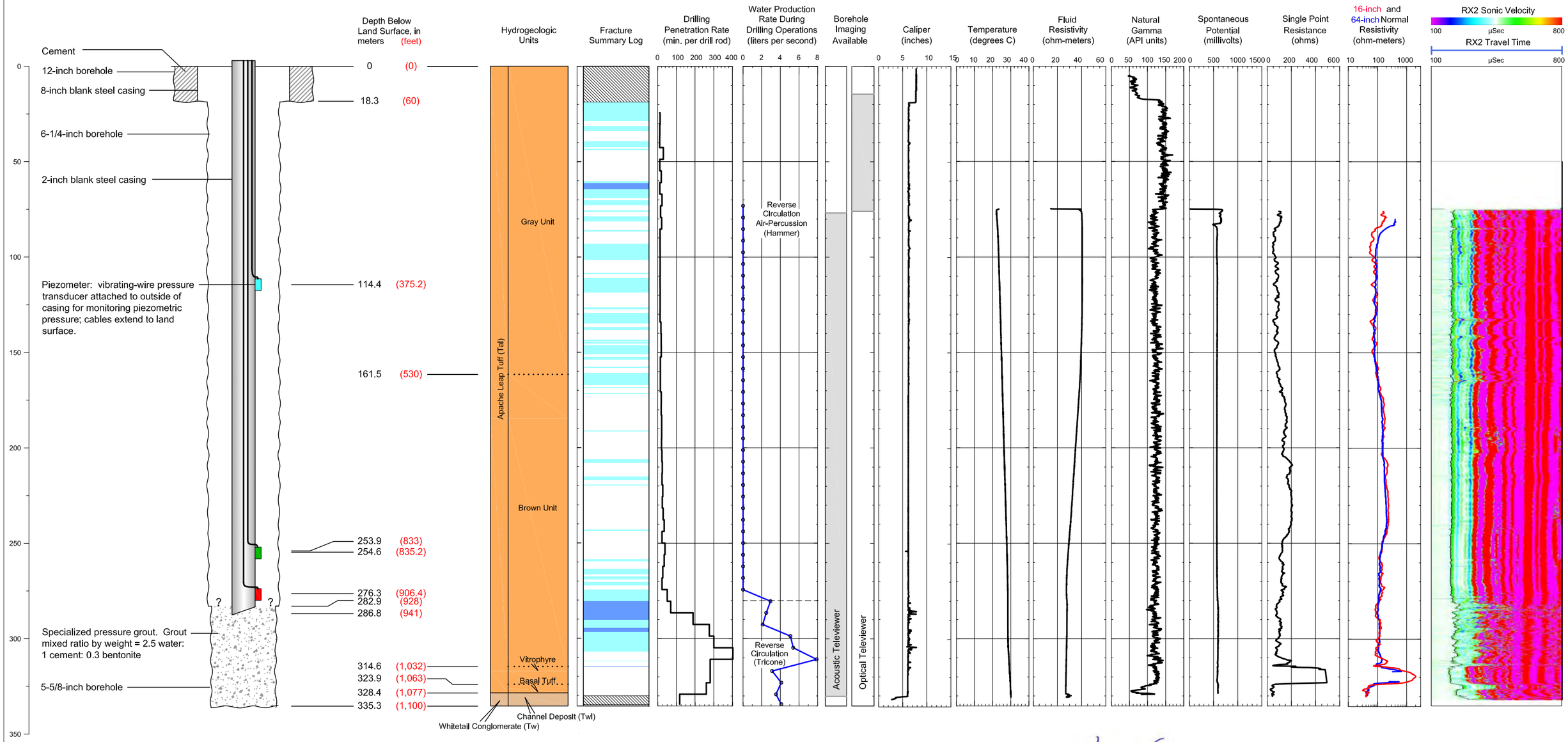
MONTGOMERY & ASSOCIATES
Water Resource Consultants

PHRES-01
SCHEMATIC DIAGRAM OF WELL CONSTRUCTION

Version: February 28, 2012

FIGURE 2

605\WellSchematics_2011\PHRES-01-WS-LOGS\28Feb2012



CADASTRAL: (D-2-13)05cbd	ADWR NO: 55-913051
NORTHING: 3682551.965	EASTING: 495776.282
LAND SURFACE ELEVATION: 1193.44	
DATUM: NAD 27 HORIZONTAL: UTM 12 VERTICAL: NGVD 29 METERS	

EXPLANATION

- No Data
- No Fracturing Evident
- Minor Fracturing
- Moderate Fracturing
- Major Fracturing

REGISTERED GEOLOGIST
CERTIFICATE NO.
25063
TODD
KEAY
Date Signed 2/29/2012
ARIZONA U.S.A.
Expires 6/30/2012

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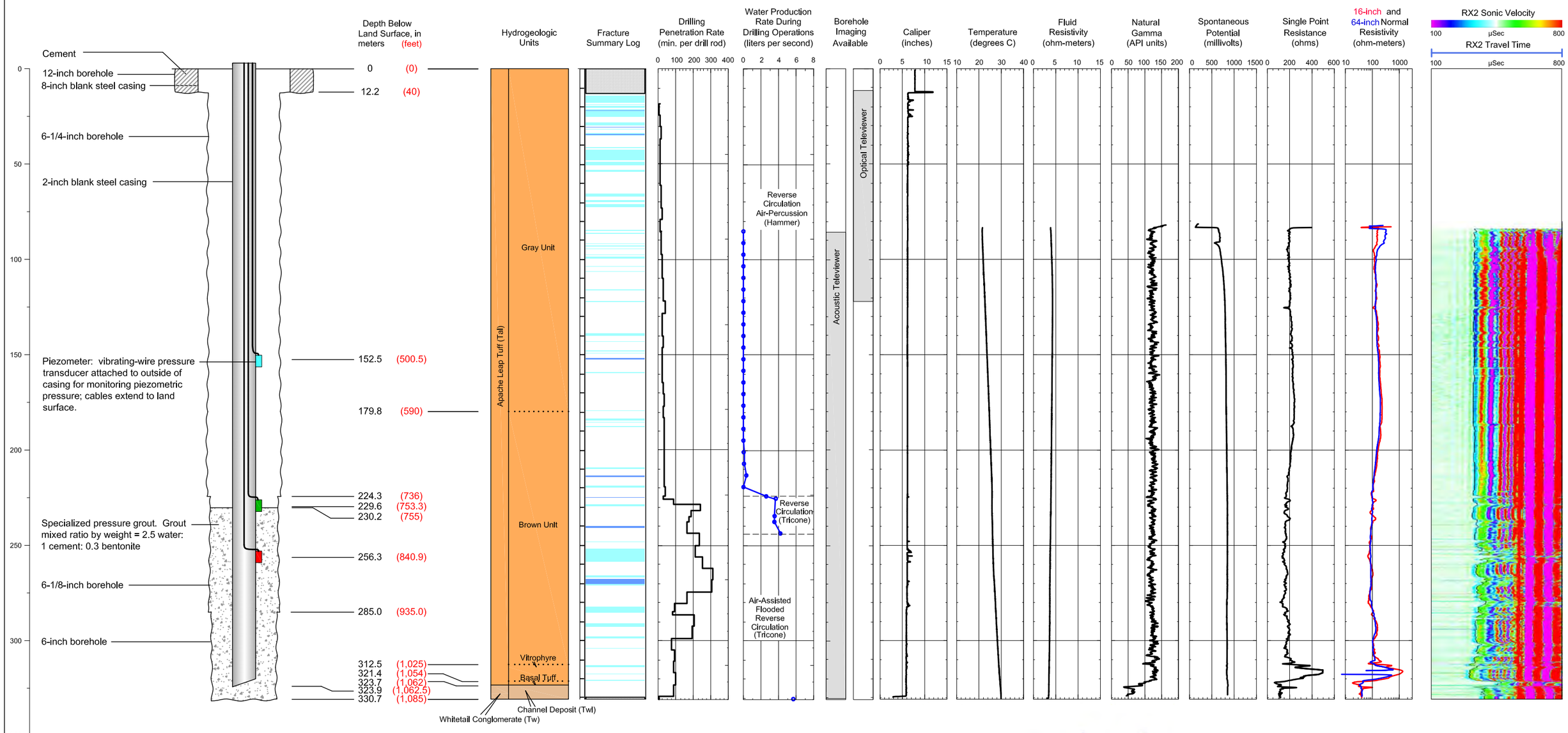
PHRES-02
SCHEMATIC DIAGRAM OF WELL CONSTRUCTION

Version: February 28, 2012

FIGURE 3

605\WellSchematics_2011\PHRES-02-WS-LOGS\28Feb2012



CADASTRAL: (D-2-13)05cbd	ADWR NO: 55-913052
NORTHING: 3682465.128	EASTING: 495718.864
LAND SURFACE ELEVATION: 1201.51	
DATUM: NAD 27 HORIZONTAL: UTM 12 VERTICAL: NGVD 29 METERS	

EXPLANATION

- No Data
- No Fracturing Evident
- Minor Fracturing
- Moderate Fracturing
- Major Fracturing

REGISTERED GEOLOGIST
CERTIFICATE NO.
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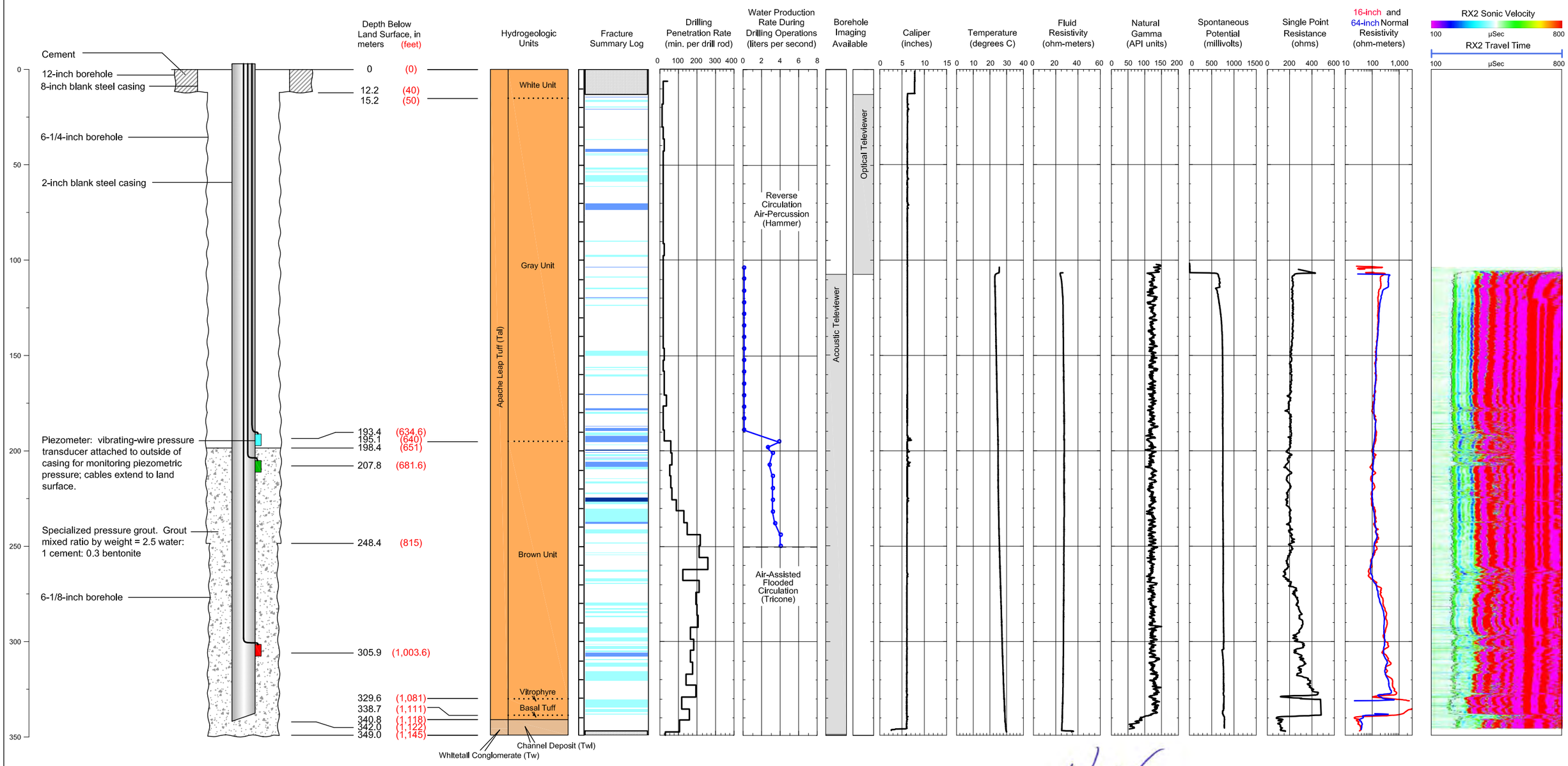
PHRES-03
SCHEMATIC DIAGRAM OF WELL CONSTRUCTION

Version: February 28, 2012

FIGURE 4

605\WellSchematics_2011\PHRES-03-WS-LOGS\28Feb2012



CADASTRAL: (D-2-13)05cca	ADWR NO: 55-913053
NORTHING: 3682377.334	EASTING: 495613.917
LAND SURFACE ELEVATION: 1224.05	
DATUM: NAD 27 HORIZONTAL: UTM 12 VERTICAL: NGVD 29 METERS	

EXPLANATION

- No Data
- No Fracturing Evident
- Minor Fracturing
- Moderate Fracturing
- Major Fracturing

REGISTERED GEOLOGIST
CERTIFICATE NO.
25063
TODD
KEAY
Date Signed 2/29/2012
ARIZONA U.S.A.
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PHRES-04
SCHEMATIC DIAGRAM OF WELL CONSTRUCTION

Version: February 28, 2012

FIGURE 5

605\WellSchematics_2011\PHRES-04-WS-LOGS\27Feb2012

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-01
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
0 - 10	0.0 - 3.0	Gray Unit; light reddish brown [5YR6/4]; weakly to moderately lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, very trace magnetite; trace pumice fragments; trace lithic fragments; reaction to acid: none	weathered, trace iron oxide (limonite) on biotite, yellowish-orange staining	subangular to subrounded chips up to 1.2 cm
10 - 20	3.0 - 6.1	Gray Unit; light reddish brown [5YR6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, very trace magnetite; trace pumice fragments; trace lithic fragments; reaction to acid: none	some weathering, trace iron oxide (limonite) on biotite, trace yellowish-orange staining	subangular to subrounded chips up to 2 cm
20 - 30	6.1 - 9.1	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic groundmass and 40% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice fragments; trace lithic fragments of red and gray siltstone and dark gray diabase; reaction to acid: none	trace iron oxide (limonite) on biotite, trace yellowish-orange staining	subangular to subrounded chips up to 1.5 cm
30 - 40	9.1 - 12.2	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic groundmass and 40% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice fragments; trace lithic fragments of red and gray siltstone and dark gray diabase; reaction to acid: none	trace iron oxide (limonite) on biotite	subrounded chips up to 0.8 cm
40 - 50	12.2 - 15.2	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice fragments; trace lithic fragments of red and gray siltstone and dark gray diabase; reaction to acid: very weak	trace iron oxide (limonite) on biotite	subrounded chips up to 01.5 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-01
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
50 - 60	15.2 - 18.3	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice fragments; very trace lithic fragments; reaction to acid: none	trace iron oxide (limonite) on biotite	subrounded chips up to 1.5 cm
60 - 70	18.3 - 21.3	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice fragments; reaction to acid: none	very trace iron oxide (limonite) on biotite	subrounded chips up to 1.2 cm
70 - 80	21.3 - 24.4	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic groundmass and 40% phenocrysts of white feldspar, clear quartz, abundant bronzy black biotite, trace magnetite; trace pumice fragments; reaction to acid: none	very trace iron oxide (limonite) on biotite	subrounded chips up to 1.5 cm
80 - 90	24.4 - 27.4	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic groundmass and 40% phenocrysts of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice fragments; reaction to acid: none	very trace iron oxide (limonite) on biotite	subrounded to subangular chips up to 0.4 cm
90 - 100	27.4 - 30.5	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic groundmass and 40% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice fragments; trace lithic fragments of dark gray siltstone; reaction to acid: none	very trace iron oxide (limonite) on biotite	subrounded to subangular chips up to 1.2 cm
100 - 110	30.5 - 33.5	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic groundmass and 40% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice fragments; trace lithic fragments of dark gray siltstone; reaction to acid: none to very weak	very trace iron oxide (limonite) on biotite; very trace loose calcite chips	subrounded to subangular chips up to 1.4 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-01
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
110 - 120	33.5 - 36.6	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic groundmass and 40% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice fragments; trace lithic fragments of dark gray siltstone; reaction to acid: none to very weak	very trace iron oxide (limonite) on biotite; very trace calcite on fracture faces	subrounded to subangular chips up to 1.0 cm
120 - 130	36.6 - 39.6	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic groundmass and 40% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice fragments; trace lithic fragments of dark gray siltstone; reaction to acid: none to very weak	very trace iron oxide (limonite) on biotite; very trace calcite on fracture faces	subrounded to subangular chips up to 1.0 cm
130 - 140	39.6 - 42.7	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic groundmass and 40% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice fragments; trace lithic fragments of dark gray siltstone; reaction to acid: none	very trace iron oxide (limonite) on biotite	subrounded to subangular chips up to 1.0 cm
140 - 150	42.7 - 45.7	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (limonite) on biotite	subrounded to subangular chips up to 2.0 cm
150 - 160	45.7 - 48.8	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of gray siltstone; reaction to acid: none to very weak	very trace iron oxide (limonite) on biotite; very trace loose calcite chips	subrounded to subangular chips up to 2.0 cm
160 - 170	48.8 - 51.8	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of gray siltstone; reaction to acid: none to very weak	very trace iron oxide (limonite) on biotite; very trace loose calcite chips	subrounded to subangular chips up to 2.0 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-01
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
170 - 180	51.8 - 54.9	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of gray siltstone; reaction to acid: none to very weak	very trace iron oxide (limonite) on biotite; very trace loose calcite chips	subrounded to subangular chips up to 1.5 cm
180 - 190	54.9 - 57.9	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of gray siltstone; reaction to acid: none to very weak	very trace iron oxide (limonite) on biotite; very trace loose calcite chips	subrounded to subangular chips up to 1.0 cm
190 - 200	57.9 - 61.0	Gray Unit; weak red [10R5/4]; well lithified; 50% crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of gray siltstone 50% pinkish gray clay; reaction to acid: none	very trace iron oxide (limonite) on biotite; very trace loose calcite chips	subrounded to subangular chips up to 2.5 cm; clayey cuttings
200 - 210	61.0 - 64.0	Gray Unit; pale red [10R6/4]; well lithified; 90% crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of gray siltstone 10% pinkish gray clay; reaction to acid: none	very trace iron oxide (hematite) on biotite	subrounded to subangular chips up to 2.0 cm
210 - 220	64.0 - 67.1	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace lithic fragments of gray siltstone; reaction to acid: none	very trace iron oxide (hematite) on biotite	subrounded to subangular chips up to 2.0 cm
220 - 230	67.1 - 70.1	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace lithic fragments of gray siltstone; reaction to acid: none to very weak	very trace iron oxide (hematite) on biotite; trace loose calcite chips	subrounded to subangular chips up to 1.0 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-01
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
230 - 240	70.1 - 73.2	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace lithic fragments of gray siltstone; reaction to acid: none to very weak	very trace iron oxide (hematite) on biotite; trace loose calcite chips	subrounded to subangular chips up to 2.0 cm
240 - 250	73.2 - 76.2	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace lithic fragments of gray silitstone; reaction to acid: none to very weak	very trace iron oxide (hematite) on biotite; trace loose calcite chips	subrounded to subangular chips up to 1.0 cm
250 - 260	76.2 - 79.2	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace lithic fragments of dark gray and red siltstone and orange chert; reaction to acid: none to very weak	very trace iron oxide (hematite) on biotite; very trace loose calcite chips	subrounded to subangular chips up to 1.0 cm
260 - 270	79.2 - 82.3	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace lithic fragments of orange chert; reaction to acid: none	very trace iron oxide (hematite) on biotite	subrounded to subangular chips up to 2.5 cm
270 - 280	82.3 - 85.3	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace lithic fragments of orange chert; reaction to acid: none	very trace iron oxide (hematite) on biotite	subrounded to subangular chips up to 0.8 cm
280 - 290	85.3 - 88.4	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace lithic fragments of dark gray siltstone; reaction to acid: none to very weak	very trace iron oxide (hematite) on biotite; very trace loose calcite chips	subrounded to subangular chips up to 1.0 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-01
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
290 - 300	88.4 - 91.4	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace lithic fragments of dark gray siltstone; reaction to acid: none		subrounded to subangular chips up to 2.0 cm
300 - 310	91.4 - 94.5	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice fragments; reaction to acid: none		subrounded to subangular chips up to 0.5 cm
310 - 320	94.5 - 97.5	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of dark gray siltstone; reaction to acid: none	very trace iron oxide (hematite) on biotite	subrounded to subangular chips up to 0.5 cm
320 - 330	97.5 - 100.6	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of dark gray siltstone; reaction to acid: none	very trace iron oxide (hematite) on biotite	subrounded to subangular chips up to 1.0 cm
330 - 340	100.6 - 103.6	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of dark gray and reddish gray siltstone; reaction to acid: none	very trace iron oxide (hematite) on biotite	subrounded to subangular chips up to 1.0 cm
340 - 350	103.6 - 106.7	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of dark gray and reddish gray siltstone; reaction to acid: none	very trace iron oxide (hematite) on biotite; very trace vein quartz on fracture face	subrounded to subangular chips up to 1.0 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-01
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
350 - 360	106.7 - 109.7	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic groundmass and 40% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none to very weak	very trace iron oxide (hematite) on biotite; very trace calcite on fracture face	subrounded to subangular chips up to 4.0 cm
360 - 370	109.7 - 112.8	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic groundmass and 40% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of reddish brown siltstone; reaction to acid: none to very weak	very trace loose calcite chips	subrounded to subangular chips up to 1.0 cm
370 - 380	112.8 - 115.8	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of red and dark gray siltstone; reaction to acid: none to very weak	very trace iron oxide (hematite) on biotite; very trace loose calcite chips	subrounded to subangular chips up to 1.5 cm
380 - 390	115.8 - 118.9	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none to very weak	very trace loose calcite crystals	subrounded to subangular chips up to 1.0 cm
390 - 400	118.9 - 121.9	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice fragments; reaction to acid: none to very weak	very trace loose calcite crystals	subrounded to subangular chips up to 0.8 cm
400 - 410	121.9 - 125.0	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 40% reddish-brown aphanitic groundmass and 60% phenocrysts (<2mm) of white feldspar, clear quartz, bronzy black biotite, very trace magnetite; reaction to acid: none to very weak	very trace iron oxide (hematite) on biotite; very trace calcite on fracture face	subrounded to subangular chips up to 1.0 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-01
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
410 - 420	125.0 - 128.0	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 40% reddish-brown aphanitic groundmass and 60% phenocrysts (<2mm) of white feldspar, clear quartz, bronzy black biotite, very trace magnetite; trace lithic fragments of red and orange siltstone and chert; reaction to acid: none to very weak	very trace iron oxide (hematite) on biotite; very trace calcite on fracture face	subrounded to subangular chips up to 1.0 cm
420 - 430	128.0 - 131.1	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 40% reddish-brown aphanitic groundmass and 60% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace lithic fragments of brown siltstone; reaction to acid: none to very weak	very trace iron oxide (hematite) on biotite; very trace loose calcite crystals; very trace vein quartz	subrounded to subangular chips up to 0.8 cm
430 - 440	131.1 - 134.1	Gray Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 40% reddish-brown aphanitic groundmass and 60% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace lithic fragments of brown siltstone; reaction to acid: none to very weak	very trace iron oxide (hematite) on biotite; very trace loose calcite crystals; very trace vein quartz	subrounded to subangular chips up to 1.4 cm
440 - 450	134.1 - 137.2	Gray Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 40% reddish-brown aphanitic groundmass and 60% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace lithic fragments of brown siltstone; reaction to acid: none to very weak	very trace iron oxide (hematite) on biotite; very trace loose calcite crystals	subrounded to subangular chips up to 0.8 cm
450 - 460	137.2 - 140.2	Gray Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 40% reddish-brown aphanitic groundmass and 60% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace lithic fragments of brown siltstone; reaction to acid: none	very trace iron oxide (hematite) on biotite	subrounded to subangular chips up to 1.4 cm
460 - 470	140.2 - 143.3	Gray Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 40% reddish-brown aphanitic groundmass and 60% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 1.0 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-01
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
470 - 480	143.3 - 146.3	Gray Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 1.2 cm
480 - 490	146.3 - 149.4	Gray Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace lithic fragments of reddish brown siltstone; reaction to acid: none	very trace iron oxide (hematite) on biotite	subrounded to subangular chips up to 1.2 cm
490 - 500	149.4 - 152.4	Gray Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none to very weak	very trace iron oxide (hematite) on biotite; very trace loose calcite crystals	subrounded to subangular chips up to 1.0 cm
500 - 510	152.4 - 155.4	Gray Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace lithic fragments of red siltstone; reaction to acid: none to very weak	very trace iron oxide (hematite) on biotite; very trace loose calcite crystals	subrounded to subangular chips up to 0.8 cm; mostly sand-sized cuttings
APACHE LEAP TUFF - Brown Unit (Talb)				
510 - 520	155.4 - 158.5	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace lithic fragments of red siltstone; reaction to acid: none to very weak	very trace iron oxide (hematite) on biotite; very trace loose calcite crystals	subrounded to subangular chips up to 3.0 cm
520 - 530	158.5 - 161.5	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace lithic fragments of red siltstone; reaction to acid: none	very trace iron oxide (hematite) on biotite	subrounded to subangular chips up to 0.5 cm; mostly sand-sized cuttings

