

APPENDIX B-1: Hydrological Assessment of Proposed Cemented Tailings Facility

**HYDROLOGICAL ASSESSMENT OF PROPOSED
CEMENTED TAILINGS FACILITY
BLACK BUTTE COPPER PROJECT**

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June 2016

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LIST OF ACRONYMS

AMSL	Average Mean Sea Level
BGS	Below Ground Surface
BMP	Below Measuring Point
CTF	Cemented Tailings Facility
GPM	Gallons Per Minute
HSU	Hydro-stratigraphic Unit
ID	Inside Diameter
MDEQ	Montana Department of Environmental Quality
MW	Monitoring Well
NFS	National Sanitation Foundation
SC	Specific Conductivity

**HYDROLOGICAL ASSESSMENT OF PROPOSED
CEMENTED TAILINGS FACILITY
BLACK BUTTE COPPER PROJECT**

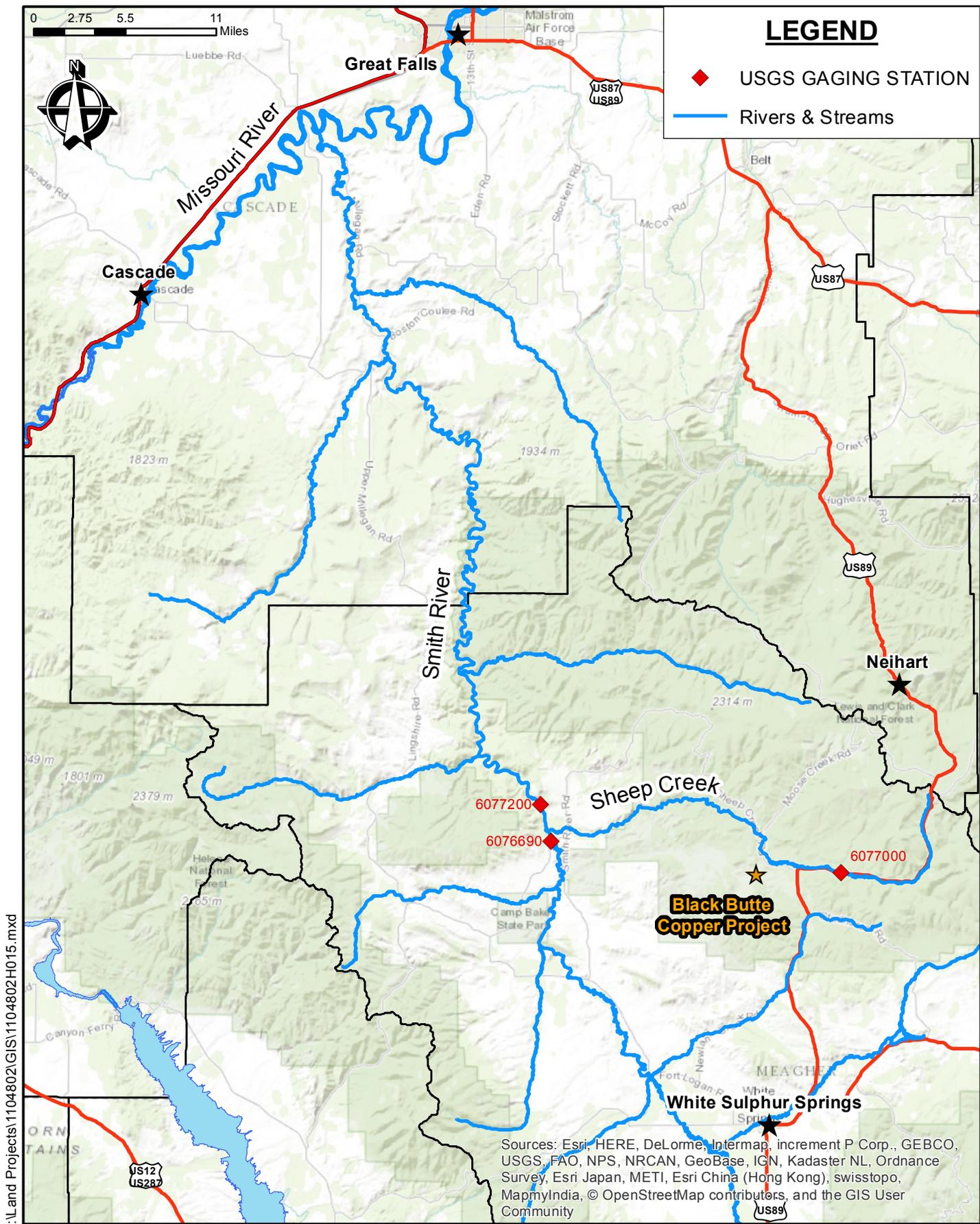
1.0 INTRODUCTION

Hydrometrics, Inc. conducted a hydrological assessment of the groundwater system in the vicinity of the proposed Cemented Tailings Facility (CTF). The purpose of this assessment was to characterize the groundwater system beneath the CTF including determining the depth at which water will be encountered in the CTF excavation, quantify the amount of water moving through the CTF excavation, and establish baseline water quality.

The scope of this assessment consisted of installation of four monitoring wells to the lowest depth of the CTF excavation, slug testing, groundwater level monitoring, estimating ambient flux of the groundwater system, and evaluate dewatering rates of the designed CTF under-drain system. A brief description of the methods used for each task and the results of the hydrological assessment are summarized in Sections 2 through 4.

1.1 SITE BACKGROUND

The Black Butte Copper Project is located approximately 16 miles north of White Sulphur Springs, Montana in Meagher County (Figure 1). The project is in the early stages of permitting an underground copper deposit and is collecting baseline data to for use in project development. The ore body consists of a massive sulfide deposit within the Newland Formation of the Precambrian Belt Supergroup. The Newland Formation can be divided into a lower member that consists of primarily dolomitic shale and an upper member of interstratified shales and carbonates (Nelson, 1963).



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Figure 1
Project Location Map
Black Butte Copper Project
Meagher County, Montana

Tintina Resources submitted a mine operations permit application to the Montana Department of Environmental Quality (MDEQ) in December 2015. The application included a CTF for surface storage of approximately 55% of all the tailings generated in the mill over the 13 year active mine life. The location of the CTF is shown on Figure 2. The CTF will also store 100% of the waste rock that is brought to surface. The excavation of the CTF includes a foundation drain system that will collect groundwater, infiltrated meteoric water, and seepage (if any) through the double HDPE-lined that might be collected in the foundation drain collection pond (Tintina Montana, 2015).

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