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
530 - 540	161.5 - 164.6	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none to very weak	trace calcite on fracture faces	subrounded to subangular chips up to 1.0 cm; mostly sand-sized cuttings
540 - 550	164.6 - 167.6	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 0.5 cm; mostly sand-sized cuttings
550 - 560	167.6 - 170.7	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace lithic fragments of red siltstone; reaction to acid: none	very trace iron oxide (hematite) on biotite	subrounded to subangular chips up to 0.5 cm; mostly sand-sized cuttings
560 - 570	170.7 - 173.7	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) on biotite; very trace calcite on fracture faces	subrounded to subangular chips up to 0.8 cm; mostly sand-sized cuttings
570 - 580	173.7 - 176.8	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of purplelish gray quartzite and orange chert; reaction to acid: none	very trace iron oxide (hematite) on biotite	subrounded to subangular chips up to 1.0 cm; mostly sand-sized cuttings
580 - 590	176.8 - 179.8	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of purplelish gray quartzite and orange chert; reaction to acid: none	very trace iron oxide (hematite) on biotite; very trace calcite on fracture faces	subrounded to subangular chips up to 1.0 cm; mostly sand-sized cuttings

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-01
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
590 - 600	179.8 - 182.9	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of purplelish gray quartzite and orange chert; reaction to acid: none	very trace iron oxide (hematite) on biotite; very trace calcite on fracture faces	subrounded to subangular chips up to 0.8 cm; mostly sand-sized cuttings
600 - 610	182.9 - 185.9	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of purplelish gray quartzite and orange chert; reaction to acid: none		subrounded to subangular chips up to 0.8 cm; mostly sand-sized cuttings
610 - 620	185.9 - 189.0	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 0.8 cm; mostly sand-sized cuttings
620 - 630	189.0 - 192.0	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 0.8 cm; mostly sand-sized cuttings
630 - 640	192.0 - 195.1	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of red siltstone; reaction to acid: none		subrounded to subangular chips up to 0.8 cm; mostly sand-sized cuttings
640 - 650	195.1 - 198.1	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 0.8 cm; mostly sand-sized cuttings

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Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
650 - 660	198.1 - 201.2	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of red siltstone; reaction to acid: none		subrounded to subangular chips up to 0.8 cm; mostly sand-sized cuttings
660 - 670	201.2 - 204.2	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of red siltstone; reaction to acid: none		subrounded to subangular chips up to 0.8 cm; mostly sand-sized cuttings
670 - 680	204.2 - 207.3	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of red siltstone; reaction to acid: none	very trace calcite crystals	subrounded to subangular chips up to 0.8 cm; mostly sand-sized cuttings
680 - 690	207.3 - 210.3	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of red siltstone; reaction to acid: none		subrounded to subangular chips up to 0.8 cm; mostly sand-sized cuttings
690 - 700	210.3 - 213.4	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of red siltstone; reaction to acid: none		subrounded to subangular chips up to 0.8 cm; mostly sand-sized cuttings
700 - 710	213.4 - 216.4	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) on biotite	subrounded to subangular chips up to 1.0 cm; mostly sand-sized cuttings

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
710 - 720	216.4 - 219.5	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 1.0 cm; mostly sand-sized cuttings
720 - 730	219.5 - 222.5	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 1.0 cm; mostly sand-sized cuttings
730 - 740	222.5 - 225.6	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 1.0 cm; mostly sand-sized cuttings
740 - 750	225.6 - 228.6	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 1.0 cm; mostly sand-sized cuttings
750 - 760	228.6 - 231.6	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 1.0 cm; mostly sand-sized cuttings
760 - 770	231.6 - 234.7	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 1.5 cm; mostly sand-sized cuttings
770 - 780	234.7 - 237.7	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 1.0 cm; mostly sand-sized cuttings

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-01
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
780 - 790	237.7 - 240.8	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 1.0 cm; mostly sand-sized cuttings
790 - 800	240.8 - 243.8	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) on biotite	subrounded to subangular chips up to 1.2 cm; mostly sand-sized cuttings
800 - 810	243.8 - 246.9	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice fragments; reaction to acid: none	very trace iron oxide (hematite) on biotite	subrounded to subangular chips up to 1.5 cm; mostly sand-sized cuttings
810 - 820	246.9 - 249.9	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice fragments; reaction to acid: none	very trace iron oxide (hematite) on biotite	subrounded to subangular chips up to 1.0 cm; mostly sand-sized cuttings
820 - 830	249.9 - 253.0	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; abundant pumice fragments; reaction to acid: none	very trace iron oxide (hematite) on biotite	subrounded to subangular chips up to 1.0 cm; mostly sand-sized cuttings
830 - 840	253.0 - 256.0	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; abundant pumice fragments; reaction to acid: none	very trace iron oxide (hematite) on biotite	subrounded to subangular chips up to 1.0 cm; mostly sand-sized cuttings

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-01
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
840 - 850	256.0 - 259.1	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice fragments; reaction to acid: none	very trace iron oxide (hematite) on biotite	subrounded to subangular chips up to 1.2 cm; mostly sand-sized cuttings
850 - 860	259.1 - 262.1	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice fragments; reaction to acid: none	very trace iron oxide (hematite) on biotite	subrounded to subangular chips up to 1.2 cm; mostly sand-sized cuttings
860 - 870	262.1 - 265.2	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice fragments; reaction to acid: none	very trace iron oxide (hematite) on biotite	subrounded to subangular chips up to 1.2 cm; mostly sand-sized cuttings
870 - 880	265.2 - 268.2	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) on biotite; very trace loose calcite chips	subrounded to subangular chips up to 2.0 cm; mostly sand-sized cuttings
880 - 890	268.2 - 271.3	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 0.2 cm; all sand-sized cuttings
890 - 900	271.3 - 274.3	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 2.0 cm; mostly sand-sized cuttings
900 - 910	274.3 - 277.4	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 0.8 cm; mostly sand-sized cuttings

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Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
910 - 920	277.4 - 280.4	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 1.0 cm; mostly sand-sized cuttings
920 - 930	280.4 - 283.5	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice fragments; reaction to acid: none	very trace iron oxide (hematite) on biotite	subrounded to subangular chips up to 1.2 cm; mostly sand-sized cuttings
930 - 940	283.5 - 286.5	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 0.6 cm; mostly sand-sized cuttings
940 - 950	286.5 - 289.6	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 0.8 cm; mostly sand-sized cuttings
950 - 960	289.6 - 292.6	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 1.0 cm; mostly sand-sized cuttings
960 - 970	292.6 - 295.7	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 1.2 cm; mostly sand-sized cuttings
970 - 980	295.7 - 298.7	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 0.8 cm; mostly sand-sized cuttings

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Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
980 - 990	298.7 - 301.8	Brown Unit; weak red [10R4/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<2mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 1.0 cm; mostly sand-sized cuttings
990 - 1,000	301.8 - 304.8	Brown Unit; weak red [10R4/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<2mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subrounded to subangular chips up to 1.0 cm; mostly sand-sized cuttings
1,000 - 1,010	304.8 - 307.8	Brown Unit; weak red [10R4/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown glassy to aphanitic groundmass and 40% phenocrysts (<2mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none to very weak	trace loose calcite chips	subangular chips up to 0.6 cm; mostly sand-sized cuttings
1,010 - 1,020	307.8 - 310.9	Brown Unit; weak red [10R4/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown glassy to aphanitic groundmass and 40% phenocrysts (<2mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none to very weak	trace loose calcite chips	subangular chips up to 1.2 cm; cuttings coarsening
1,020 - 1,030	310.9 - 313.9	Brown Unit; weak red [10R4/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown glassy to aphanitic groundmass and 40% phenocrysts (<2mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none to weak	trace loose calcite chips	subangular chips up to 1.2 cm; cuttings coarsening
1,030 - 1,040	313.9 - 317.0	Brown Unit; weak red [10R4/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown glassy to aphanitic groundmass and 40% phenocrysts (<2mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none to weak	trace loose calcite chips	subangular chips up to 1.2 cm; cuttings coarsening

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-01
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
1,040 - 1,050	317.0 - 320.0	Brown Unit; weak red [10R4/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown glassy to aphanitic groundmass and 40% phenocrysts (<2mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subangular chips up to 1.2 cm
1,050 - 1,060	320.0 - 323.1	Brown Unit; weak red [10R4/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown glassy to aphanitic groundmass and 40% phenocrysts (<2mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	trace loose calcite chips; trace vein quartz	subangular chips up to 1.0 cm
1,060 - 1,070	323.1 - 326.1	Brown Unit; weak red [10R4/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown glassy to aphanitic groundmass and 40% phenocrysts (<2mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	trace iron oxide staining; trace calcite chips	subangular chips up to 1.0 cm
1,070 - 1,080	326.1 - 329.2	Brown Unit; weak red [10R4/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown glassy to aphanitic groundmass and 40% phenocrysts (<2mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	trace iron oxide staining; trace calcite chips; trace vein quartz; trace unknown yellowish white mineral	subangular chips up to 1.0 cm
1,080 - 1,090	329.2 - 332.2	Brown Unit; weak red [10R4/4]; well lithified; crystal-rich dacite porphyry tuff with 70% reddish-brown glassy to aphanitic groundmass and 30% phenocrysts (<2mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	trace calcite on fracture faces; trace iron oxide staining	subangular chips up to 2.0 cm
1,090 - 1,100	332.2 - 335.3	Brown Unit; weak red [10R4/4]; well lithified; crystal-rich dacite porphyry tuff with 80% reddish-brown glassy to aphanitic groundmass and 20% phenocrysts (<2mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	trace iron oxide staining; trace calcite chips; trace unknown green mineral	subangular chips up to 0.8 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-01
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Vitrophyre (Talv)				
1,100 - 1,110	335.3 - 338.3	Vitrophyre; black [5Y2.5/1]; well lithified; vitrophyre with 90% black glassy groundmass and 10% phenocrysts of biotite, feldspar, quartz and amphibole; reaction to acid: none	trace loose calcite chips	subangular chips up to 1.0 cm
1,110 - 1,120	338.3 - 341.4	Vitrophyre; black [5Y2.5/1]; well lithified; vitrophyre with 90% black glassy groundmass and 10% phenocrysts of biotite, feldspar, quartz and amphibole; reaction to acid: none	trace vein quartz	subangular chips up to 1.0 cm
1,120 - 1,125	341.4 - 342.9	Vitrophyre; black [5Y2.5/1]; well lithified; vitrophyre with 90% black glassy groundmass and 10% phenocrysts of biotite, feldspar, quartz and amphibole; reaction to acid: none	trace vein quartz	subangular chips up to 1.0 cm
APACHE LEAP TUFF - Basal tuff (Talbt)				
1,125 - 1,130	342.9 - 344.4	Basal Tuff Unit; yellowish red [5YR5/6]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic groundmass and 40% phenocrysts (<2mm) of black biotite, white feldspar, opaque quartz, very trace magnetite; reaction to acid: none	trace vein quartz	subangular chips up to 1.0 cm
1,130 - 1,140	344.4 - 347.5	Basal Tuff Unit; reddish brown [5YR4/4] and light reddish brown [5YR6/3]; well lithified; crystal-rich dacite porphyry tuff with 70% light brown aphanitic groundmass and 30% phenocrysts (<2mm) of black biotite, white feldspar, opaque quartz, very trace magnetite; reaction to acid: none		angular to subangular chips up to 1.5 cm
WHITETAIL CONGLOMERATE - Channel Fill Unit (Tw1)				
1,140 - 1,150	347.5 - 350.5	Clast-supported conglomerate; pinkish gray [5YR6/2]; weakly lithified; silty gravelly sand; 25% red sandstone matrix chips; 75% clasts of limestone, diabase, sandstone, quartzite; reaction to acid: moderate	trace iron oxide staining; calcite veinlets in some clasts	angular chips up to 1.5 cm
1,150 - 1,160	350.5 - 353.6	Clast-supported conglomerate; red [2.5YR4/6]; weakly lithified; silty gravelly sand; 50% red sandstone matrix chips; 50% clasts of limestone, diabase, sandstone, quartzite; reaction to acid: moderate	trace iron oxide staining; calcite veinlets in some clasts	angular chips up to 1.5 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-02
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
0 - 10	0.0 - 3.0	Gray Unit; reddish brown [2.5YR5/3]; weakly lithified; dacite porphyry tuff colluvium; reaction to acid: none	weathered, yellowish-orange staining on surfaces and throughout some grains (10-15%), trace iron oxide.	85% silt and medium to coarse sand, 15% gravel; subangular to subrounded to 3 cm
10 - 20	3.0 - 6.1	Gray Unit; reddish brown [2.5YR5/3]; weakly lithified; weathered dacite porphyry tuff with reddish-brown aphanitic groundmass and phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, trace magnetite; reaction to acid: none	weathered, yellowish-orange staining on surfaces and throughout some grains (10-15%), trace iron oxide.	85% silt and medium to coarse sand, 15% gravel; subangular to subrounded to 3 cm
20 - 30	6.1 - 9.1	Gray Unit; reddish brown [2.5YR5/3]; weakly to moderately lithified; dacite porphyry tuff with reddish-brown aphanitic groundmass and phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, trace magnetite; reaction to acid: none	weathered, clayey, yellowish-orange staining on surfaces and throughout some grains (10-15%), trace hematite?.	40% coarse to very coarse sand, 60% subangular to subrounded gravel to 2 cm. (85% fragments, 15% phenocrysts)
30 - 40	9.1 - 12.2	Gray Unit; dark reddish gray [5YR4/2]; weakly to moderately lithified; dacite porphyry tuff with reddish-brown aphanitic groundmass and phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, trace magnetite; reaction to acid: none	weathered, less clayey, yellowish-orange and reddish brown (limonite/hematite?) staining on mineral faces, surfaces and throughout some grains	subangular to subrounded chips to 3 cm
40 - 50	12.2 - 15.2	Gray Unit; dark reddish gray [5YR4/2]; weakly to moderately lithified; dacite porphyry tuff with reddish-brown aphanitic groundmass and phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, trace magnetite; reaction to acid: none	less weathered (50% weathered), less clayey, yellowish-orange and reddish brown (limonite/hematite?) staining on mineral faces, surfaces and throughout some grains	subangular to subrounded chips to 2 cm
50 - 60	15.2 - 18.3	Gray Unit; dark reddish gray [5YR4/2]; moderately lithified; dacite porphyry tuff with reddish-brown aphanitic groundmass and phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, trace magnetite, possible amphibole; reaction to acid: none	less weathered (30% weathered), clayey, yellowish-orange and reddish brown (limonite/hematite?) staining on mineral faces, surfaces and throughout some grains	subangular to subrounded chips to 3 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-02
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
60 - 70	18.3 - 21.3	Gray Unit; reddish brown [5YR4/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, trace magnetite, possible amphibole; reaction to acid: none	very slightly clayey, yellowish-orange and reddish brown (limonite/hematite?) staining on some mineral faces, and alteration of some biotite (~2%)	subangular to subrounded chips to 2 cm
70 - 80	21.3 - 24.4	Gray Unit; reddish brown [5YR4/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, trace magnetite, possible amphibole; reaction to acid: none	very slightly weathered (non clayey), yellowish-orange and reddish brown (limonite/hematite?) staining on some mineral faces, and alteration of some biotite	subangular to subrounded chips to 1 cm
80 - 90	24.4 - 27.4	Gray Unit; reddish brown [5YR4/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, increased bronzy-black biotite, trace magnetite, possible amphibole and trace lithic fragments of dark gray siltstone; reaction to acid: none	very slightly weathered (non clayey), yellowish-orange and reddish brown (limonite/hematite?) staining on some mineral faces, and alteration of some biotite	subangular to subrounded chips to 1 cm
90 - 100	27.4 - 30.5	Gray Unit; weak red [2.5YR5/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, trace magnetite, possible amphibole and trace lithic fragments of dark gray siltstone; reaction to acid: none	very slightly weathered (non clayey), yellowish-orange and reddish brown (limonite/hematite?) staining on some mineral faces, and alteration of some biotite	subangular to subrounded chips to 1 cm
100 - 110	30.5 - 33.5	Gray Unit; weak red [2.5YR5/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, trace magnetite, possible amphibole, and trace lithic fragments of dark gray siltstone; reaction to acid: none to very weak	very slightly weathered (non clayey), yellowish-orange and reddish brown (limonite/hematite?) staining on some mineral faces, and alteration of some biotite	subangular to subrounded chips to 1 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-02
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
110 - 120	33.5 - 36.6	Gray Unit; weak red [2.5YR5/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, trace magnetite, possible amphibole, and trace lithic fragments of dark gray siltstone; reaction to acid: none	very slightly weathered (non clayey), yellowish-orange and reddish brown (limonite/hematite?) staining on some mineral faces, and alteration of some biotite	subangular to subrounded chips to 1 cm
120 - 130	36.6 - 39.6	Gray Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, trace magnetite, possible amphibole, and increased lithic fragments of dark gray siltstone (~2%); reaction to acid: none to very weak	trace iron oxide (limonite) on biotite; trace calcite	subangular to subrounded chips to 1 cm
130 - 140	39.6 - 42.7	Gray Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, trace magnetite, possible amphibole, and increased lithic fragments of dark gray siltstone (~4%); reaction to acid: none to very weak	trace iron oxide (limonite) on biotite; trace calcite	subangular to subrounded chips less than 1 cm
140 - 150	42.7 - 45.7	Gray Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxide (limonite) on biotite; trace calcite	subangular to subrounded chips less than 1 cm
150 - 160	45.7 - 48.8	Gray Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxide (limonite) on biotite; trace calcite	subangular to subrounded chips less than 1 cm; few to 2 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-02
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
160 - 170	48.8 - 51.8	Gray Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxide (limonite) on biotite; trace calcite	subangular to subrounded chips to 1.5 cm
170 - 180	51.8 - 54.9	Gray Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxide (limonite) on biotite; trace calcite	subangular to subrounded chips to 1.5 cm
180 - 190	54.9 - 57.9	Gray Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxide (limonite) on biotite; trace calcite	subangular to subrounded chips less than 1 cm; few to 2 cm
190 - 200	57.9 - 61.0	Gray Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxide (limonite) on biotite; trace calcite	subangular to subrounded chips to 3 cm
200 - 210	61.0 - 64.0	Gray Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxide (limonite) on biotite; trace calcite	subangular to subrounded chips to 1.5 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-02
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
210 - 220	64.0 - 67.1	Gray Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxide (limonite) on biotite; trace calcite	subangular to subrounded chips to 1.5 cm
220 - 230	67.1 - 70.1	Gray Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxide (limonite) on biotite; trace calcite	subangular to subrounded chips to 3 cm
230 - 240	70.1 - 73.2	Gray Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxide (limonite) on biotite; trace calcite	subangular to subrounded chips to 1 cm
240 - 250	73.2 - 76.2	Gray Unit; weak red [2.5YR4/2] and weak red [2.5YR5/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxide (limonite) on biotite; trace calcite	subangular to subrounded chips to 1.5 cm
250 - 260	76.2 - 79.2	Gray Unit; weak red [2.5YR4/2] and weak red [2.5YR5/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxide (limonite) on biotite; trace calcite	subangular to subrounded chips to 1.5 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-02
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
260 - 270	79.2 - 82.3	Gray Unit; weak red [2.5YR4/2] and weak red [2.5YR5/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxide (limonite) on biotite; few large calcite crystals	subangular to subrounded chips to 3 cm
270 - 280	82.3 - 85.3	Gray Unit; reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	increased iron oxide (limonite) on biotite; trace calcite	subangular to subrounded chips to 1.5 cm
280 - 290	85.3 - 88.4	Gray Unit; reddish brown [2.5YR5/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxide (limonite) on biotite; trace calcite	subangular to subrounded chips to 2 cm
290 - 300	88.4 - 91.4	Gray Unit; reddish brown [2.5YR5/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxide (limonite) on biotite; trace calcite	subangular to subrounded chips to 2 cm
300 - 310	91.4 - 94.5	Gray Unit; reddish brown [2.5YR5/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxide (limonite) on biotite; trace calcite	subangular to subrounded chips to 1.5 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-02
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
310 - 320	94.5 - 97.5	Gray Unit; reddish brown [2.5YR5/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxide (limonite) on biotite; trace calcite	subangular to subrounded chips less than 0.5 cm
320 - 330	97.5 - 100.6	Gray Unit; reddish brown [2.5YR5/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxides (limonite/hematite) on biotite; trace calcite	subangular to subrounded chips less than 0.5 cm
330 - 340	100.6 - 103.6	Gray Unit; reddish brown [2.5YR5/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	trace iron oxides (limonite/hematite) on biotite; trace calcite	subangular to subrounded chips less than 0.5 cm
340 - 350	103.6 - 106.7	Gray Unit; reddish brown [2.5YR5/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	trace iron oxides (limonite/hematite) on biotite; trace calcite	subangular to subrounded chips less than 0.5 cm
350 - 360	106.7 - 109.7	Gray Unit; reddish brown [2.5YR5/3] and reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxides (limonite/hematite) on biotite; trace calcite	subangular to subrounded chips less than 0.5 cm

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Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
360 - 370	109.7 - 112.8	Gray Unit; reddish brown [2.5YR5/3] and reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxides (limonite/hematite) on biotite; trace calcite	subangular to subrounded chips to 2 cm
370 - 380	112.8 - 115.8	Gray Unit; reddish brown [2.5YR5/3] and reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxides (limonite/hematite) on biotite; trace calcite	subangular to subrounded chips to 1 cm
380 - 390	115.8 - 118.9	Gray Unit; reddish brown [2.5YR5/3] and reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxides (limonite/hematite) on biotite; trace calcite	subangular to subrounded chips less than 0.5 cm
390 - 400	118.9 - 121.9	Gray Unit; reddish brown [2.5YR5/3] and reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxides (limonite/hematite) on biotite; trace calcite	subangular to subrounded chips to 1 cm
400 - 410	121.9 - 125.0	Gray Unit; reddish brown [2.5YR5/3] and reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxides (limonite/hematite) on biotite; trace calcite	subangular to subrounded chips to 1 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-02
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
410 - 420	125.0 - 128.0	Gray Unit; reddish brown [2.5YR5/3] and reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxides (limonite/hematite) on biotite; trace calcite	subangular to subrounded chips less than 0.1 cm
420 - 430	128.0 - 131.1	Gray Unit; reddish brown [2.5YR5/3] and reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxides (limonite/hematite) on biotite; trace calcite	subangular to subrounded chips less than 0.5 cm
430 - 440	131.1 - 134.1	Gray Unit; reddish brown [2.5YR5/3] and reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	trace iron oxides (limonite/hematite) on biotite; trace calcite	subangular to subrounded chips less than 0.5 cm
440 - 450	134.1 - 137.2	Gray Unit; reddish brown [2.5YR5/3] and reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace to no iron oxides ; trace calcite	subangular to subrounded chips less than 0.5 cm
450 - 460	137.2 - 140.2	Gray Unit; reddish brown [2.5YR5/3] and reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace to no iron oxides ; trace calcite	subangular to subrounded chips less than 0.5 cm; increased fine material

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-02
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
460 - 470	140.2 - 143.3	Gray Unit; reddish brown [2.5YR5/3] and reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace to no iron oxides ; trace calcite	subangular to subrounded chips less than 0.5 cm
470 - 480	143.3 - 146.3	Gray Unit; reddish brown [2.5YR5/3] and reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace to no iron oxides ; trace calcite	subangular to subrounded chips less than 0.5 cm
480 - 490	146.3 - 149.4	Gray Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace to no iron oxides ; trace calcite	subangular to subrounded chips less than 0.5 cm
490 - 500	149.4 - 152.4	Gray Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace to no iron oxides ; trace calcite	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm
500 - 510	152.4 - 155.4	Gray Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace to no iron oxides ; trace calcite	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-02
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
510 - 520	155.4 - 158.5	Gray Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace to no iron oxides ; trace calcite	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm
520 - 530	158.5 - 161.5	Gray Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace to no iron oxides ; trace calcite	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm
APACHE LEAP TUFF - Brown Unit (Talb)				
530 - 540	161.5 - 164.6	Brown Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace to no iron oxides except as bronzy biotite; trace calcite	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm
540 - 550	164.6 - 167.6	Brown Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	very trace to no iron oxides except as bronzy biotite; trace calcite	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm
550 - 560	167.6 - 170.7	Brown Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	very trace to no iron oxides except as bronzy biotite; trace calcite	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-02
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
560 - 570	170.7 - 173.7	Brown Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	very trace to no iron oxides except as bronzy biotite; trace calcite	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm
570 - 580	173.7 - 176.8	Brown Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	very trace to no iron oxides except as bronzy biotite; trace calcite	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm
580 - 590	176.8 - 179.8	Brown Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	very trace to no iron oxides except as bronzy biotite; trace calcite	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm
590 - 600	179.8 - 182.9	Brown Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	very trace to no iron oxides except as bronzy biotite; trace calcite	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm
600 - 610	182.9 - 185.9	Brown Unit; weak red [2.5YR4/2] and weak red [10R4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	very trace to no iron oxides except as bronzy biotite; trace calcite	subangular to subrounded chips less than 0.5 cm; few to 1.0 cm
610 - 620	185.9 - 189.0	Brown Unit; weak red [2.5YR4/2] and weak red [10R4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone and yellow-orange banded siltstone, trace magnetite, possible amphibole; reaction to acid: none	very trace to no iron oxides except as bronzy biotite; trace calcite	subangular to subrounded chips less than 0.5 cm; few to 1.0 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-02
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
620 - 630	189.0 - 192.0	Brown Unit; weak red [2.5YR4/2] and weak red [10R4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone and yellow-orange banded siltstone, trace magnetite, possible amphibole; reaction to acid: none	very trace to no iron oxides except as bronzy biotite; trace calcite	subangular to subrounded chips less than 0.5 cm; few to 1.0 cm
630 - 640	192.0 - 195.1	Brown Unit; weak red [2.5YR4/2] and weak red [10R4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone and yellow-orange banded siltstone, trace magnetite, possible amphibole; reaction to acid: none	very trace to no iron oxides except as bronzy biotite; trace calcite	subangular to subrounded chips less than 0.5 cm; few to 1.0 cm
640 - 650	195.1 - 198.1	Brown Unit; weak red [2.5YR4/2] and weak red [10R4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone and yellow-orange banded siltstone, trace magnetite, possible amphibole; reaction to acid: none	very trace to no iron oxides except as bronzy biotite; trace calcite	subangular to subrounded chips less than 0.5 cm; few to 1.0 cm
650 - 660	198.1 - 201.2	Brown Unit; weak red [2.5YR4/2] and weak red [10R4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone and yellow-orange banded siltstone, trace magnetite, possible amphibole; reaction to acid: none	very trace to no iron oxides except as bronzy biotite; trace calcite	subangular to subrounded chips less than 0.5 cm; few to 1.0 cm
660 - 670	201.2 - 204.2	Brown Unit; weak red [2.5YR4/2] and weak red [10R4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone and yellow-orange banded siltstone, trace magnetite, possible amphibole; reaction to acid: none	very trace to no iron oxides except as bronzy biotite; trace calcite	subangular to subrounded chips less than 0.5 cm; few to 1.0 cm

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
670 - 680	204.2 - 207.3	Brown Unit; weak red [2.5YR4/2] and weak red [10R4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone and yellow-orange banded siltstone, trace magnetite, possible amphibole; reaction to acid: none	very trace to no iron oxides except as bronzy biotite; trace calcite	subangular to subrounded chips less than 0.5 cm; few to 1.0 cm
680 - 690	207.3 - 210.3	Brown Unit; weak red [2.5YR4/2] and weak red [10R4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone and yellow-orange banded siltstone, trace magnetite, possible amphibole; reaction to acid: none	very trace to no iron oxides except as bronzy biotite; trace calcite	subangular to subrounded chips less than 0.5 cm; few to 1.0 cm
690 - 700	210.3 - 213.4	Brown Unit; weak red [2.5YR4/2] and weak red [10R4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone and yellow-orange banded siltstone, trace magnetite, possible amphibole; reaction to acid: none	some matrix appears oxidized to yellowish-orange; trace iron oxide (hematite) on biotite; clayey	subangular to subrounded chips less than 0.5 cm; few to 2.0 cm
700 - 710	213.4 - 216.4	Brown Unit; weak red [2.5YR5/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	some matrix appears oxidized to yellowish-orange; trace iron oxide (hematite) on biotite	subangular to subrounded chips less than 0.5 cm; few to 1.0 cm
710 - 720	216.4 - 219.5	Brown Unit; weak red [2.5YR5/2] and weak red [10R5/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	some matrix appears oxidized to yellowish-orange; trace iron oxide (hematite) on biotite	subangular to subrounded chips less than 0.5 cm; few to 1.0 cm

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
720 - 730	219.5 - 222.5	Brown Unit; weak red [2.5YR4/2] and weak red [10R4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	some matrix appears oxidized to yellowish-orange; trace iron oxide (hematite) on biotite	subangular to subrounded chips less than 0.5 cm; few to 1.0 cm
730 - 740	222.5 - 225.6	Brown Unit; weak red [2.5YR4/2] and weak red [10R4/2]; well lithified; dacite porphyry tuff with 55% reddish-brown aphanitic groundmass and 45%phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	some matrix appears oxidized to yellowish-orange; trace iron oxide (hematite) on biotite	subangular to subrounded chips less than 0.5 cm
740 - 750	225.6 - 228.6	Brown Unit; weak red [2.5YR4/2] and weak red [10R4/2]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	some matrix appears oxidized to yellowish-orange; trace iron oxide (hematite) on biotite	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm
750 - 760	228.6 - 231.6	Brown Unit; weak red [2.5YR4/2] and weak red [10R4/2]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	some matrix appears oxidized to yellowish-orange; trace iron oxide (hematite) on biotite	subangular to subrounded chips less than 0.5 cm; few to 1.0 cm
760 - 770	231.6 - 234.7	Brown Unit; weak red [2.5YR4/2] and weak red [10R4/2]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	some matrix appears oxidized to yellowish-orange; trace iron oxide (hematite) on biotite	subangular to subrounded chips less than 0.5 cm; few to 1.0 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-02
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
770 - 780	234.7 - 237.7	Brown Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55-60% reddish-brown aphanitic groundmass and 40-45% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, increased lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	some matrix appears oxidized to yellowish-orange; trace iron oxide (hematite) on biotite	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm
780 - 790	237.7 - 240.8	Brown Unit; weak red [2.5YR5/2]; well lithified; dacite porphyry tuff with 55-60% reddish-brown aphanitic groundmass and 40-45% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	some matrix appears oxidized to yellowish-orange; trace iron oxide (hematite) on biotite	subangular to subrounded chips less than 0.5 cm; "sandy"
790 - 800	240.8 - 243.8	Brown Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 55-60% reddish-brown aphanitic groundmass and 40-45% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	some matrix appears oxidized to yellowish-orange; trace iron oxide (hematite) on biotite	subangular to subrounded chips less than 0.5 cm
800 - 810	243.8 - 246.9	Brown Unit; weak red [10R4/2]; well lithified; dacite porphyry tuff with 55-60% reddish-brown aphanitic groundmass and 40-45% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	some matrix appears oxidized to yellowish-orange; trace iron oxide (hematite) on biotite; some greenish chloritic? alteration on feldspars	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm; on large chip produced (7cm)
810 - 820	246.9 - 249.9	Brown Unit; weak red [10R4/2]; well lithified; dacite porphyry tuff with 55-60% reddish-brown aphanitic groundmass and 40-45% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	some matrix appears oxidized to yellowish-orange; trace iron oxide (hematite) on biotite; some greenish chloritic? alteration on feldspars	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm
820 - 830	249.9 - 253.0	Brown Unit; weak red [10R4/2]; well lithified; dacite porphyry tuff with 55-60% reddish-brown aphanitic groundmass and 40-45% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	some matrix appears oxidized to yellowish-orange; trace iron oxide (hematite) on biotite; some greenish chloritic? alteration on feldspars	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
830 - 840	253.0 - 256.0	Brown Unit; weak red [10R4/2]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, increased lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	some matrix appears oxidized to yellowish-orange; trace iron oxide (hematite) on biotite; some greenish chloritic? alteration on feldspars	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm
840 - 850	256.0 - 259.1	Brown Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace iron oxides; some matrix with orange alteration	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm
850 - 860	259.1 - 262.1	Brown Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace iron oxides; some matrix with orange alteration	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm
860 - 870	262.1 - 265.2	Brown Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace iron oxides; some matrix with orange alteration	subangular to subrounded chips less than 0.5 cm; few to 1.0 cm
870 - 880	265.2 - 268.2	Brown Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace iron oxides; some matrix with orange alteration	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-02
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
880 - 890	268.2 - 271.3	Brown Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace iron oxides; some matrix with orange alteration	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm
890 - 900	271.3 - 274.3	Brown Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace iron oxides; some matrix with orange alteration; some alteration of feldspars	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm
900 - 910	274.3 - 277.4	Brown Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, increased lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace iron oxides; some matrix with orange alteration; some alteration of feldspars	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm
910 - 920	277.4 - 280.4	Brown Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace iron oxides; some matrix with orange alteration; some alteration of feldspars	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm; flow rate produced by airlift increased significantly
920 - 930	280.4 - 283.5	Brown Unit; weak red [2.5YR4/2]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace iron oxides; some matrix with orange alteration; some alteration of feldspars	subangular to subrounded chips less than 0.5 cm; few to 1.5 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-02
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
930 - 940	283.5 - 286.5	Brown Unit; weak red [2.5YR4/2] and reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace iron oxides; some matrix with orange alteration; some alteration of feldspars	subangular to subrounded chips less than 0.5 cm; 6-inch Tric-cone bit
940 - 950	286.5 - 289.6	Brown Unit; weak red [2.5YR4/2] and reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace iron oxides; some matrix with orange alteration; some alteration of feldspars	subangular to subrounded chips less than 0.5 cm
950 - 960	289.6 - 292.6	Brown Unit; weak red [2.5YR4/2] and reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace iron oxides; some matrix with orange alteration; some alteration of feldspars	subangular to subrounded chips less than 0.5 cm
960 - 970	292.6 - 295.7	Brown Unit; weak red [2.5YR4/2] and reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	very trace iron oxides; some matrix with orange alteration; some alteration of feldspars	subangular to subrounded chips less than 0.5 cm
970 - 980	295.7 - 298.7	Brown Unit; weak red [2.5YR4/2] and reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	very trace iron oxides; some matrix with orange alteration; some alteration of feldspars	subangular to subrounded chips less than 0.5 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-02
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
980 - 990	298.7 - 301.8	Brown Unit; weak red [2.5YR4/2] and reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	very trace iron oxides; some matrix with orange alteration; some alteration of feldspars	subangular to subrounded chips less than 0.5 cm
990 - 1,000	301.8 - 304.8	Brown Unit; weak red [2.5YR4/2] and reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of white-gray feldspar, increased clear-gray quartz (15-20%), bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	very trace iron oxides; some matrix with orange alteration; some alteration of feldspars	subangular to subrounded chips less than 0.5 cm
1,000 - 1,010	304.8 - 307.8	Brown Unit; weak red [2.5YR4/2] and reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of white-gray feldspar, clear-gray quartz (10-15%), bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	very trace iron oxides; some matrix with orange alteration; some alteration of feldspars on surfaces	subangular to subrounded chips less than 1 cm
1,010 - 1,020	307.8 - 310.9	Brown Unit; weak red [2.5YR4/2] and reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of clear-gray quartz, white-gray feldspar, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none	very trace iron oxides; some matrix with orange alteration; some alteration of feldspars on surfaces	subangular to subrounded chips less than 0.5 cm
1,020 - 1,030	310.9 - 313.9	Brown Unit; reddish brown [2.5YR4/3]; well lithified; dacite porphyry tuff with 60-65% reddish-brown aphanitic groundmass and 35-40% phenocrysts of clear-gray quartz, white-gray feldspar, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to very weak	very trace iron oxides; some matrix with orange alteration; some alteration of feldspars on surfaces	subangular to subrounded chips less than 0.5 cm

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Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
1,030 - 1,039	313.9 - 316.7	Brown Unit; reddish brown [2.5YR4/4]; well lithified; vitrophyre with 70% black glassy groundmass and 30% phenocrysts of feldspar, quartz, biotite and amphibole; reaction to acid: none	very trace iron oxides; some matrix with orange alteration; some alteration of feldspars on surfaces	subangular to subrounded chips less than 0.5 cm
APACHE LEAP TUFF - Vitrophyre (Talv)				
1,039 - 1,050	316.7 - 320.0	Vitrophyre; reddish black [2.5YR2.5/1]; well lithified; vitrophyre with 70% black glassy groundmass and 30% phenocrysts of feldspar, quartz, biotite and amphibole; reaction to acid: none	very trace iron oxides; some matrix with orange alteration; some alteration of feldspars on surfaces	subangular chips up to 0.5 cm; cuttings coarsening; vitrophyre encountered at 1039 ft bls)
1,050 - 1,060	320.0 - 323.1	Vitrophyre; reddish black [2.5YR2.5/1]; well lithified; vitrophyre with 70% black glassy groundmass and 30% phenocrysts of feldspar, quartz, biotite and amphibole; reaction to acid: none	very trace iron oxides; some matrix with orange alteration; some alteration of feldspars on surfaces	subangular to subrounded chips less than 0.5 cm
1,060 - 1,070	323.1 - 326.1	Vitrophyre; reddish black [2.5YR2.5/1] and black [N2.5]; well lithified; vitrophyre with 70% black glassy groundmass and 30% phenocrysts of feldspar, quartz, biotite and amphibole; reaction to acid: none	very trace iron oxides; some matrix with orange alteration; some alteration of feldspars on surfaces	subangular to subrounded chips less than 0.5 cm
APACHE LEAP TUFF - Basal Tuff (Talbt)				
1,070 - 1,080	326.1 - 329.2	Basal Tuff Unit; light reddish brown [5YR6/4]; well lithified; dacite porphyry tuff with 60% reddish-brown aphanitic groundmass and 40% phenocrysts of white-gray feldspar, clear-gray quartz, bronzy-black biotite, lithic fragments of dark gray siltstone, trace magnetite, possible amphibole; reaction to acid: none to weak	very trace iron oxides; some matrix with orange alteration; some alteration of feldspars on surfaces	subangular to subrounded chips less than 0.5 cm
WHITETAIL CONGLOMERATE - Channel Fill Unit (Tw1)				
1,080 - 1,090	329.2 - 332.2	Clast-supported conglomerate; reddish brown [2.5YR5/3]; weakly lithified; clasts of calcareous siltstone, limestone, and quartzite with minor silty sand matrix; some tuff, minor biotite and magnetite; reaction to acid: strong		subangular to subrounded chips less than 0.5 cm; some to 1 cm
1,090 - 1,100	332.2 - 335.3	Clast-supported conglomerate; reddish brown [2.5YR4/3]; weakly lithified; clasts of calcareous siltstone, limestone, and quartzite with minor silty sand matrix; some tuff, minor biotite and magnetite; reaction to acid: strong		subangular to subrounded chips less than 0.5 cm; some to 1 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-03
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
0 - 10	0.0 - 3.0	Gray Unit; red [10R5/6]; moderately lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice white fragments; reaction to acid: none	weathered, trace iron oxide (limonite and hematite), yellowish-orange staining	subangular chips up to 1.0 cm
10 - 20	3.0 - 6.1	Gray Unit; red [10R5/6]; moderately lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice white fragments; trace lithic fragments of dark gray quartzite; reaction to acid: none to weak	weathered, trace iron oxide (limonite and hematite), yellowish-orange staining; very trace calcite chips	subangular chips up to 1.0 cm
20 - 30	6.1 - 9.1	Gray Unit; red [10R5/6]; moderately to well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice white fragments; trace lithic fragments of dark gray quartzite; reaction to acid: none to weak	weathered, trace iron oxide (limonite and hematite), yellowish-orange staining; very trace calcite chips	subangular chips up to 2.6 cm
30 - 40	9.1 - 12.2	Gray Unit; red [10R5/6]; moderately to well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pumice white fragments; trace lithic fragments of dark gray quartzite; reaction to acid: none	some weathering, trace iron oxide (limonite and hematite), yellowish-orange staining; very trace calcite chips	subangular chips up to 1.6 cm
40 - 50	12.2 - 15.2	Gray Unit; red [10R5/6]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace lithic fragments of gray siltstone and white quartzite; reaction to acid: none	very trace manganese oxide on fracture surfaces	subangular to subrounded chips up to 1.2 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-03
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
50 - 60	15.2 - 18.3	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none	trace iron oxide (hematite) on biotite; very trace manganese oxide on fracture surfaces	subangular to subrounded chips up to 1.4 cm
60 - 70	18.3 - 21.3	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) on biotite; very trace manganese oxide on fracture surfaces	subangular to subrounded chips up to 1.0 cm
70 - 80	21.3 - 24.4	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% light reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) on biotite; very trace manganese oxide on fracture surfaces	subangular to subrounded chips up to 1.0 cm; chips finer
80 - 90	24.4 - 27.4	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; trace lithic fragments of gray quartzite; reaction to acid: none	very trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 1.0 cm; coarser chips
90 - 100	27.4 - 30.5	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of gray quartzite and reddish gray siltstone; reaction to acid: none	very trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 1.0 cm
100 - 110	30.5 - 33.5	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; abundant lithic fragments of gray quartzite; reaction to acid: none	trace iron oxide (hematite) on biotite and lithic fragments	subangular to subrounded chips up to 1.2 cm

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Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
110 - 120	33.5 - 36.6	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of gray quartzite; reaction to acid: none	very trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 1.0 cm
120 - 130	36.6 - 39.6	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; trace lithic fragments of gray quartzite; reaction to acid: none	trace iron oxide (hematite) on biotite; very trace manganese oxide on fracture surfaces	subangular to subrounded chips up to 1.8 cm
130 - 140	39.6 - 42.7	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; very trace lithic fragments of gray quartzite; reaction to acid: none	trace iron oxide (hematite) on biotite; very trace manganese oxide on fracture surfaces	subangular to subrounded chips up to 1.8 cm
140 - 150	42.7 - 45.7	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; very trace lithic fragments of gray quartzite; reaction to acid: none	trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 1.2 cm
150 - 160	45.7 - 48.8	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 2.2 cm
160 - 170	48.8 - 51.8	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace white pumice fragments; trace lithic fragments of gray quartzite; reaction to acid: none	trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 1.6 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-03
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
170 - 180	51.8 - 54.9	Gray Unit; weak red [10R4/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown to reddish gray aphanitic groundmass and 40% phenocrysts (<2mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace white pumice fragments; trace lithic fragments of gray quartzite; reaction to acid: none to weak	trace iron oxide (hematite) on biotite; very trace manganese oxide on fracture surfaces; very trace calcite on fracture surfaces	subangular to subrounded chips up to 1.4 cm
180 - 190	54.9 - 57.9	Gray Unit; weak red [10R4/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<2mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace white pumice fragments; trace lithic fragments of gray quartzite; reaction to acid: none to weak	trace iron oxide (hematite) on biotite; very trace manganese oxide on fracture surfaces; very trace calcite on fracture surfaces	subangular to subrounded chips up to 1.4 cm
190 - 200	57.9 - 61.0	Gray Unit; weak red [10R4/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown to reddish gray aphanitic groundmass and 40% phenocrysts (<2mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace white pumice fragments; trace lithic fragments of gray quartzite; reaction to acid: none to weak	trace iron oxide (hematite) on biotite; very trace manganese oxide on fracture surfaces; very trace loose calcite chips	subangular to subrounded chips up to 1.4 cm
200 - 210	61.0 - 64.0	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of gray quartzite; reaction to acid: none	trace iron oxide (hematite) staining and on biotite	subangular to subrounded chips up to 1.0 cm
210 - 220	64.0 - 67.1	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of gray quartzite; reaction to acid: none	trace iron oxide (hematite) staining and on biotite	subangular to subrounded chips up to 1.0 cm

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Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
220 - 230	67.1 - 70.1	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace white pumice fragments; reaction to acid: none to weak	trace caclite on fracture surfaces	subangular to subrounded chips up to 1.0 cm
230 - 240	70.1 - 73.2	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace white pumice fragments; reaction to acid: none to weak	trace iron oxide (hematite) staining and on biotite; trace calcite on fracture surfaces	subangular to subrounded chips up to 0.8 cm
240 - 250	73.2 - 76.2	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none	trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 1.0 cm
250 - 260	76.2 - 79.2	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; very trace lithic fragments of red orange sandstone; reaction to acid: none	trace iron oxide (hematite) staining and on biotite	subangular to subrounded chips up to 1.0 cm
260 - 270	79.2 - 82.3	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; very trace lithic fragments of red orange sandstone; reaction to acid: none to weak	trace iron oxide (hematite) staining and on biotite; trace calcite chips	subangular to subrounded chips up to 1.0 cm
270 - 280	82.3 - 85.3	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none to weak	very trace iron oxide (hematite) staining and on biotite; trace calcite chips	subangular to subrounded chips up to 1.6 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-03
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
280 - 290	85.3 - 88.4	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none to weak	trace iron oxide (hematite) staining and on biotite; trace calcite chips	subangular to subrounded chips up to 1.0 cm
290 - 300	88.4 - 91.4	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none to weak	trace iron oxide (hematite) staining and on biotite; abundant calcite chips up to 2mm	subangular to subrounded chips up to 0.8 cm
300 - 310	91.4 - 94.5	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none to weak	trace iron oxide (hematite) staining and on biotite; trace calcite chips	subangular to subrounded chips up to 0.8 cm
310 - 320	94.5 - 97.5	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none to weak	trace iron oxide (hematite) staining and on biotite; trace calcite chips	subangular to subrounded chips up to 0.8 cm
320 - 330	97.5 - 100.6	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none to weak	trace iron oxide (hematite) staining and on biotite; trace calcite chips	subangular to subrounded chips up to 0.8 cm
330 - 340	100.6 - 103.6	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none to weak	very trace calcite chips	subangular to subrounded chips up to 0.8 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-03
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
340 - 350	103.6 - 106.7	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 0.5 cm; mostly sand-size chips
350 - 360	106.7 - 109.7	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 0.8 cm; mostly sand-sized chips
360 - 370	109.7 - 112.8	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace white pumice fragments; very trace lithic fragments of brown siltstone; reaction to acid: none to very weak	trace iron oxide (hematite) on biotite; very trace calcite chips	subangular to subrounded chips up to 1.4 cm
370 - 380	112.8 - 115.8	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace white pumice fragments; very trace lithic fragments of purplish gray quartzite; reaction to acid: none	trace iron oxide (hematite) staining on lithic fragments and biotite; very trace calcite chips	subangular to subrounded chips up to 1.0 cm
380 - 390	115.8 - 118.9	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 0.5 cm
390 - 400	118.9 - 121.9	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown to dark grayish red aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 0.8 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-03
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
400 - 410	121.9 - 125.0	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown to dark grayish red aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace white pumice fragments; trace lithic fragments of red orange sandstone; reaction to acid: none	very trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 0.8 cm
410 - 420	125.0 - 128.0	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown to dark grayish red aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace white pumice fragments; trace lithic fragments of red orange sandstone; reaction to acid: none		subangular to subrounded chips up to 0.8 cm
420 - 430	128.0 - 131.1	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subangular to subrounded chips up to 0.8 cm
430 - 440	131.1 - 134.1	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none		subangular to subrounded chips up to 0.8 cm
440 - 450	134.1 - 137.2	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	trace to abundant iron oxide (hematite) staining; trace calcite chips	subangular to subrounded chips up to 0.8 cm
450 - 460	137.2 - 140.2	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 0.5 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-03
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
460 - 470	140.2 - 143.3	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pinkish white pumice fragments; trace lithic fragments of gray quartzite; reaction to acid: none	trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 1.0 cm
470 - 480	143.3 - 146.3	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pinkish white pumice fragments; trace lithic fragments of gray quartzite; reaction to acid: none		subangular to subrounded chips up to 1.0 cm
480 - 490	146.3 - 149.4	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none to weak	trace to abundant iron oxide (hematite) staining; trace calcite on fracture surfaces	subangular to subrounded chips up to 1.0 cm
490 - 500	149.4 - 152.4	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 1.0 cm
500 - 510	152.4 - 155.4	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pinkish white pumice fragments; reaction to acid: none to weak	trace to abundant iron oxide (hematite) staining; trace calcite on fracture surfaces	subangular to subrounded chips up to 0.8 cm
510 - 520	155.4 - 158.5	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown to dark reddish brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pinkish white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 1.0 cm

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
520 - 530	158.5 - 161.5	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pinkish white pumice fragments; trace lithic fragments of gray quartzite; reaction to acid: none		subangular to subrounded chips up to 1.0 cm
530 - 540	161.5 - 164.6	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pinkish white pumice fragments; reaction to acid: none		subangular to subrounded chips up to 1.0 cm
540 - 550	164.6 - 167.6	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace pinkish white pumice fragments; reaction to acid: none		subangular to subrounded chips up to 1.0 cm
550 - 560	167.6 - 170.7	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace white pumice fragments; trace lithic fragments of red sandstone; reaction to acid: none	very trace iron oxide (hematite) staining on lithic fragments	subangular to subrounded chips up to 1.0 cm
560 - 570	170.7 - 173.7	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) staining on biotite	subangular to subrounded chips up to 1.2 cm
570 - 580	173.7 - 176.8	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of red sandstone and gray quartzite; reaction to acid: none	very trace iron oxide (hematite) staining on biotite	subangular to subrounded chips up to 1.0 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-03
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
580 - 590	176.8 - 179.8	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of red sandstone and gray quartzite; reaction to acid: none	very trace iron oxide (hematite) staining on biotite	subangular to subrounded chips up to 0.8 cm
APACHE LEAP TUFF - Brown Unit (Talb)				
590 - 600	179.8 - 182.9	Brown Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic groundmass and 40% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) staining on biotite	subangular to subrounded chips up to 0.8 cm
600 - 610	182.9 - 185.9	Brown Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic groundmass and 40% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) staining on biotite	subangular to chips up to 0.8 cm
610 - 620	185.9 - 189.0	Brown Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic groundmass and 40% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) staining on biotite	subangular to chips up to 1.2 cm
620 - 630	189.0 - 192.0	Brown Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic groundmass and 40% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) staining on biotite	subangular chips up to 0.8 cm
630 - 640	192.0 - 195.1	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown to grayish red aphanitic groundmass and 40% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) staining on biotite	subangular chips up to 0.8 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-03
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
640 - 650	195.1 - 198.1	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown to grayish red aphanitic groundmass and 40% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) staining on biotite	subangular chips up to 0.8 cm
650 - 660	198.1 - 201.2	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown to grayish red aphanitic groundmass and 40% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) staining on biotite	subangular chips up to 1.2 cm
660 - 670	201.2 - 204.2	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) staining on biotite	subangular chips up to 1.0 cm
670 - 680	204.2 - 207.3	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) staining on biotite	subangular chips up to 1.2 cm
680 - 690	207.3 - 210.3	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace white pumice fragments; reaction to acid: none		subangular chips up to 2.0 cm
690 - 700	210.3 - 213.4	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) staining on biotite	subangular chips up to 1.0 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-03
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
700 - 710	213.4 - 216.4	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) staining on biotite	subangular chips up to 1.0 cm
710 - 720	216.4 - 219.5	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) staining on biotite	subangular chips up to 1.2 cm
720 - 730	219.5 - 222.5	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) staining on biotite; very trace calcite chips	subangular chips up to 1.0 cm
730 - 740	222.5 - 225.6	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) staining on biotite; very trace calcite chips	subangular chips up to 1.0 cm
740 - 750	225.6 - 228.6	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) staining on biotite; very trace calcite chips	subangular to subrounded chips up to 0.5 cm; mostly sand-size chips
750 - 760	228.6 - 231.6	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) staining on biotite; very trace calcite chips	subangular to subrounded chips up to 0.5 cm; mostly sand-size chips
760 - 770	231.6 - 234.7	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) staining on biotite; very trace calcite chips	subangular to subrounded chips up to 0.5 cm; mostly sand-size chips

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-03
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
770 - 780	234.7 - 237.7	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) staining on biotite; very trace calcite chips	subangular to subrounded chips up to 0.5 cm; mostly sand-size chips
780 - 790	237.7 - 240.8	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace white pumice fragments; reaction to acid: none		subangular to subrounded chips up to 1.2 cm; mostly sand-size chips
790 - 800	240.8 - 243.8	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) staining on biotite	subangular to subrounded chips up to 1.8 cm; mostly sand-size chips
800 - 810	243.8 - 246.9	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace white pumice fragments; reaction to acid: none		subangular to subrounded chips up to 0.8 cm; mostly sand-size chips
810 - 820	246.9 - 249.9	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) staining on biotite	subangular to subrounded chips up to 1.2 cm; mostly sand-size chips
820 - 830	249.9 - 253.0	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	trace loose quartz chips (vein quartz)	subangular to subrounded chips up to 1.2 cm; mostly sand-size chips
830 - 840	253.0 - 256.0	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	trace loose quartz chips (vein quartz)	subangular to subrounded chips up to 1.2 cm; mostly sand-size chips

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-03
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
840 - 850	256.0 - 259.1	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace loose quartz chips (vein quartz)	subangular to subrounded chips up to 1.0 cm; mostly sand-size chips
850 - 860	259.1 - 262.1	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) staining on biotite; very trace loose quartz chips (vein quartz)	subangular to subrounded chips up to 0.8 cm; mostly sand-size chips
860 - 870	262.1 - 265.2	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none to weak	trace calcite chips; very trace loose quartz chips (vein quartz)	subangular to subrounded chips up to 0.8 cm; mostly sand-size chips
870 - 880	265.2 - 268.2	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none to weak	very trace calcite chips	subangular to subrounded chips up to 1.6 cm; mostly sand-size chips
880 - 890	268.2 - 271.3	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none to weak	trace iron oxide (hematite) staining on biotite; very trace calcite chips	subangular to subrounded chips up to 1.6 cm; mostly sand-size chips
890 - 900	271.3 - 274.3	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none to weak	trace iron oxide (hematite) staining on biotite; very trace calcite chips	subangular chips up to 1.6 cm; mostly sand-size chips
900 - 910	274.3 - 277.4	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic groundmass and 40% phenocrysts (<2mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) staining	subangular chips up to 0.8 cm; mostly sand-size chips

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-03
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
910 - 920	277.4 - 280.4	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% pinkish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) staining	subangular to subrounded chips up to 1.0 cm; coarser chips
920 - 930	280.4 - 283.5	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 60% pinkish-brown aphanitic groundmass and 40% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) staining; trace green mineral	subangular to subrounded chips up to 1.6 cm; coarser chips
930 - 940	283.5 - 286.5	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 60% pinkish-brown aphanitic groundmass and 40% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) staining	subangular to subrounded chips up to 1.2 cm
940 - 950	286.5 - 289.6	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 60% pinkish-brown aphanitic groundmass and 40% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of gray quartzite; reaction to acid: none	very trace iron oxide (hematite) staining; trace green mineral	subangular to subrounded chips up to 1.0 cm
950 - 960	289.6 - 292.6	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 60% pinkish-brown aphanitic groundmass and 40% phenocrysts (<4mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) staining; trace green mineral	subangular to subrounded chips up to 0.8 cm
960 - 970	292.6 - 295.7	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none to weak	very trace iron oxide (hematite) staining; very trace calcite chips	subangular to subrounded chips up to 1.0 cm; coarser chips
970 - 980	295.7 - 298.7	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) staining	subangular to angular chips up to 1.4 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-03
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
980 - 990	298.7 - 301.8	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none to weak	very trace iron oxide (hematite) staining; very trace calcite crystals	subangular to angular chips up to 0.8 cm
990 - 1,000	301.8 - 304.8	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none to weak	very trace iron oxide (hematite) staining; very trace calcite crystals	subangular to angular chips up to 0.8 cm
1,000 - 1,010	304.8 - 307.8	Brown Unit; weak red [10R4/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown glassy to aphanitic groundmass and 40% phenocrysts (<2mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; reaction to acid: none to moderate	very trace iron oxide (hematite) staining; very trace calcite crystals	subangular to angular chips up to 1.2 cm
1,010 - 1,020	307.8 - 310.9	Brown Unit; weak red [10R4/4]; well lithified; 60% crystal-rich dacite porphyry tuff with 70% reddish-brown glassy to aphanitic groundmass and 30% phenocrysts (<2mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite 40% well-formed rhombehedral calcite crystals; reaction to acid: none to strong	abundant calcite crystals up to 0.8 mm; trace iron oxide (hematite) staining	subangular to angular chips up to 1.8 cm
1,020 - 1,030	310.9 - 313.9	Brown Unit; weak red [10R4/4]; well lithified; 90% crystal-rich dacite porphyry tuff with 80% reddish-brown glassy to aphanitic groundmass and 20% phenocrysts (<2mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite 10% vitrophyre with 90% black glassy groundmass and 10% phenocrysts of biotite, feldspar, quartz and amphibole; reaction to acid: none to weak	trace calcite crystals;	subangular to angular chips up to 1.0 cm
APACHE LEAP TUFF - Vitrophyre (Talv)				
1,030 - 1,040	313.9 - 317.0	Vitrophyre; black [5Y2.5/1]; well lithified; vitrophyre with 90% black glassy groundmass and 10% phenocrysts of biotite, feldspar, quartz and amphibole; reaction to acid: none to weak	very trace calcite chips	subangular to angular chips up to 1.0 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-03
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Vitrophyre (Talv)				
1,040 - 1,050	317.0 - 320.0	Vitrophyre; black [5Y2.5/1]; well lithified; vitrophyre with 90% black glassy groundmass and 10% phenocrysts of biotite, feldspar, quartz and amphibole; reaction to acid: none	very trace vein quartz	subangular to angular chips up to 1.2 cm
1,050 - 1,060	320.0 - 323.1	Vitrophyre; black [5Y2.5/1] and yellowish red 5YR5/6]; well lithified; 90% vitrophyre with 90% black glassy groundmass and 10% phenocrysts of biotite, feldspar, quartz and amphibole 10% crystal-rich dacite porphyry tuff with 70% light brown aphanitic groundmass and 30% phenocrysts (<2mm) of black biotite, white feldspar, opaque quartz, very trace magnetite; reaction to acid: none	very trace vein quartz	subangular chips up to 1.0 cm
APACHE LEAP TUFF - Basal tuff (Talbt)				
1,060 - 1,065	323.1 - 324.6	Basal tuff Unit; light reddish brown [5YR6/3]; well lithified; crystal-rich dacite porphyry tuff with 70% light brown aphanitic groundmass and 30% phenocrysts (<2mm) of black biotite, white feldspar, opaque quartz, very trace magnetite; reaction to acid: none		subangular chips up to 2.0 cm
WHITETAIL CONGLOMERATE - Channel Fill Unit (Tw1)				
1,065 - 1,070	324.6 - 326.1	Clast-supported conglomerate; pinkish gray [7.5YR6/2] and pinkish gray [5YR6/2]; weakly to well lithified; 60% gray calcareous fine-grained uniform siltstone 40% conglomerate: 25% red sandstone matrix chips; 75% clasts of limestone, diabase, sandstone, quartzite; reaction to acid: strong	trace iron oxide staining; calcite veinlets in some conglomerate clasts	subangular to angular chips up to 2.0 cm
1,070 - 1,080	326.1 - 329.2	Clast-supported conglomerate; red [2.5YR4/6]; weakly lithified; silty gravelly sand; 30% red sandstone matrix chips; 70% clasts of limestone, diabase, sandstone, quartzite; reaction to acid: strong	trace iron oxide staining; calcite veinlets in some clasts	angular chips up to 2.0 cm
1,080 - 1,085	329.2 - 330.7	Clast-supported conglomerate; red [2.5YR4/6]; weakly lithified; silty gravelly sand; 30% red sandstone matrix chips; 70% clasts of limestone, diabase, sandstone, quartzite; reaction to acid: strong	trace iron oxide staining; calcite veinlets in some clasts	angular chips up to 2.0 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-04
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - White Unit (Talw)				
0 - 10	0.0 - 3.0	White Unit; white [2.5YR8/1]; moderately lithified; crystal-rich dacite porphyry tuff with 60% pinkish white aphanitic groundmass and 40% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; abundant white to gray pumice fragments; trace lithic fragments of grayish red quartzite; reaction to acid: none	weathered, trace iron oxide staining (limonite and hematite), trace yellowish green alteration/mineralization	angular to subangular chips up to 3.5 cm
10 - 20	3.0 - 6.1	White Unit; white [2.5YR8/1]; moderately lithified; crystal-rich dacite porphyry tuff with 60% pinkish white aphanitic groundmass and 40% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; abundant white to gray pumice fragments; trace lithic fragments of grayish red quartzite; reaction to acid: none	weathered, trace iron oxide (limonite and hematite) on biotite, trace yellowish green alteration/mineralization; trace manganese oxide on fracture surfaces	angular to subangular chips up to 2.0 cm
20 - 30	6.1 - 9.1	White Unit; pale red [10R7/2]; moderately lithified; crystal-rich dacite porphyry tuff with 60% pinkish white aphanitic groundmass and 40% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; abundant white to gray pumice fragments; trace lithic fragments of grayish red quartzite; reaction to acid: none	weathered, trace iron oxide (limonite and hematite) on biotite, trace yellowish green alteration/mineralization; trace manganese oxide on fracture surfaces	angular to subangular chips up to 3.0 cm
30 - 40	9.1 - 12.2	White Unit; pale red [10R7/2]; moderately lithified; crystal-rich dacite porphyry tuff with 60% pinkish white to reddish gray aphanitic groundmass and 40% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; abundant white to gray pumice fragments; trace lithic fragments of grayish red quartzite; reaction to acid: none	weathered, trace iron oxide (limonite and hematite) on biotite, trace yellowish green alteration/mineralization; trace manganese oxide on fracture surfaces	angular to subangular chips up to 1.0 cm
40 - 50	12.2 - 15.2	White Unit; pale red [10R6/2]; moderately to well lithified; crystal-rich dacite porphyry tuff with 50% pinkish white to reddish gray aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; abundant white to gray pumice fragments; trace lithic fragments of grayish red quartzite; reaction to acid: none	some weathering, trace iron oxide (limonite and hematite) on biotite	subangular to subrounded chips up to 1.0 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-04
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
50 - 60	15.2 - 18.3	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace white pumice fragments; trace lithic fragments of gray quartzite; reaction to acid: none	trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 0.8 cm
60 - 70	18.3 - 21.3	Gray Unit; pale red [10R6/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; trace lithic fragments of dark gray and brown quartzite; reaction to acid: none	trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 1.2 cm
70 - 80	21.3 - 24.4	Gray Unit; "weak red [10R5/4]"; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; trace lithic fragments of dark gray and brown quartzite; reaction to acid: none	trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 0.5 cm
80 - 90	24.4 - 27.4	Gray Unit; "weak red [10R5/4]"; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; trace lithic fragments of dark gray quartzite; reaction to acid: none	trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 1.4 cm
90 - 100	27.4 - 30.5	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; trace lithic fragments of dark gray quartzite; reaction to acid: none	trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 0.5 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-04
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
100 - 110	30.5 - 33.5	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; abundant lithic fragments of dark gray quartzite; reaction to acid: none to weak	trace iron oxide (hematite) staining; very trace calcite chips	subangular to subrounded chips up to 1.2 cm
110 - 120	33.5 - 36.6	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic groundmass and 40% phenocrysts (<3mm) of white feldspar, clear quartz, bronzy black biotite, trace magnetite; very trace white pumice fragments; trace lithic fragments of dark gray quartzite; reaction to acid: none to weak	trace iron oxide (hematite) staining; very trace calcite chips	subangular to subrounded chips up to 0.5 cm
120 - 130	36.6 - 39.6	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; trace lithic fragments of gray quartzite; reaction to acid: none to weak	very trace calcite chips	subangular to subrounded chips up to 1.2 cm
130 - 140	39.6 - 42.7	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; trace lithic fragments of gray quartzite; reaction to acid: none		subangular to subrounded chips up to 0.5 cm; mostly sand sized chips
140 - 150	42.7 - 45.7	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; very trace lithic fragments of gray quartzite; reaction to acid: none to weak	trace iron oxide (hematite) staining; very trace calcite chips	subangular to subrounded chips up to 1.2 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-04
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
150 - 160	45.7 - 48.8	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; very trace lithic fragments of gray quartzite; reaction to acid: none to weak	very trace calcite chips	subangular to subrounded chips up to 0.5 cm
160 - 170	48.8 - 51.8	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace lithic fragments of gray quartzite; reaction to acid: none		subangular to subrounded chips up to 1.0 cm
170 - 180	51.8 - 54.9	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none		subangular to subrounded chips up to 0.8 cm
180 - 190	54.9 - 57.9	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; very trace lithic fragments of reddish brown quartzite; reaction to acid: none	trace iron oxide (hematite) staining and on biotite	subangular to subrounded chips up to 0.8 cm
190 - 200	57.9 - 61.0	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace white pumice fragments; very trace lithic fragments of reddish brown quartzite; reaction to acid: none to weak		subangular to subrounded chips up to 1.0 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-04
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
200 - 210	61.0 - 64.0	Gray Unit; red [2.5YR5/6]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace white pumice fragments; very trace lithic fragments of reddish brown quartzite; reaction to acid: none		subangular to subrounded chips up to 1.6 cm
210 - 220	64.0 - 67.1	Gray Unit; red [2.5YR5/6]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace white pumice fragments; reaction to acid: none		subangular to subrounded chips up to 0.8 cm
220 - 230	67.1 - 70.1	Gray Unit; red [2.5YR5/6]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace white pumice fragments; reaction to acid: none	trace iron oxide (hematite) staining	subangular to subrounded chips up to 0.8 cm
230 - 240	70.1 - 73.2	Gray Unit; red [2.5YR5/6]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic groundmass and 40% phenocrysts (<2mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; trace lithic fragments of gray quartzite; reaction to acid: none		subangular to subrounded chips up to 0.8 cm
240 - 250	73.2 - 76.2	Gray Unit; red [2.5YR5/6]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic groundmass and 40% phenocrysts (<2mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace lithic fragments of gray quartzite; reaction to acid: none	trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 1.0 cm
250 - 260	76.2 - 79.2	Gray Unit; red [2.5YR5/6]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none	trace iron oxide (hematite) staining and on biotite	subangular to subrounded chips up to 1.0 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-04
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
260 - 270	79.2 - 82.3	Gray Unit; red [2.5YR5/6]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; trace lithic fragments of gray quartzite; reaction to acid: none to weak	trace iron oxide (hematite) staining and on biotite; trace calcite chips	subangular to subrounded chips up to 1.6 cm
270 - 280	82.3 - 85.3	Gray Unit; red [2.5YR5/6]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none	trace iron oxide (hematite) staining and on biotite	subangular to subrounded chips up to 1.0 cm
280 - 290	85.3 - 88.4	Gray Unit; red [2.5YR5/6]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace lithic fragments of gray quartzite; reaction to acid: none	trace iron oxide (hematite) staining and on biotite	subangular to subrounded chips up to 1.2 cm
290 - 300	88.4 - 91.4	Gray Unit; red [2.5YR5/6]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace lithic fragments of gray quartzite; reaction to acid: none	trace iron oxide (hematite) staining and on biotite	subangular to subrounded chips up to 1.2 cm
300 - 310	91.4 - 94.5	Gray Unit; red [2.5YR5/6]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace pinkish white pumice fragments; trace lithic fragments of gray quartzite; reaction to acid: none	trace iron oxide (hematite) staining and on biotite	subangular to subrounded chips up to 1.2 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-04
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
310 - 320	94.5 - 97.5	Gray Unit; red [10R5/6]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace pinkish white pumice fragments; trace lithic fragments of gray quartzite; reaction to acid: none	trace iron oxide (hematite) staining and on biotite	subangular to subrounded chips up to 0.8 cm
320 - 330	97.5 - 100.6	Gray Unit; red [10R5/6]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace lithic fragments of gray quartzite; reaction to acid: none to weak	trace iron oxide (hematite) staining and on biotite; trace calcite on fracture surfaces	subangular to subrounded chips up to 0.8 cm
330 - 340	100.6 - 103.6	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace lithic fragments of gray quartzite; reaction to acid: none to weak	trace iron oxide (hematite) staining and on biotite; trace calcite crystals	subangular to subrounded chips up to 1.2 cm
340 - 350	103.6 - 106.7	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace lithic fragments of reddish brown quartzite; reaction to acid: none to weak	trace iron oxide (hematite) staining and on biotite; trace calcite crystals and on fracture surfaces	subangular to subrounded chips up to 0.8 cm
350 - 360	106.7 - 109.7	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace white pumice fragments; trace lithic fragments of gray quartzite; reaction to acid: none to weak	trace iron oxide (hematite) staining and on biotite; trace calcite crystals	subangular to subrounded chips up to 1.0 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-04
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
360 - 370	109.7 - 112.8	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear to smokey quartz, white feldspar, bronzy black biotite, trace magnetite; trace white pumice fragments; trace lithic fragments of gray quartzite; reaction to acid: none to weak	trace iron oxide (hematite) on biotite; very trace calcite chips	subangular to subrounded chips up to 1.0 cm
370 - 380	112.8 - 115.8	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear to smokey quartz, white feldspar, bronzy black biotite, trace magnetite; trace white pumice fragments; trace lithic fragments of gray quartzite; reaction to acid: none	very trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 1.0 cm
380 - 390	115.8 - 118.9	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear to smokey quartz, white feldspar, bronzy black biotite, trace magnetite; trace white pumice fragments; trace lithic fragments of gray quartzite; reaction to acid: none	very trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 1.0 cm
390 - 400	118.9 - 121.9	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear to smokey quartz, white feldspar, bronzy black biotite, trace magnetite; trace lithic fragments of gray quartzite; reaction to acid: none	very trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 1.0 cm
400 - 410	121.9 - 125.0	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear to smokey quartz, white feldspar, bronzy black biotite, trace magnetite; very trace lithic fragments of gray quartzite; reaction to acid: none		subangular to subrounded chips up to 1.0 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-04
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
410 - 420	125.0 - 128.0	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear to smokey quartz, white feldspar, bronzy black biotite, trace magnetite; very trace pinkish white pumice fragments; trace lithic fragments of gray quartzite; reaction to acid: none to weak	very trace calcite crystals	subangular to subrounded chips up to 0.8 cm
420 - 430	128.0 - 131.1	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear to smokey quartz, white feldspar, bronzy black biotite, trace magnetite; very trace pinkish white pumice fragments; trace lithic fragments of gray quartzite; reaction to acid: none to weak	trace iron oxide (hematite) staining and on biotite; very trace calcite crystals	subangular to subrounded chips up to 1.0 cm
430 - 440	131.1 - 134.1	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear to smokey quartz, white feldspar, bronzy black biotite, trace magnetite; very trace pinkish white pumice fragments; very trace lithic fragments of gray quartzite; reaction to acid: none	very trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 0.8 cm
440 - 450	134.1 - 137.2	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear to smokey quartz, white feldspar, bronzy black biotite, trace magnetite; very trace lithic fragments of brown sandstone; reaction to acid: none	very trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 0.8 cm
450 - 460	137.2 - 140.2	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear to smokey quartz, white feldspar, bronzy black biotite, trace magnetite; very trace pinkish white pumice fragments; very trace lithic fragments of gray quartzite; reaction to acid: none	very trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 2.0 cm; generally coarser chips

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
460 - 470	140.2 - 143.3	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear to smokey quartz, white feldspar, bronzy black biotite, trace magnetite; very trace lithic fragments of brown sandstone; reaction to acid: none	very trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 0.8 cm
470 - 480	143.3 - 146.3	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear to smokey quartz, white feldspar, bronzy black biotite, trace magnetite; very trace pinkish white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 1.2 cm
480 - 490	146.3 - 149.4	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear to smokey quartz, white feldspar, bronzy black biotite, trace magnetite; very trace lithic fragments of gray quartzite; reaction to acid: none	trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 1.0 cm
490 - 500	149.4 - 152.4	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown to grayish pink aphanitic groundmass and 50% phenocrysts (<3mm) of clear to smokey quartz, white feldspar, bronzy black biotite, trace magnetite; very trace lithic fragments of gray quartzite; reaction to acid: none	trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 1.0 cm
500 - 510	152.4 - 155.4	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown to grayish pink aphanitic groundmass and 50% phenocrysts (<3mm) of clear to smokey quartz, white feldspar, bronzy black biotite, trace magnetite; very trace lithic fragments of gray quartzite; reaction to acid: none to weak	trace iron oxide (hematite) on biotite; trace calcite on fracture surfaces	subangular to subrounded chips up to 0.8 cm
510 - 520	155.4 - 158.5	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace lithic fragments of gray quartzite; reaction to acid: none to weak	trace iron oxide (hematite) on biotite; trace calcite on fracture surfaces	subangular to subrounded chips up to 1.0 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-04
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
520 - 530	158.5 - 161.5	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace pinkish white pumice fragments; very trace lithic fragments of gray quartzite; reaction to acid: none	trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 2.0 cm
530 - 540	161.5 - 164.6	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; reaction to acid: none	trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 1.0 cm
540 - 550	164.6 - 167.6	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace lithic fragments of black to dark gray quartzite; reaction to acid: none	trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 0.8 cm
550 - 560	167.6 - 170.7	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace lithic fragments of black to dark gray quartzite; reaction to acid: none	trace iron oxide (hematite) on biotite	subangular to subrounded chips up to 0.8 cm
560 - 570	170.7 - 173.7	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace lithic fragments of black to dark gray quartzite; reaction to acid: none		subangular to subrounded chips up to 1.0 cm
570 - 580	173.7 - 176.8	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; reaction to acid: none to weak	trace calcite on fracture surfaces	subangular to subrounded chips up to 0.8 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-04
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Gray Unit (Talg)				
580 - 590	176.8 - 179.8	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; reaction to acid: none		subangular to subrounded chips up to 0.5 cm
590 - 600	179.8 - 182.9	Gray Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; reaction to acid: none to weak	trace calcite on fracture surfaces	subangular to subrounded chips up to 0.5 cm
600 - 610	182.9 - 185.9	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) staining on biotite	subangular to subrounded chips up to 1.0 cm
610 - 620	185.9 - 189.0	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; reaction to acid: none to weak	very trace iron oxide (hematite) staining on biotite; very trace calcite on fracture surfaces	subangular to subrounded chips up to 0.8 cm
620 - 630	189.0 - 192.0	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; reaction to acid: none to weak	very trace iron oxide (hematite) staining on biotite; trace calcite on fracture surfaces	subangular to subrounded chips up to 1.0 cm
630 - 640	192.0 - 195.1	Gray Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace lithic fragments of gray quartzite; reaction to acid: none to weak	very trace iron oxide (hematite) staining on biotite; trace calcite on fracture surfaces	subangular to subrounded chips up to 1.0 cm
APACHE LEAP TUFF - Brown Unit (Talb)				
640 - 650	195.1 - 198.1	Brown Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; reaction to acid: none	trace milky white soft flaky mineral (not calcite)	subangular to subrounded chips up to 1.0 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-04
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
650 - 660	198.1 - 201.2	Brown Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; reaction to acid: none	abundant milky white soft flaky mineral (not calcite)	subangular to subrounded chips up to 0.5 cm
660 - 670	201.2 - 204.2	Brown Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace flattened white pumice fragments; reaction to acid: none	trace iron oxide (hematite) on biotite; trace milky white soft flaky mineral (not calcite)	subangular to subrounded chips up to 1.8 cm
670 - 680	204.2 - 207.3	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace flattened white pumice fragments; reaction to acid: none	trace iron oxide (hematite) on biotite; very trace milky white soft flaky mineral (not calcite)	subangular to subrounded chips up to 2.0 cm
680 - 690	207.3 - 210.3	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace flattened white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) staining on biotite	subangular to subrounded chips up to 1.2 cm
690 - 700	210.3 - 213.4	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; reaction to acid: none to weak	very trace iron oxide (hematite) staining on biotite; trace calcite chips	subangular to subrounded chips up to 0.5 cm
700 - 710	213.4 - 216.4	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) staining	subangular to subrounded chips up to 1.0 cm

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Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
710 - 720	216.4 - 219.5	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace lithic fragments of purplish red quartzite; reaction to acid: none	very trace iron oxide (hematite) staining and on biotite	subangular to subrounded chips up to 1.0 cm
720 - 730	219.5 - 222.5	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 60% dark reddish-brown aphanitic groundmass and 40% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace white pumice fragments; reaction to acid: none	trace iron oxide (hematite) staining and on biotite	subangular to subrounded chips up to 1.0 cm
730 - 740	222.5 - 225.6	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 60% dark reddish-brown aphanitic groundmass and 40% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace white pumice fragments; trace lithic fragments of black diabase; reaction to acid: none	trace iron oxide (hematite) staining on lithics and on biotite	subangular to subrounded chips up to 1.0 cm
740 - 750	225.6 - 228.6	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 60% dark reddish-brown aphanitic groundmass and 40% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace white pumice fragments; trace lithic fragments of black diabase; reaction to acid: none	trace iron oxide (hematite) staining	subangular to subrounded chips up to 0.8 cm
750 - 760	228.6 - 231.6	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 60% dark reddish-brown aphanitic groundmass and 40% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none	trace iron oxide (hematite) staining	subangular to subrounded chips up to 1.2 cm
760 - 770	231.6 - 234.7	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 60% dark reddish-brown aphanitic groundmass and 40% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none	trace iron oxide (hematite) staining	subangular to subrounded chips up to 0.8 cm

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Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
770 - 780	234.7 - 237.7	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 60% dark reddish-brown aphanitic groundmass and 40% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace white pumice fragments; very trace lithic fragments of black diabase; reaction to acid: none	trace iron oxide (hematite) staining and on biotite	subangular to subrounded chips up to 0.8 cm
780 - 790	237.7 - 240.8	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 60% dark reddish-brown aphanitic groundmass and 40% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace white pumice fragments; very trace lithic fragments of black diabase; reaction to acid: none to weak	trace iron oxide (hematite) staining; very trace calcite chips	subangular to subrounded chips up to 1.6 cm
790 - 800	240.8 - 243.8	Brown Unit; weak red [10R5/3]; well lithified; crystal-rich dacite porphyry tuff with 60% dark reddish-brown aphanitic groundmass and 40% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none to moderate	very trace iron oxide (hematite) staining; abundant calcite chips and crystals on fracture surfaces	subangular to subrounded chips up to 1.2 cm
800 - 810	243.8 - 246.9	Brown Unit; red [10R4/6]; well lithified; crystal-rich dacite porphyry tuff with 60% dark reddish-brown aphanitic groundmass and 40% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none to weak	very trace iron oxide (hematite) staining; trace calcite chips and crystals on fracture surfaces	subangular to subrounded chips up to 0.8 cm
810 - 820	246.9 - 249.9	Brown Unit; red [10R4/6]; well lithified; crystal-rich dacite porphyry tuff with 60% dark reddish-brown aphanitic groundmass and 40% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) staining and on biotite	subangular to subrounded chips up to 2.0 cm
820 - 830	249.9 - 253.0	Brown Unit; red [10R4/6]; well lithified; crystal-rich dacite porphyry tuff with 60% dark reddish-brown aphanitic groundmass and 40% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) staining and on biotite	subangular to subrounded chips up to 1.8 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-04
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
830 - 840	253.0 - 256.0	Brown Unit; red [10R4/6]; well lithified; crystal-rich dacite porphyry tuff with 60% dark reddish-brown aphanitic groundmass and 40% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace white pumice fragments; reaction to acid: none to weak	very trace iron oxide (hematite) staining; trace calcite chips and crystals on fracture surfaces	subangular to subrounded chips up to 1.0 cm
840 - 850	256.0 - 259.1	Brown Unit; red [10R4/6]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace white pumice fragments; reaction to acid: none to weak	trace calcite chips	subangular to subrounded chips up to 0.5 cm; mostly sand sized chips
850 - 860	259.1 - 262.1	Brown Unit; red [10R4/6]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace white pumice fragments; reaction to acid: none		subangular to subrounded chips up to 0.5 cm; mostly sand sized chips
860 - 870	262.1 - 265.2	Brown Unit; red [10R4/6]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none		subangular to subrounded chips up to 0.5 cm; mostly sand sized chips
870 - 880	265.2 - 268.2	Brown Unit; red [10R4/6]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none to weak	trace iron oxide (hematite) on biotite; trace calcite crystals	subangular to subrounded chips up to 0.5 cm; mostly sand sized chips
880 - 890	268.2 - 271.3	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace white pumice fragments; reaction to acid: none		subangular to subrounded chips up to 0.3 cm; mostly sand sized chips

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-04
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
890 - 900	271.3 - 274.3	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none		subangular to subrounded chips up to 0.5 cm; mostly sand sized chips
900 - 910	274.3 - 277.4	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none		subangular to subrounded chips up to 0.3 cm; mostly sand sized chips
910 - 920	277.4 - 280.4	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none		subangular to subrounded chips up to 0.3 cm; mostly sand sized chips
920 - 930	280.4 - 283.5	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none		subangular to subrounded chips up to 0.3 cm; mostly sand sized chips
930 - 940	283.5 - 286.5	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none		subangular to subrounded chips up to 0.5 cm; mostly sand sized chips
940 - 950	286.5 - 289.6	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none	trace iron oxide (hematite) staining	subangular to subrounded chips up to 0.5 cm; mostly sand sized chips

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-04
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
950 - 960	289.6 - 292.6	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace white pumice fragments; reaction to acid: none	trace iron oxide (hematite) staining	subangular to subrounded chips up to 0.5 cm; mostly sand sized chips
960 - 970	292.6 - 295.7	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace pinkish white pumice fragments; reaction to acid: none		subangular to subrounded chips up to 0.5 cm; mostly sand sized chips
970 - 980	295.7 - 298.7	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; reaction to acid: none		subangular to angular chips up to 1.0 cm
980 - 990	298.7 - 301.8	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; reaction to acid: none to weak	very trace calcite crystals	subangular to angular chips up to 1.0 cm
990 - 1,000	301.8 - 304.8	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; reaction to acid: none	very trace iron oxide (hematite) staining	subangular to subrounded chips up to 0.3 cm; mostly sand sized chips
1,000 - 1,010	304.8 - 307.8	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 50% reddish-brown aphanitic groundmass and 50% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; trace pinkish white pumice fragments; reaction to acid: none to weak	very trace iron oxide (hematite) staining; trace calcite crystals	subangular to angular chips up to 1.6 cm; much coarser chips

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-04
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
1,010 - 1,020	307.8 - 310.9	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic to glassy groundmass and 40% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace pinkish white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) staining; trace calcite chips	subangular to angular chips up to 1.2 cm
1,020 - 1,030	310.9 - 313.9	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic to glassy groundmass and 40% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace pinkish white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) staining	subangular to angular chips up to 1.2 cm
1,030 - 1,040	313.9 - 317.0	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic to glassy groundmass and 40% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace pinkish white pumice fragments; reaction to acid: none	very trace iron oxide (hematite) staining	subangular to angular chips up to 1.2 cm
1,040 - 1,050	317.0 - 320.0	Brown Unit; weak red [10R4/3]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic to glassy groundmass and 40% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace pinkish white pumice fragments; reaction to acid: none		subangular to subrounded chips up to 0.3 cm; mostly sand sized chips
1,050 - 1,060	320.0 - 323.1	Brown Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 60% reddish-brown aphanitic to glassy groundmass and 40% phenocrysts (<3mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; very trace pinkish white pumice fragments; reaction to acid: none	trace iron oxide (hematite) staining	subangular to subrounded chips up to 0.5 cm
1,060 - 1,070	323.1 - 326.1	Brown Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 70% reddish-brown aphanitic to glassy groundmass and 30% phenocrysts (<2mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; reaction to acid: none	trace iron oxide (hematite) staining	subangular to subrounded chips up to 1.0 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-04
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
APACHE LEAP TUFF - Brown Unit (Talb)				
1,070 - 1,080	326.1 - 329.2	Brown Unit; weak red [10R5/4]; well lithified; crystal-rich dacite porphyry tuff with 70% reddish-brown aphanitic to glassy groundmass and 30% phenocrysts (<2mm) of clear quartz, white feldspar, bronzy black biotite, trace magnetite; reaction to acid: none to weak	trace iron oxide (hematite) staining; trace calcite chips	subangular to subrounded chips up to 1.0 cm
1,080 - 1,090	329.2 - 332.2	Brown Unit; red [2.5YR5/6]; well lithified; crystal-rich dacite porphyry tuff with 70% reddish-brown aphanitic to glassy groundmass and 30% phenocrysts (<2mm) of clear quartz, white feldspar, bronzy black biotite, very trace magnetite; reaction to acid: none to weak	trace iron oxide (hematite) staining; very trace calcite crystals	subangular chips up to 0.5 cm
APACHE LEAP TUFF - Vitrophyre (Talv)				
1,090 - 1,100	332.2 - 335.3	Vitrophyre; black [5Y2.5/1]; well lithified; vitrophyre with 90% black glassy groundmass and 10% phenocrysts of biotite, feldspar, quartz and amphibole; reaction to acid: none to weak	trace calcite chips; trace vein quartz chips	subangular chips up to 1.0 cm
1,100 - 1,110	335.3 - 338.3	Vitrophyre; black [5Y2.5/1]; well lithified; vitrophyre with 90% black glassy groundmass and 10% phenocrysts of biotite, feldspar, quartz and amphibole; reaction to acid: none to weak	trace calcite chips; trace vein quartz chips	subangular chips up to 1.0 cm
1,110 - 1,120	338.3 - 341.4	Vitrophyre; very dusky red [10R2.5/2]; well lithified; vitrophyre with 90% black to reddish brown glassy groundmass and 10% phenocrysts of biotite, feldspar, quartz and amphibole; reaction to acid: none to weak	trace calcite chips; trace vein quartz chips	subangular chips up to 1.0 cm
APACHE LEAP TUFF - Basal tuff (Talbt)				
1,120 - 1,125	341.4 - 342.9	Basal tuff Unit; pink [5YR7/3]; well lithified; crystal-rich dacite porphyry tuff with 70% pink to light brown aphanitic groundmass and 30% phenocrysts (<2mm) of black biotite, white feldspar, opaque quartz, very trace magnetite; reaction to acid: none		subangular chips up to 0.8 cm
WHITETAIL CONGLOMERATE - Channel Fill Unit (Tw1)				
1,125 - 1,130	342.9 - 344.4	Clast-supported conglomerate; red [2.5YR4/8]; weakly lithified; silty gravelly sand; 30% red sandstone matrix chips; 70% clasts of limestone, diabase, sandstone, quartzite; reaction to acid: strong	trace iron oxide staining; calcite veinlets in some conglomerate clasts	subangular chips up to 2.0 cm

LITHOLOGIC DESCRIPTION OF DRILL CUTTINGS FROM HYDROGEOLOGIC TEST WELL PHRES-04
Resolution Copper Mining
Pinal County, Arizona

DEPTH INTERVAL (feet)	DEPTH INTERVAL (meters)	GENERAL DESCRIPTION	SECONDARY FEATURES	COMMENTS
WHITETAIL CONGLOMERATE - Channel Fill Unit (Tw1)				
1,130 - 1,140	344.4 - 347.5	Clast-supported conglomerate; red [2.5YR4/8]; weakly lithified; silty gravelly sand; 30% red sandstone matrix chips; 70% clasts of limestone, diabase, sandstone, quartzite; reaction to acid: strong	trace iron oxide staining; calcite veinlets in some conglomerate clasts	subangular chips up to 2.0 cm
1,140 - 1,145	347.5 - 349.0	Clast-supported conglomerate; red [2.5YR4/8]; weakly lithified; silty gravelly sand; 30% red sandstone matrix chips; 70% clasts of limestone, diabase, sandstone, quartzite; reaction to acid: strong	trace iron oxide staining; calcite veinlets in some conglomerate clasts	subangular chips up to 2.0 cm

Date	Hole #	Reporter	Daily Safety	Shift Change Depth (m)	Shift Change Depth (ft)	Progress in last 24 Hrs (m)	Progress in last 24 Hrs (ft)	Comments	Hole Type/Size	Hydro Data	Geology
21-Mar	PHRES-1	E. Jung	Conducted RCM/Hydrology site induction and orientation for crews of new drilling contractor on site.	0.00	0.00	0.00	0.00	Conducted RCM/Hydrology site induction and orientation. Crews toured West Plant and East Plant laydown yards and drill sites. Mobilization to site continued thereafter. Complete site set up and final inspections are scheduled for mid to late morning tomorrow.	Mobilization	N/A	N/A
22-Mar	PHRES-1	E. Jung	Pre-drill site and rig inspections conducted by RCM representative, Peeks Performance, and Mercanti Electric. No major issues were found. Minor issues were corrected immediately. Talked to the crew about the emergency response plan, and communications. Also discussed site inductions for visitors.	0.00	0.00	0.00	0.00	Site and rig inspections were completed at 1400hrs. Crew is assembling the starter assembly and obtaining water. Anticipate drilling to commence ~ 1700hrs.	12" Hammer RC Air w/ water injection.	N/A	N/A
23-Mar	PHRES-1	E. Jung	Discussed the importance of Take Five risk assessments. Talked again about the emergency response plan, available communication from site, and site inductions for visitors.	12.19	40.00	12.19	40.00	Drilled to 6.01m and installed 8-5/8" surface casing. Waited on cement cure for 12hrs. Resumed drilling at 1000hrs with 6" hammer bit. Drilled to 12.2m - began loosing air to surface near the rig while drilling. Pulled surface casing and reamed to 12.2m with 12" bit. Currently installing 8-5/8" casing to 12.2m.	12" Hammer RC Air w/ water injection.	N/A	Apache Leap Tuff (Tal)
24-Mar	PHRES-1	E. Jung	Discussed MSHA's 13 rules to live by. Helper shared three Take Five's completed.	24.38	80.00	12.19	40.00	Installed surface casing to 12.2m. On standby for 12hr cement cure. Hydrogeologic contractor presented concerns that near surface water that was encountered while drilling may contaminate well. The decision was made to evacuate the hole and take water level and recovery readings for 2hrs. No change in 2hrs will determine confidence of surface seal, and to continue drilling 6" well bore with the current 12.2m of casing. If significant change in water level, surface casing will be removed and re-installed to 18.29m or more. Currently monitoring water level/recovery.	6" Hammer RC Air w/ water injection.	Hole produced water between 6.01m and 24.38m. No production data obtained.	Apache Leap Tuff (Tal)

25-Mar	PHRES-1	A.Jergenson	M&A held safety meeting on no go areas onsite. Completed site inductions with four RCM representatives.	164.59	540.00	140.21	460.00	Drilled down to 146m, making good progress. Tripped back to clean up a bridge at 85m, blew air up the backside to clear out plugged zone. Tripped back down and commenced drilling down to 164m. Bit plugged up with cuttings, tripped out of the hole. Currently working on cleaning out tooling. Anticipate drilling to start late this afternoon.	6" Hammer RC Air w/ water injection.	Started making minimal water at 79m bls. Took a water level reading after the crew's completed tripping out of the hole, water level was 74m bls.	Apache Leap Tuff (Tal)
26-Mar	PHRES-1	D. Stalling	M&A and crews carefully discussed current plans to solve drilling issue and discussed the importance of Take 5 during the process.	249.94	820.00	85.34	280.00	Penetration rate has decreased to 1.5hrs/rod which is thought to be the result of a hammer problem. Crew has begun trip out for a hammer exchange. Anticipate drilling to resume late tonight.	6" Hammer RC Air w/ water injection.	Water production decreased from up to 10gpm to <5gpm.	Apache Leap Tuff (Tal)
27-Mar	PHRES-1	E. Jung	Discussed pre-task and pre-shift risk assessments. Helper completed several Take Five risk assessments on various tasks.	270.36	887.00	20.42	67.00	Tripped for new hammer and resumed drilling with similar penetration rate. Penetration rate increased to 150min/rod between 262.12 and 268.21m. Drill crew determined that the hammer was watered out. Tripped for tricone bit. Penetration rate increased significantly with tricone to a 12hr/rod equivalent. Crew is currently tripping out to inspect drill string connections and BHA to determine cause and solution to slow penetration.	5-7/8" Tricone Flooded Reverse	Water production increased from 4 to 6gpm.	Apache Leap Tuff (Tal) Brown unit.
28-Mar	PHRES-1	E. Jung	Crew is on standby.	271.88	892.00	1.52	5.00	Tripped out tricone and found it badly damaged after 8hrs drilling. Tripped in new tricone and drilled for one hour with similarly poor penetration rate. Tripped out and found bit to be badly damaged. Tripped in hammer assembly while sealed bearing tricone bit(s) could be procured. Drilled from 271.26 - 271.87m. Twisted off at quill at 0300hrs. Currently procuring replacement tooling. Crew is on standby.	6" Hammer RC Air w/ water injection.	N/A	Apache Leap Tuff (Tal)

29-Mar	PHRES-1	E. Jung	Discussed fatigue and maintaining awareness during multiple round trips. Driller talked about avoiding complacency.	277.37	910.00	5.49	18.00	Crew on standby until night shift (1900hrs). Tripped out hammer assembly and switched to 5-5/8" tricone, drilling without the quill (still being re-machined). Drilled 0.61m in 4hrs. Tripped out tricone. It was discovered that there is a design flaw in the lift sub being used, and fluids had not been able to circulate through the bit and remove cuttings. Removed lift sub, tripped in, and resumed drilling at ~1145hrs with ~2hrs/rod penetration rate. Currently drilling.	5-5/8" Tricone Flooded Reverse	Water production is 18-20gpm.	Apache Leap Tuff (Tal)
30-Mar	PHRES-1	E. Jung	Discussed pre-shift safety meetings. Talked about hand placement and avoiding pinch points.	313.94	1030.00	36.58	120.00	Penetration rate has decreased to 4hrs/rod. Anticipate TD to be reached at ~0800hrs tomorrow at current rate - out of hole, ready for geophysics at ~1130hrs. Currently drilling.	5-5/8" Tricone Flooded Reverse	Water production is 16-18gpm	Apache Leap Tuff (Tal)
31-Mar	PHRES-1 PHRES-2	E. Jung	Discussed the hazards of acetylene gas, and proper handling/storage procedures. Talked about pre-shift safety meetings.	353.57	1160.00	39.62	130.00	TD hole at 1045hrs, 353.57m. Tripped out and mobilized rig off site. Welded monument to surface casing and locked. Mobilized to PHRES-2. Inspections by Peeks Performance, Mercanti Electric, and RCM representative were completed at 1845hrs today. Minor issues were taken care of immediately. Drilling for surface casing to commence late this evening on PHRES-2 with 12" air hammer. Geophysics are scheduled for tomorrow, 0700hrs on PHRES-1.	5-5/8" Open Hole / Mobilization	Water production held at 16-18gpm to TD.	**Contact with (Tal) vitrophyre at 335.26m. Contact with (Tal) basal tuff unit at 342.88m. Contact with Whitetail Conglomerate (Tw) at 347.46m.**
1-Apr	PHRES-2	D. Stalling	Crew not onsite, currently on stand-by until cement has set up.	18.29	60.00	18.29	60.00	Drilled surface casing down to ~18m utilizing a 10-1/2 hammer, and then reamed out hole with a 12-1/4" tricone. Installed and cemented up 8-5/8" casing. Currently on stand-by until cement has set up. Anticipate drilling this evening. Geophysical Logging commenced this 0730hrs, anticipate completion later this evening.	10-1/2" Hammer - Reamed with 12-1/4" Tri-Cone	N/A	Tal
2-Apr	PHRES-2	D. Stalling	Crew and M&A personnel discussed cautionary areas on site due to mobile equipment or poor vision. A spotter will be used to help prevent these possibilities.	195.07	640.00	176.78	580.00	Set surface casing successfully. Currently drilling with great progress. Penetration rate between 15-20 minutes per rod. Geophysics completed successfully with excellent results and data collected for PHRES-1.	5-5/8" Tricone Flooded Reverse	Producing <1gpm	Tal

3-Apr	PHRES-2	E. Jung	Conducted a risk assessment with both drillers on use of the auxiliary air compressor. Discussed the hazards of diesel fuel stored on mobile equipment, and shared an MSHA fatalgram involving collision and resultant diesel fueled fire.	284.07	932.00	89.00	292.00	Hammer watered out at ~280.4m. Crew mobilized auxiliary air compressor to site and set up. Drilled 2.44m in one hour with significant blow-by fluid discharge. The decision was made to trip for tricone bit, due to concerns about the potential over time for fluids on the drill pad breaching the containment berm. Initial penetration rate with tricone is ~1-3/4hrs per rod. Currently drilling.	6-1/8" Tricone Flooded Reverse	Water production increased to 45-50gpm at 280.4m.	Apache Leap Tuff (Tal)
4-Apr	PHRES-2	E. Jung	Discussed fitness for work and maintaining focus before days off.	313.94	1030.00	29.87	98.00	Drilling with a 3-4hr penetration rate. Crew was on standby ~2hrs at midnight while vac truck contractor caught up with increase (double) in water production overnight. Shut down 2-1/2hrs for rig repairs at 0800hrs. Currently drilling.	6-1/8" Tricone Flooded Reverse	Water production increased to ~85-95gpm last night, and increased to ~130gpm this afternoon.	Apache Leap Tuff (Tal)
5-Apr	PHRES-2	E. Jung	Discusses risk assessments, site inductions, and wellhead security. Conducted pre-drill inspections on PHRES-3.	334.37	1097.00	20.42	67.00	Reached TD at 0440hrs. Tripped out and mobilized rig and equipment to PHRES-3 drill site. Site inspections were conducted by Peeks Performance, Mercanti Electric, and an RCM representative by 1730hrs. Minor issues were taken care of immediately. Currently cleaning up PHRES-2 drill site. Plan to drill for surface casing this evening. Once surface casing is set and cemented tonight, crews will be on days off until Tuesday morning.	Mobilization	Flow rate at TD was ~65gpm.	N/A
6-Apr	PHRES-3	E. Jung	Crews are on days off.	12.19	40.00	12.19	40.00	Drilled for surface seal to 12.19m. Bit used was 10-1/2" hammer, with extension tabs welded to the outside circumference. Largest measured distance, tab to tab, and thus diameter of drill hole, is 11-15/16". Set and cemented 12.91m of surface casing. Crew left site at 2230hrs on days off. Drilling will resume on Tuesday, 4/12. Geophysical logging was conducted on PHRES-2 from 0700hrs to 1230hrs. All tools were run successfully.	8-5/8" Surface Casing	N/A	Apache Leap Tuff (Tal)
7-Apr	PHRES-3	E. Jung	Crews are on days off.	12.19	40.00	0.00	0.00	Crews are on days off.	8-5/8" Surface Casing	N/A	Apache Leap Tuff (Tal)
8-Apr	PHRES-3	J.Kent	Crews are on days off.	12.19	40.00	0.00	0.00	Crews are on days off.	8-5/8" Surface Casing	N/A	Apache Leap Tuff (Tal)
9-Apr	PHRES-3	D. Stalling	Crews are on days off.	12.19	40.00	0.00	0.00	Crews are on days off.	8-5/8" Surface Casing	N/A	Apache Leap Tuff (Tal)
10-Apr	PHRES-3	E. Jung	Crews are on days off.	12.19	40.00	0.00	0.00	Crews are on days off.	8-5/8" Surface Casing	N/A	Apache Leap Tuff (Tal)
11-Apr	PHRES-3	E. Jung	Crews are on days off.	12.19	40.00	0.00	0.00	Crews are on days off.	8-5/8" Surface Casing	N/A	Apache Leap Tuff (Tal)

12-Apr	PHRES-3	E. Jung	Discussed pre-shift inspections of equipment and work area. Talked about the emergency response plan, and site inductions for visitors.	36.58	120.00	24.38	80.00	Crews returned from days off at 0630hrs this morning. Conducted maintenance on equipment, rigged up to drill with 6-1/4" hammer bit, and resumed drilling at ~1230hrs. Currently drilling 9min/rod.	8-5/8" Surface Casing	N/A	Apache Leap Tuff (Tal)
13-Apr	PHRES-3	E. Jung	Discussed a recent safety alert involving line-of-fire, pinch points, and risk assessments. RCM safety representative inspected site – minor issues were taken care of immediately.	225.55	740.00	188.98	620.00	Drilled with great progress until high water production was encountered, and the hammer watered out. Tripped for tricone bit. Changed packing in head while catching up on fluid management. Resumed drilling ~1630hrs.	6-1/4" Hammer RC - switch to 6-1/8" Tricone Flooded Reverse	Water was encountered at ~82m. Water production was <1gpm until ~224m, where it spiked to 40gpm, and increased to ~60gpm by 225.55m.	Apache Leap Tuff (Tal)
14-Apr	PHRES-3	E. Jung	Discussed warning signage on site, vehicles and driving, and storage of combustible materials.	239.27	785.00	13.72	45.00	Shut down for rig repairs for ~9hrs - procuring and replacing wash tube. Currently drilling with slow progress. Penetration rate is ~4-5hrs per rod. Pulling more vac truck resources to keep up with water production (3600gal/hr).	6-1/8" Tricone Flooded Reverse	Water production is ~58gpm	Apache Leap Tuff (Tal)
15-Apr	PHRES-3	J.Kent	M&A held safety meeting at shift change.	271.27	890.00	32.00	105.00	Drill crew's switched from drilling RC with a tri-cone to flooded reverse. By switching over to flooded reverse there will be a substantial decrease in fluids that need to be pumped off, as the crew's will re-circulate the water down the hole. Currently drilling making good progress.	6-1/8" Tricone Flooded Reverse	N/A	Apache Leap Tuff (Tal)
16-Apr	PHRES-3	D. Stalling	Cross-shift safety meeting led by M&A.	320.04	1050.00	48.77	160.00	Currently drilling with a penetration rate of 1.5hrs per rod. Anticipate the drilling to reach TD later this afternoon and begin site breakdown. Crews will mobilize equipment during daylight hours and mobilize the rig early tomorrow morning. Geophysics will be scheduled after the well has been completed.	6-1/8" Tricone Flooded Reverse	N/A	Apache Leap Tuff (Tal) vitrophyre contact at 313.9m.
17-Apr	PHRES-3 PHRES-4	E. Jung	RCM representative conducted pre-drill rig and site inspection. Driller discovered the need for a DC electrical repair. No other issues were found. Recommended enhancements to secondary containment under rig.	7.62	25.00	7.62	25.00	Reached TD of 331m at ~1600hrs on PHRES-3. Tripped out and mobilized to PHRES-4. Inspections were conducted on PHRES-4 this morning. Driller made DC electrical repair and drilling commenced at ~1000hrs. Electrical issue returned. Currently shut down - troubleshooting. When repairs are complete, crew plans to drill for and set 12.2m of surface casing, followed by a minimum 8hr cure on cement.	12-1/4" (Effective) Hammer RC Air	Static water level on PHRES-3 is ~83m bls.	PHRES-3: Contact with Whitetail Conglomerate (Tw) at 325m. PHRES-4: Apache Leap Tuff (Tal)

18-Apr	PHRES-4	E. Jung	Discussed safety issues related to the small drill pad and restricted access. Driller designated no-go areas around auxiliary compressor for all personnel not working for the drilling contractor. AM Inspections by Peeks Performance and Mercanti Electric found no major issues. Drilling contractor is procuring several small warning signs needed.	91.44	300.00	83.82	275.00	Set and cemented 12.2m of 8-5/8" surface casing by 1800hrs. 12hr cure on surface seal cement. Rig air compressor continues to have electrical problems - discontinued use. Mobilized auxiliary compressor on site and set up. Site inspections by Mercanti and Peeks were conducted at ~0800hrs and ~0930hrs. Currently drilling with a penetration rate of ~15min/rod.	6-1/4" Hammer RC Air w/ water injection.	N/A	Apache Leap Tuff (Tal)
19-Apr	PHRES-4	E. Jung	Crews have attached a few additional warning signs on flammables containers and storage. Talked about protection against the sun, and maintaining hydration. Discussed containment and clean-up of any leaks.	243.84	800.00	152.40	500.00	Drilling with penetration rate(s): Yesterday evening ~20min/rod, this morning ~1hr/rod, early this afternoon ~3hrs/rod. The decision was made to trip for a tricone bit at 243.84m and drill flooded reverse. Currently tripping out.	6-1/4" Hammer RC Air w/ water injection.	Water was encountered at 104m, producing <0.5gpm. Water production increased to 40gpm at 193m. Water production was 50gpm at 232m. Currently producing 60gpm.	Apache Leap Tuff (Tal)
20-Apr	PHRES-4	E. Jung	Driller talked about maintaining focus and not rushing tasks as the end of the drilling campaign draws near.	280.42	920.00	36.58	120.00	Tripped in with tricone bit. Initial ~3hrs/rod penetration rate has decreased to a current ~4hrs/rod. Currently drilling.	6-1/8" Tri-Cone Flooded Reverse	N/A	Apache Leap Tuff (Tal)
21-Apr	PHRES-4	E. Jung	Discussed the demobilization process. Driller talked about re-inspecting mobile equipment and loads before transition onto highway.	323.09	1060.00	42.67	140.00	Drilling with an average penetration rate of ~3hrs/rod. Anticipate reaching TD tonight. Currently drilling.	6-1/8" Tri-Cone Flooded Reverse	N/A	Apache Leap Tuff (Tal)
22-Apr	PHRES-4	D. Stalling	M&A held safety meeting at shift change.	349.00	1145.00	25.91	85.00	Drilling reached a TD of 349.0m. Crew is currently breaking down site. Geophysical logging is scheduled to take place this afternoon once rig has been mobilized off site.	6-1/8" Tri-Cone Flooded Reverse	N/A	**Apache Leap Tuff (Tal) contact with vitrophyre at 332.0m. Vitrophyre contact with Whitetail conglomerate at 343.0m.**
23-Apr	PHRES-4	D. Stalling	Demobilizing equipment. No cross shift safety meeting held.	349.00	1145.00	0.00	0.00	Geophysics were logged successfully by SWE. Crews are demobilizing equipment and dog house from site.	6-1/8" Tri-Cone Flooded Reverse	N/A	Whitetail Conglomerate (Tw)
24-Apr	PHRES-4	E. Jung	Crew is off site.	349.00	1145.00	0.00	0.00	Crew has demobilized from drill site. Drill rig and backhoe are staged by RES-9, and will return to Phoenix tomorrow. The drilling phase of the PHRES series holes is complete. Anticipate re-mobilization and completion of piezometer arrays on PHRES holes to occur in approximately 2 months.	N/A	N/A	N/A

HALLIBURTON

ERROL L. MONTGOMERY & ASSOCIATES

PHRES 1

Pinal County , Arizona

Cement Surface Casing

19-Aug-2011

Job Site Documents

HALLIBURTON

Cementing Job Summary

The Road to Excellence Starts with Safety

Sold To #: 356041	**Ship To #:** 2872966	**Quote #:**	**Sales Order #:** 8404814
Customer: ERROL L. MONTGOMERY & ASSOCIATES		**Customer Rep:**	
Well Name: PHRES	**Well #:** 1		**API/UWI #:**
Field:	**City (SAP):** SUPERIOR	**County/Parish:** Pinal	**State:** Arizona
Job Purpose: Cement Surface Casing			
Well Type: Development Well	**Job Type:** Cement Surface Casing		
Sales Person: KIDDOO, JUSTIN	**Srvc Supervisor:** DOBBS, GARY	**MBU ID Emp #:** 122012	

Job Personnel

HES Emp Name	Exp Hrs	Emp #	HES Emp Name	Exp Hrs	Emp #	HES Emp Name	Exp Hrs	Emp #
BRANDT, NICHOLAS Wayne	5	487947	DOBBS, GARY D	5	122012	ETCITTY, JERRY	5	227876
MARTIN, EHLER Dean	5	458474						

Equipment

HES Unit #	*Distance-1 way*	HES Unit #	*Distance-1 way*	HES Unit #	*Distance-1 way*	HES Unit #	*Distance-1 way*

Job Hours

Date	*On Location Hours*	Operating Hours	Date	*On Location Hours*	Operating Hours	Date	*On Location Hours*	Operating Hours
8/19/11	5	2						
TOTAL			*Total is the sum of each column separately*					

Job

Formation Name			
Formation Depth (MD)	**Top**		**Bottom**
Form Type		**BHST**	
Job depth MD	1100. ft	**Job Depth TVD**	1100. ft
Water Depth		**Wk Ht Above Floor**	
Perforation Depth (MD)	*From*		**To**

Job Times

	Date	Time	Time Zone
Called Out	18 - Aug - 2011	15:00	MST
On Location	19 - Aug - 2011	12:00	MST
Job Started	19 - Aug - 2011	15:23	MST
Job Completed	19 - Aug - 2011	16:11	MST
Departed Loc	19 - Aug - 2011	17:00	MST

Well Data

Description	New / Used	Max pressure psig	Size in	ID in	Weight lbm/ft	Thread	Grade	Top MD ft	Bottom MD ft	Top TVD ft	Bottom TVD ft
6" Open Hole				6.				.	1085.		
2 3/8" Tubing	Unknown		2.375	1.995	4.6			.	1085.		

Tools and Accessories

Type	Size	Qty	Make	Depth	Type	Size	Qty	Make	Depth	Type	Size	Qty	Make
Guide Shoe					Packer					Top Plug			
Float Shoe					Bridge Plug					Bottom Plug			
Float Collar					Retainer					SSR plug set			
Insert Float										Plug Container			
Stage Tool										Centralizers			

Miscellaneous Materials

Gelling Agt		Conc		Surfactant		Conc		Acid Type		Qty		*Conc*	%
Treatment Fld		Conc		*Inhibitor*		Conc		Sand Type		*Size*		*Qty*	

Fluid Data

Stage/Plug #: 1

Fluid #	Stage Type	Fluid Name	Qty	Qty uom	Mixing Density lbm/gal	Yield ft3/sk	Mix Fluid Gal/sk	Rate bbl/min	Total Mix Fluid Gal/sk

Stage/Plug #: 1

Fluid #	Stage Type	Fluid Name	Qty	Qty uom	Mixing Density uom	Yield uom	Mix Fluid uom	Rate uom	Total Mix Fluid uom

HALLIBURTON

Cementing Job Summary

Stage/Plug #: 1									
Fluid #	Stage Type	Fluid Name	Qty	Qty uom	Mixing Density lbm/gal	Yield ft3/sk	Mix Fluid Gal/sk	Rate bbl/min	Total Mix Fluid Gal/sk
1	CHEMICAL WASH	CHEMICAL WASH - SBM (21914)	10.00	bbl	8.4	.0	.0	5.0	
2	Fresh Water Spacer			bbl	8.33	.0	.0	5.0	
3	Specialized Pressure Grout	CMT - PREMIUM - CLASS G, 94 LB SK (100003685)	60	sacks	10.8	4.42	28.19	5.0	28.19
	94 lbm	CMT - PREMIUM - CLASS G REG OR TYPE V, BULK (100003685)							
	30 %	BENTONITE, BULK (100003682)							
	28.187 Gal	FRESH WATER							
4	Fresh Water Displacement			bbl	8.33	.0	.0	5.0	

Calculated Values		Pressures		Volumes					
Displacement	0	Shut In: Instant		Lost Returns		Cement Slurry		Pad	
Top Of Cement		5 Min		Cement Returns	0	Actual Displacement		Treatment	
Frac Gradient		15 Min		Spacers	35	Load and Breakdown		Total Job	

Rates							
Circulating	3	Mixing	3	Displacement	0	Avg. Job	3

Cement Left In Pipe	Amount	0 ft	Reason	Shoe Joint

Frac Ring # 1 @		ID		Frac ring # 2 @		ID		Frac Ring # 3 @		ID		Frac Ring # 4 @		ID	

The Information Stated Herein Is Correct	***Customer Representative Signature***

HALLIBURTON

Cementing Job Log

The Road to Excellence Starts with Safety

Sold To #: 356041	**Ship To #:** 2872966	**Quote #:**	**Sales Order #:** 8404814
Customer: ERROL L. MONTGOMERY & ASSOCIATES		**Customer Rep:**	
Well Name: PHRES	**Well #:** 1		**API/UWI #:**
Field:	**City (SAP):** SUPERIOR	**County/Parish:** Pinal	**State:** Arizona
Legal Description:			
Lat:		**Long:**	
Contractor:	**Rig/Platform Name/Num:**		
Job Purpose: Cement Surface Casing			**Ticket Amount:**
Well Type: Development Well	**Job Type:** Cement Surface Casing		
Sales Person: KIDDOO, JUSTIN	**Srvc Supervisor:** DOBBS, GARY		**MBU ID Emp #:** 122012

Activity Description	Date/Time	Cht #	Rate bbl/ min	Volume bbl		Pressure psig		Comments
				Stage	Total	Tubing	Casing	
Pre-Convoy Safety Meeting	08/18/2011 18:00							ALL HES EMPLOYEES
Unknown Event Number	08/18/2011 23:55							STOPED IN SHOWLOW AZ, AND CALLED FOR A MECHANIC TO FIX BREAKS ON PUMP TRUCK
Pre-Convoy Safety Meeting	08/19/2011 10:00							ALL HES EMPLOYEES
Arrive at Location from Service Center	08/19/2011 12:30							
Wait on Customer or Customer Sub-Contractor Equip	08/19/2011 12:35							WAIT ON CO. REP TO HOLD SAFTEY MEETING
Wait on Customer or Customer Sub-Contractor Equipm	08/19/2011 14:30							
Pre-Rig Up Safety Meeting	08/19/2011 14:35							ALL HES EMPLOYEES
Rig-Up Equipment	08/19/2011 14:45							RIG UP PUMP TRUCK, 1 BULK TRUCK, AND PICK-UP
Pre-Job Safety Meeting	08/19/2011 15:00							EVERYONE ON LOCATION
Start Job	08/19/2011 15:20							
Test Lines	08/19/2011 15:24					2000.0		
Circulate Well	08/19/2011 15:26		2	23		.0		TRY TO BREAK CIRCULATION, WELL WOULD CIRCULATE
Pump Spacer 1	08/19/2011 15:54		3	10		8.0		CHEM WASH, NO CIRCULATION
Pump Spacer 2	08/19/2011 15:57		3	2		84.0		WATER, GOOD CIRCULATION

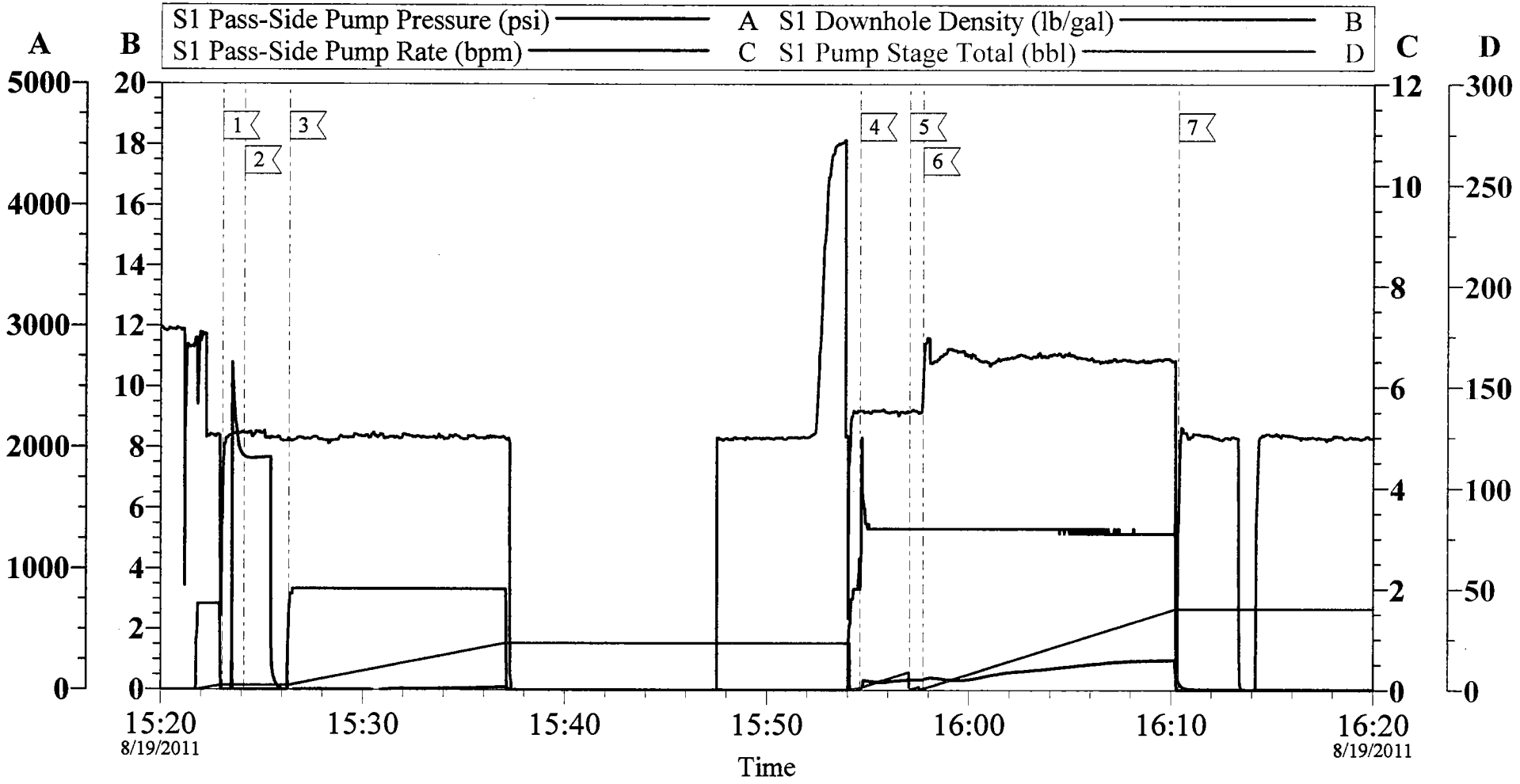
HALLIBURTON

Cementing Job Log

Activity Description	Date/Time	Cht #	Rate bbl/ min	Volume bbl		Pressure psig		Comments
				Stage	Total	Tubing	Casing	
Pump Cement	08/19/2011 15:58		3	47		87.0		MIX AND PUMP 60 SKS OF SPECIALIZED PRESSURE GROUT, MIXED @ 10.8#, 4.42 YEILD, 28.19 GPS FRESH WATER
End Job	08/19/2011 16:10							GOOD CIRCULATION, WHEN WE STOPED PUMPING CEMENT FELL BACK
Unknown Event Number	08/20/2011 16:20							RIG DOWN AND MOVE TO NEXT LOCATION

ERROL L. MONTGOMERY

PHRES #1 / 2 3/8



Local Event Log

	Intersection		SPPP		Intersection		SPPP		Intersection		SPPP
1	START JOB	15:23:04	-5.000	2	TEST LINES	15:24:08	1924	3	PUMP WATER	15:26:21	-5.000
4	PUMP SPACER 1	15:54:37	7.709	5	PUMP SPACER 2	15:57:05	84.92	6	PUMP CEMENT	15:57:44	87.54
7	END JOB	16:10:21	66.31								

Customer:	ERROL L. MONTGOMERY	Job Date:	19-Aug-2011	Sales Order #:	8404814
Well Description:	PHRES #1	Job Type:	2 3/8	ADC Used:	YES
Customer Rep:	HEATHER GLUSKI	Service Supervisor:	DONNY DOBBS	Operator/Pump:	JERRY ETCITTY

OptiCem v6.4.9
19-Aug-11 16:36

HALLIBURTON

ERROL L. MONTGOMERY & ASSOCIATES

PHRES 2

Pinal County , Arizona

Cement Surface Casing

19-Aug-2011

Job Site Documents

HALLIBURTON

Cementing Job Summary

The Road to Excellence Starts with Safety

Sold To #: 356041	**Ship To #:** 2872967	**Quote #:**	**Sales Order #:** 8404828
Customer: ERROL L. MONTGOMERY & ASSOCIATES		**Customer Rep:**	
Well Name: PHRES	**Well #:** 2		**API/UWI #:**
Field:	**City (SAP):** SUPERIOR	**County/Parish:** Pinal	**State:** Arizona
Job Purpose: Cement Surface Casing			
Well Type: Development Well	**Job Type:** Cement Surface Casing		
Sales Person: KIDDOO, JUSTIN	**Srvc Supervisor:** DOBBS, GARY	**MBU ID Emp #:** 122012	

Job Personnel

HES Emp Name	Exp Hrs	Emp #	HES Emp Name	Exp Hrs	Emp #	HES Emp Name	Exp Hrs	Emp #
BRANDT, NICHOLAS Wayne	2.5	487947	DOBBS, GARY D	2.5	122012	ETCITTY, JERRY	2.5	227876
MARTIN, EHLER Dean	2.5	458474						

Equipment

HES Unit #	*Distance-1 way*	HES Unit #	*Distance-1 way*	HES Unit #	*Distance-1 way*	HES Unit #	*Distance-1 way*

Job Hours

Date	*On Location Hours*	Operating Hours	Date	*On Location Hours*	Operating Hours	Date	*On Location Hours*	Operating Hours
8/19/11	2.5		2.5					
TOTAL			*Total is the sum of each column separately*					

Job

Formation Name			
Formation Depth (MD)	**Top**		**Bottom**
Form Type		**BHST**	
Job depth MD	1100. ft	**Job Depth TVD**	1100. ft
Water Depth		**Wk Ht Above Floor**	. ft
Perforation Depth (MD)	*From*		**To**

Job Times

	Date	Time	Time Zone
Called Out			
On Location	19 - Aug - 2011	17:00	MST
Job Started	19 - Aug - 2011	18:15	MST
Job Completed	19 - Aug - 2011	18:40	MST
Departed Loc	19 - Aug - 2011	19:30	MST

Well Data

Description	New / Used	Max pressure psig	Size in	ID in	Weight lbm/ft	Thread	Grade	Top MD ft	Bottom MD ft	Top TVD ft	Bottom TVD ft
6" Open Hole				6.				.	1100.		
2 3/8" Tubing	Unknown		2.375	1.995	4.6			.	1100.		

Tools and Accessories

Type	Size	Qty	Make	Depth	Type	Size	Qty	Make	Depth	Type	Size	Qty	Make
Guide Shoe					Packer					Top Plug			
Float Shoe					Bridge Plug					Bottom Plug			
Float Collar					Retainer					SSR plug set			
Insert Float										Plug Container			
Stage Tool										Centralizers			

Miscellaneous Materials

Gelling Agt		Conc		Surfactant		Conc		Acid Type		Qty		*Conc*	%
Treatment Fld		Conc		*Inhibitor*		Conc		Sand Type		*Size*		*Qty*	

Fluid Data

Stage/Plug #: 1

Fluid #	Stage Type	Fluid Name	Qty	Qty uom	Mixing Density lbm/gal	Yield ft3/sk	Mix Fluid Gal/sk	Rate bbl/min	Total Mix Fluid Gal/sk

Stage/Plug #: 1

Fluid #	Stage Type	Fluid Name	Qty	Qty uom	Mixing Density uom	Yield uom	Mix Fluid uom	Rate uom	Total Mix Fluid uom

HALLIBURTON

Cementing Job Summary

Stage/Plug #: 1									
Fluid #	Stage Type	Fluid Name	Qty	Qty uom	Mixing Density lbm/gal	Yield ft3/sk	Mix Fluid Gal/sk	Rate bbl/min	Total Mix Fluid Gal/sk
1	CHEMICAL WASH	CHEMICAL WASH - SBM (21914)	10.00	bbl	8.4	.0	.0	5.0	
2	Fresh Water Spacer			bbl	8.33	.0	.0	5.0	
3	Specialized Pressure Grout	CMT - PREMIUM - CLASS G, 94 LB SK (100003685)	55	sacks	10.8	4.42	28.19	5.0	28.19
	94 lbm	CMT - PREMIUM - CLASS G REG OR TYPE V, BULK (100003685)							
	30 %	BENTONITE, BULK (100003682)							
	28.187 Gal	FRESH WATER							
4	Fresh Water Displacement			bbl	8.33	.0	.0	5.0	

Calculated Values		Pressures		Volumes					
Displacement		Shut In: Instant		Lost Returns		*Cement Slurry*		Pad	
Top Of Cement		5 Min		Cement Returns		Actual Displacement		Treatment	
Frac Gradient		15 Min		Spacers		Load and Breakdown		Total Job	

Rates							
Circulating		*Mixing*		*Displacement*		Avg. Job	
Cement Left In Pipe	Amount *0 ft*	*Reason*	*Shoe Joint*				
Frac Ring # 1 @	*ID*	*Frac ring # 2 @*	*ID*	*Frac Ring # 3 @*	*ID*	*Frac Ring # 4 @*	*ID*

The Information Stated Herein Is Correct	***Customer Representative Signature***

HALLIBURTON

Cementing Job Log

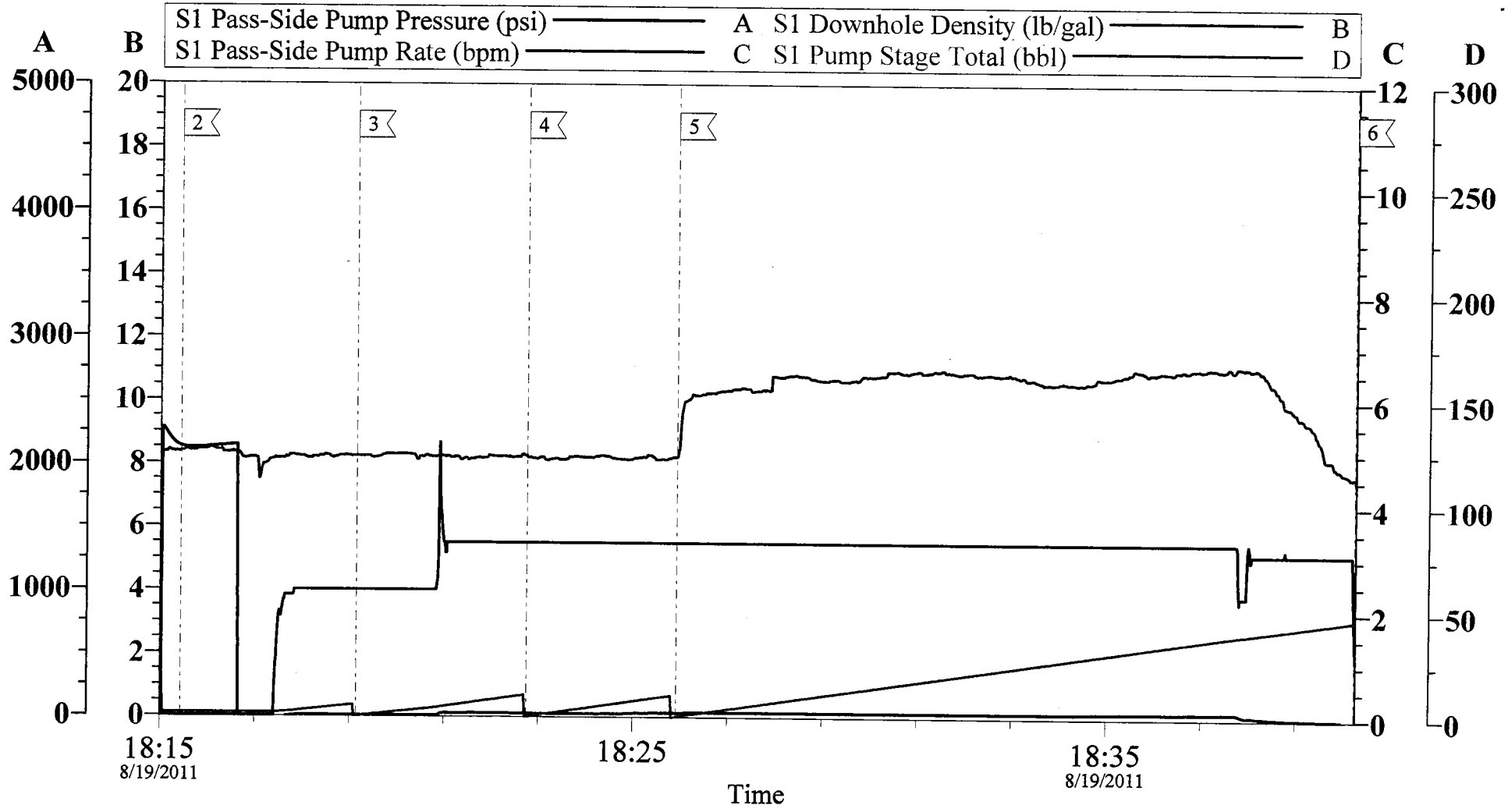
The Road to Excellence Starts with Safety

Sold To #: 356041	**Ship To #:** 2872967	**Quote #:**	**Sales Order #:** 8404828
Customer: ERROL L. MONTGOMERY & ASSOCIATES		**Customer Rep:**	
Well Name: PHRES	**Well #:** 2		**API/UWI #:**
Field:	**City (SAP):** SUPERIOR	**County/Parish:** Pinal	**State:** Arizona
Legal Description:			
Lat:		**Long:**	
Contractor:	**Rig/Platform Name/Num:**		
Job Purpose: Cement Surface Casing			**Ticket Amount:**
Well Type: Development Well	**Job Type:** Cement Surface Casing		
Sales Person: KIDDOO, JUSTIN	**Srvc Supervisor:** DOBBS, GARY		**MBU ID Emp #:** 122012

Activity Description	Date/Time	Cht #	Rate bbl/ min	Volume bbl		Pressure psig		Comments
				Stage	Total	Tubing	Casing	
Assessment Of Location Safety Meeting	08/19/2011 17:00							
Pre-Rig Up Safety Meeting	08/19/2011 17:05							
Rig-Up Equipment	08/19/2011 17:10							RIG UP PUMP TRUCK 1 BULK TRUCK & PICK-UP
Pre-Job Safety Meeting	08/19/2011 17:50							EVERYONE ON LOCATION
Start Job	08/19/2011 18:14							
Test Lines	08/19/2011 18:15					2000.0		
Pump Spacer 1	08/19/2011 18:19		3	10		6.0		CHEM WASH
Pump Spacer 2	08/19/2011 18:22		3	10		26.0		WATER
Pump Cement	08/19/2011 18:25		3	43		34.0		MIX AND PUMP 55 SKS OF SPECIALIZED GROUT MIXED @ 10.8#, 4.42 YEILD, 28.19 GPS FRESH WATER
End Job	08/19/2011 18:40							RELEACED FROM LOCATION UNTIL 8/20/11 @ 0630

ERROL L. MONTGOMERY

PHRES #2 / 2 3/8



Local Event Log

Intersection		SPPP	Intersection		SPPP	Intersection		SPPP
2 TEST LINES	18:15:26	2129	3 PUMP SPACER 1	18:19:09	6.000	4 PUMP SPACER 2	18:22:45	26.00
5 PUMP CEMENT	18:25:55	34.00	6 END JOB	18:40:15	-1.904			

Customer:	ERROL L. MONTGOMERY	Job Date:	19-Aug-2011	Sales Order #:	8404828
Well Description:	PHRES #2	Job Type:	2 3/8	ADC Used:	YES
Customer Rep:	HEATHER GLUSKI	Service Supervisor:	DONNY DOBBS	Operator/Pump:	JERRY ETCITTY

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19-Aug-11 18:53

HALLIBURTON

ERROL L. MONTGOMERY & ASSOCIATES

PHRES 3

Pinal County , Arizona

Cement Surface Casing

20-Aug-2011

Job Site Documents

HALLIBURTON

Cementing Job Summary

The Road to Excellence Starts with Safety

Sold To #: 356041	**Ship To #:** 2872968	**Quote #:**	**Sales Order #:** 8404845
Customer: ERROL L. MONTGOMERY & ASSOCIATES		**Customer Rep:**	
Well Name: PHRES	**Well #:** 3		**API/UWI #:**
Field:	**City (SAP):** SUPERIOR	**County/Parish:** Pinal	**State:** Arizona
Job Purpose: Cement Surface Casing			
Well Type: Development Well	**Job Type:** Cement Surface Casing		
Sales Person: KIDDOO, JUSTIN	**Srvc Supervisor:** DOBBS, GARY	**MBU ID Emp #:** 122012	

Job Personnel

HES Emp Name	Exp Hrs	Emp #	HES Emp Name	Exp Hrs	Emp #	HES Emp Name	Exp Hrs	Emp #
BRANDT, NICHOLAS Wayne	5	487947	DOBBS, GARY D	5	122012	ETCITTY, JERRY	5	227876
MARTIN, EHLER Dean	5	458474						

Equipment

HES Unit #	*Distance-1 way*	HES Unit #	*Distance-1 way*	HES Unit #	*Distance-1 way*	HES Unit #	*Distance-1 way*

Job Hours

Date	*On Location Hours*	Operating Hours	Date	*On Location Hours*	Operating Hours	Date	*On Location Hours*	Operating Hours
8/20/11	5	2.5						
TOTAL								

Total is the sum of each column separately

Job

Formation Name			
Formation Depth (MD)	**Top**		**Bottom**
Form Type		**BHST**	
Job depth MD	1145. ft	**Job Depth TVD**	1145. ft
Water Depth		**Wk Ht Above Floor**	
Perforation Depth (MD)	*From*		**To**

Job Times

	Date	Time	Time Zone
Called Out	20 - Aug - 2011	04:30	MST
On Location	20 - Aug - 2011	06:30	MST
Job Started	20 - Aug - 2011	10:17	MST
Job Completed	20 - Aug - 2011	10:47	MST
Departed Loc	20 - Aug - 2011	11:30	MST

Well Data

Description	New / Used	Max pressure psig	Size in	ID in	Weight lbm/ft	Thread	Grade	Top MD ft	Bottom MD ft	Top TVD ft	Bottom TVD ft
6" Open Hole				6.					1145.		
2 3/8" Tubing	Unknown		2.375	1.995	4.6			.	1145.		

Tools and Accessories

Type	Size	Qty	Make	Depth	Type	Size	Qty	Make	Depth	Type	Size	Qty	Make
Guide Shoe					Packer					Top Plug			
Float Shoe					Bridge Plug					Bottom Plug			
Float Collar					Retainer					SSR plug set			
Insert Float										Plug Container			
Stage Tool										Centralizers			

Miscellaneous Materials

Gelling Agt		**Conc**		**Surfactant**		**Conc**		**Acid Type**		**Qty**		*Conc*	%
Treatment Fld		**Conc**		*Inhibitor*		Conc		**Sand Type**		*Size*		*Qty*	

Fluid Data

Stage/Plug #: 1

Fluid #	Stage Type	Fluid Name	Qty	Qty uom	Mixing Density lbm/gal	Yield ft3/sk	Mix Fluid Gal/sk	Rate bbl/min	Total Mix Fluid Gal/sk

Stage/Plug #: 1

Fluid #	Stage Type	Fluid Name	Qty	Qty uom	Mixing Density uom	Yield uom	Mix Fluid uom	Rate uom	Total Mix Fluid uom

HALLIBURTON

Cementing Job Summary

Stage/Plug #: 1									
Fluid #	**Stage Type**	**Fluid Name**	**Qty**	**Qty uom**	**Mixing Density lbm/gal**	**Yield ft3/sk**	**Mix Fluid Gal/sk**	**Rate bbl/min**	**Total Mix Fluid Gal/sk**
1	CHEMICAL WASH	CHEMICAL WASH - SBM (21914)	10.00	bbl	8.4	.0	.0	5.0	
2	Fresh Water Spacer			bbl	8.33	.0	.0	5.0	
3	Specialized Pressure Grout	CMT - PREMIUM - CLASS G, 94 LB SK (100003685)	55	sacks	10.8	4.42	28.19	5.0	28.19
94 lbm		CMT - PREMIUM - CLASS G REG OR TYPE V, BULK (100003685)							
30 %		BENTONITE, BULK (100003682)							
28.187 Gal		FRESH WATER							
4	Fresh Water Displacement			bbl	8.33	.0	.0	5.0	

Calculated Values		Pressures		Volumes					
Displacement	0	Shut In: Instant		Lost Returns		*Cement Slurry*	43	Pad	
Top Of Cement		5 Min		Cement Returns	0	Actual Displacement		Treatment	
Frac Gradient		15 Min		Spacers	20	Load and Breakdown		Total Job	

Rates							
Circulating		*Mixing*		*Displacement*		Avg. Job	
Cement Left In Pipe	Amount *0 ft*	*Reason*	*Shoe Joint*				
Frac Ring # 1 @	*ID*	*Frac ring # 2 @*	*ID*	*Frac Ring # 3 @*	*ID*	*Frac Ring # 4 @*	*ID*

The Information Stated Herein Is Correct	***Customer Representative Signature***

HALLIBURTON

Cementing Job Log

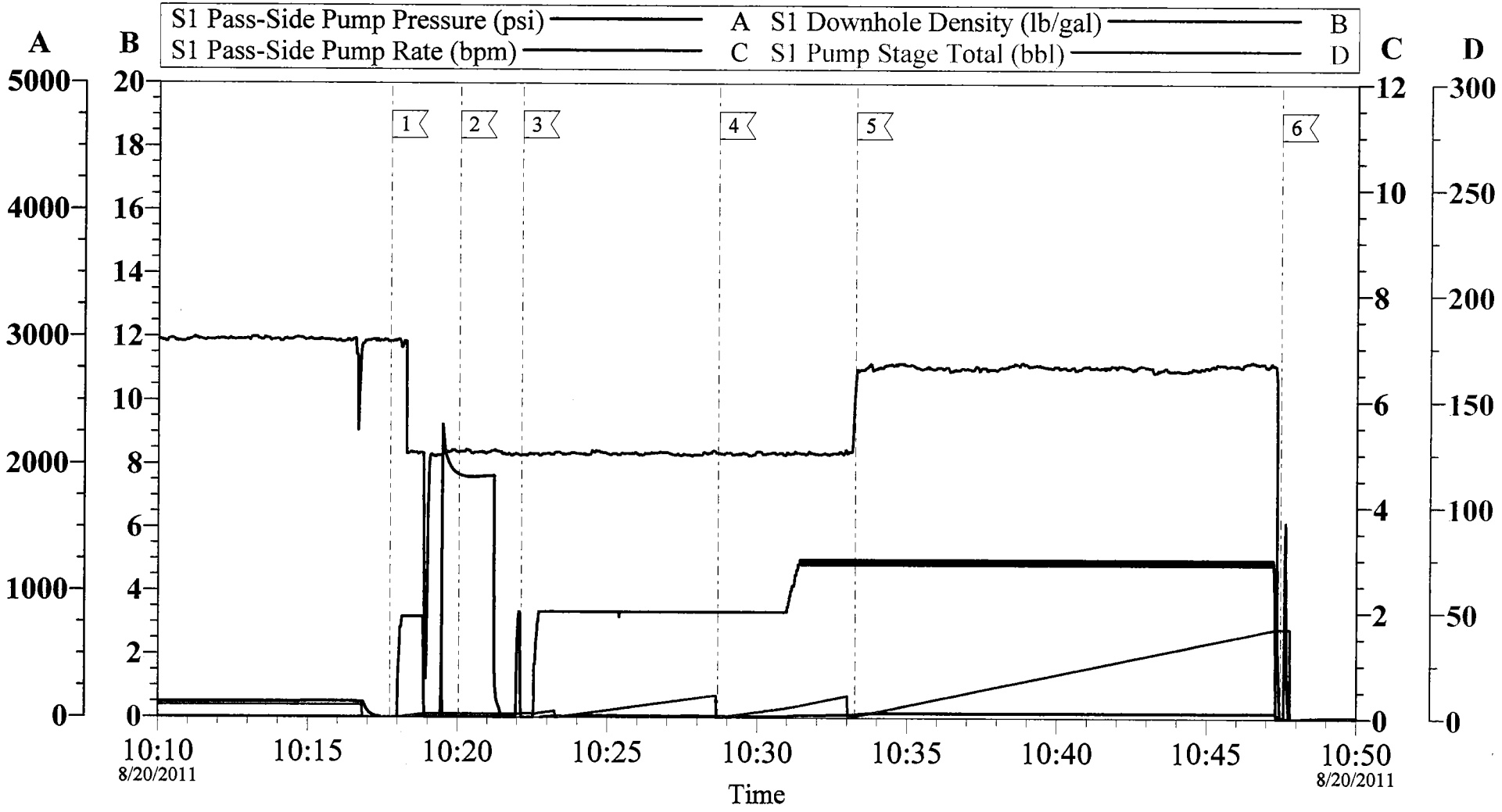
The Road to Excellence Starts with Safety

Sold To #: 356041	**Ship To #:** 2872968	**Quote #:**	**Sales Order #:** 8404845
Customer: ERROL L. MONTGOMERY & ASSOCIATES		**Customer Rep:**	
Well Name: PHRES	**Well #:** 3		**API/UWI #:**
Field:	**City (SAP):** SUPERIOR	**County/Parish:** Pinal	**State:** Arizona
Legal Description:			
Lat:		**Long:**	
Contractor:	**Rig/Platform Name/Num:**		
Job Purpose: Cement Surface Casing			**Ticket Amount:**
Well Type: Development Well	**Job Type:** Cement Surface Casing		
Sales Person: KIDDOO, JUSTIN	**Srvc Supervisor:** DOBBS, GARY		**MBU ID Emp #:** 122012

Activity Description	Date/Time	Cht #	Rate bbl/ min	Volume bbl		Pressure psig		Comments
				Stage	Total	Tubing	Casing	
Pre-Convoy Safety Meeting	08/20/2011 07:00							ALL HES EMPLOYEES
Arrive at Location from Service Center	08/20/2011 07:30							
Assessment Of Location Safety Meeting	08/20/2011 07:35							ALL HES EMPLOYEES
Wait on Customer or Customer Sub-Contractor Equip	08/20/2011 07:40							WAIT ON WATER TRUCKS TO ARRIVE ON LOCATION
Wait on Customer or Customer Sub-Contractor Equipm	08/20/2011 08:30							
Pre-Rig Up Safety Meeting	08/20/2011 08:30							ALL HES EMPLOYEES
Rig-Up Equipment	08/20/2011 09:15							RIG UP PUMP TRUCK, 1 BULK TRUCK, & PICK-UP
Pre-Job Safety Meeting	08/20/2011 10:00							
Start Job	08/20/2011 10:17							
Test Lines	08/20/2011 10:20					1900.0		
Pump Spacer 1	08/20/2011 10:22		3	10		10.0		CHEM WASH
Pump Spacer 2	08/20/2011 10:28		3	10		11.0		WATER
Pump Cement	08/20/2011 10:33		3	43		29.0		MIX AND PUMP 55 SKS OF SPECIALIZED GROUT MIXED @ 10.8#, 4.42 YEILD, 28.19 GPS FRESH WATER
End Job	08/20/2011 10:47							NO CIRCULATION ON JOB

ERROL L. MONTGOMERY

PHRES #3 / 2 3/8



Local Event Log

	Intersection		SPPP		Intersection		SPPP		Intersection		SPPP
1	START JOB	10:17:45	0.000	2	TEST LINES	10:20:03	1917	3	PUMP SPACER 1	10:22:08	-75.46
4	PUMP SPACER 2	10:28:41	11.00	5	PUMP CEMENT	10:33:16	29.18	6	END JOB	10:47:28	11.48

Customer:	ERROL L. MONTGOMERY	Job Date:	20-Aug-2011	Sales Order #:	8404845
Well Description:	PHRES #3	Job Type:	2 3/8	ADC Used:	YES
Customer Rep:	HEATHER GLUSKI	Service Supervisor:	DONNY DOBBS	Operator/Pump:	JERRY ETCITTY / 11223557

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20-Aug-11 10:56

HALLIBURTON

ERROL L. MONTGOMERY & ASSOCIATES

PHRES 4

Pinal County , Arizona

Cement Surface Casing

20-Aug-2011

Job Site Documents

HALLIBURTON

Cementing Job Summary

The Road to Excellence Starts with Safety

Sold To #: 356041	**Ship To #:** 2872969	**Quote #:**	**Sales Order #:** 8404854
Customer: ERROL L. MONTGOMERY & ASSOCIATES		**Customer Rep:**	
Well Name: PHRES	**Well #:** 4		**API/UWI #:**
Field:	**City (SAP):** SUPERIOR	**County/Parish:** Pinal	**State:** Arizona
Job Purpose: Cement Surface Casing			
Well Type: Development Well	**Job Type:** Cement Surface Casing		
Sales Person: KIDDOO, JUSTIN	**Srvc Supervisor:** DOBBS, GARY	**MBU ID Emp #:** 122012	

Job Personnel

HES Emp Name	Exp Hrs	Emp #	HES Emp Name	Exp Hrs	Emp #	HES Emp Name	Exp Hrs	Emp #
BRANDT, NICHOLAS Wayne	3	487947	DOBBS, GARY D	3	122012	ETCITTY, JERRY	3	227876
MARTIN, EHLER Dean	3	458474						

Equipment

HES Unit #	*Distance-1 way*	HES Unit #	*Distance-1 way*	HES Unit #	*Distance-1 way*	HES Unit #	*Distance-1 way*

Job Hours

Date	*On Location Hours*	Operating Hours	Date	*On Location Hours*	Operating Hours	Date	*On Location Hours*	Operating Hours
8/20/11	3	3						
TOTAL			*Total is the sum of each column separately*					

Job

Formation Name			
Formation Depth (MD)	**Top**		**Bottom**
Form Type		**BHST**	
Job depth MD	1160. ft	**Job Depth TVD**	1160. ft
Water Depth		**Wk Ht Above Floor**	
Perforation Depth (MD)	*From*		**To**

Job Times

	Date	Time	Time Zone
Called Out			
On Location	20 - Aug - 2011	11:15	MST
Job Started	20 - Aug - 2011	12:32	MST
Job Completed	20 - Aug - 2011	12:57	MST
Departed Loc	20 - Aug - 2011	14:00	MST

Well Data

Description	New / Used	Max pressure psig	Size in	ID in	Weight lbm/ft	Thread	Grade	Top MD ft	Bottom MD ft	Top TVD ft	Bottom TVD ft
6" Open Hole				6.				.	1160.		
2 3/8" Tubing	Unknown		2.375	1.995	4.6			.	1160.		

Tools and Accessories

Type	Size	Qty	Make	Depth	Type	Size	Qty	Make	Depth	Type	Size	Qty	Make
Guide Shoe					**Packer**					**Top Plug**			
Float Shoe					**Bridge Plug**					**Bottom Plug**			
Float Collar					**Retainer**					**SSR plug set**			
Insert Float										**Plug Container**			
Stage Tool										**Centralizers**			

Miscellaneous Materials

Gelling Agt		**Conc**		**Surfactant**		**Conc**		**Acid Type**		**Qty**		*Conc*	%
Treatment Fld		**Conc**		*Inhibitor*		**Conc**		**Sand Type**		*Size*		*Qty*	

Fluid Data

Stage/Plug #: 1

Fluid #	Stage Type	Fluid Name	Qty	Qty uom	Mixing Density lbm/gal	Yield ft3/sk	Mix Fluid Gal/sk	Rate bbl/min	Total Mix Fluid Gal/sk

Stage/Plug #: 1

Fluid #	Stage Type	Fluid Name	Qty	Qty uom	Mixing Density uom	Yield uom	Mix Fluid uom	Rate uom	Total Mix Fluid uom

HALLIBURTON

Cementing Job Summary

Stage/Plug #: 1									
Fluid #	**Stage Type**	**Fluid Name**	**Qty**	**Qty uom**	**Mixing Density lbm/gal**	**Yield ft3/sk**	**Mix Fluid Gal/sk**	**Rate bbl/min**	**Total Mix Fluid Gal/sk**
1	CHEMICAL WASH	CHEMICAL WASH - SBM (21914)	10.00	bbl	8.4	.0	.0	5.0	
2	Fresh Water Spacer			bbl	8.33	.0	.0	5.0	
3	Specialized Pressure Grout	CMT - PREMIUM - CLASS G, 94 LB SK (100003685)	60	sacks	10.8	4.42	28.19	5.0	28.19
94 lbm		CMT - PREMIUM - CLASS G REG OR TYPE V, BULK (100003685)							
30 %		BENTONITE, BULK (100003682)							
28.187 Gal		FRESH WATER							
4	Fresh Water Displacement			bbl	8.33	.0	.0	5.0	

Calculated Values		Pressures		Volumes					
Displacement	0	Shut In: Instant		Lost Returns		*Cement Slurry*	47	Pad	
Top Of Cement		5 Min		Cement Returns	0	Actual Displacement		Treatment	
Frac Gradient		15 Min		Spacers	20	Load and Breakdown		Total Job	

Rates							
Circulating		*Mixing*	3	*Displacement*		Avg. Job	3
Cement Left In Pipe	Amount *0 ft*	*Reason*	*Shoe Joint*				
Frac Ring # 1 @	*ID*	*Frac ring # 2 @*	*ID*	*Frac Ring # 3 @*	*ID*	*Frac Ring # 4 @*	*ID*

The Information Stated Herein Is Correct	***Customer Representative Signature***

HALLIBURTON

Cementing Job Log

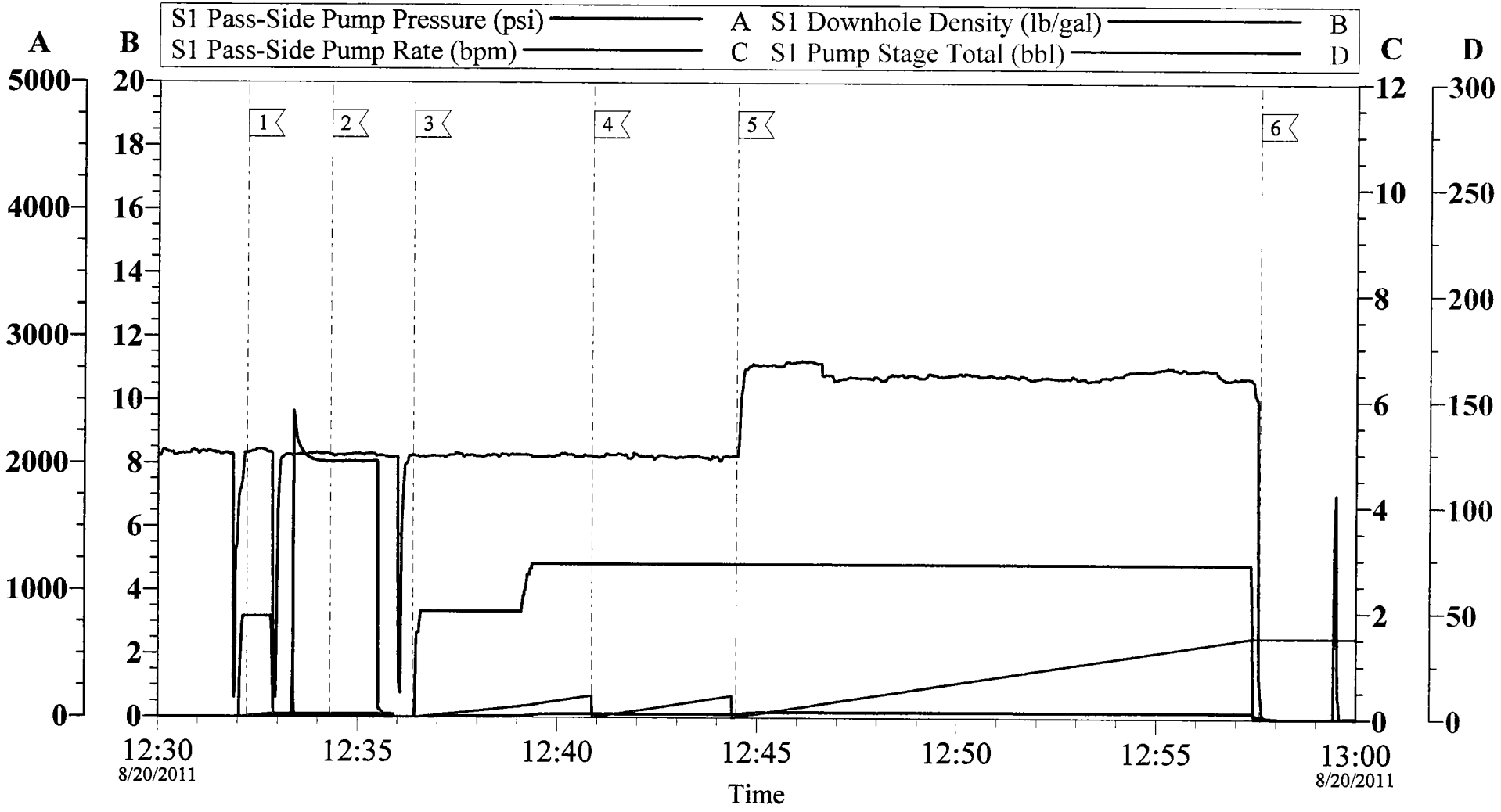
The Road to Excellence Starts with Safety

Sold To #: 356041	**Ship To #:** 2872969	**Quote #:**	**Sales Order #:** 8404854
Customer: ERROL L. MONTGOMERY & ASSOCIATES		**Customer Rep:**	
Well Name: PHRES	**Well #:** 4		**API/UWI #:**
Field:	**City (SAP):** SUPERIOR	**County/Parish:** Pinal	**State:** Arizona
Legal Description:			
Lat:		**Long:**	
Contractor:	**Rig/Platform Name/Num:**		
Job Purpose: Cement Surface Casing			**Ticket Amount:**
Well Type: Development Well	**Job Type:** Cement Surface Casing		
Sales Person: KIDDOO, JUSTIN	**Srvc Supervisor:** DOBBS, GARY		**MBU ID Emp #:** 122012

Activity Description	Date/Time	Cht #	Rate bbl/ min	Volume bbl		Pressure psig		Comments
				Stage	Total	Tubing	Casing	
Assessment Of Location Safety Meeting	08/20/2011 11:20							ALL HES EMPLOYEES
Pre-Rig Up Safety Meeting	08/20/2011 11:30							ALL HES EMPLOYEES
Arrive at Location from Service Center	08/20/2011 11:30							
Rig-Up Equipment	08/20/2011 11:35							RIG UP PUMP TRUCK, 1 BULK TRUCK, & PICK-UP
Pre-Job Safety Meeting	08/20/2011 12:15							EVERYONE ON LOCATION
Start Job	08/20/2011 12:32							
Test Lines	08/20/2011 12:34					2000.0		
Pump Spacer 1	08/20/2011 12:36		3	10		.0		CHEM WASH
Pump Spacer 2	08/20/2011 12:40		3	10		27.0		WATER
Pump Cement	08/20/2011 12:44		3	47		27.0		MIX AND PUMP 60 SKS OF GROUT MIXED @ 10.8#, 4.42 YEILD, 28.19 GPS FRESH WATER
End Job	08/20/2011 12:57							NO CIRCULATION ON JOB

ERROL L. MONTGOMERY

PRES #4 / 2 3/8



Local Event Log

Intersection		SPPP	Intersection		SPPP	Intersection		SPPP
1 START JOB	12:32:14	4.000	2 TEST LINES	12:34:19	2010	3 PUMP SPACER 1	12:36:23	-42.00
4 PUMP SPACER 2	12:40:52	27.00	5 PUMP CEMENT	12:44:29	27.15	6 END JOB	12:57:35	15.13

Customer:	ERROL L. MONTGOMERY	Job Date:	20-Aug-2011	Sales Order #:	8404850
Well Description:	PHRES #4	Job Type:	2 3/8	ADC Used:	YES
Customer Rep:	HEATHER GLUSKI	Service Supervisor:	DONNY DOBBS	Operator/Pump:	JERRY ETCITTY / 11223557

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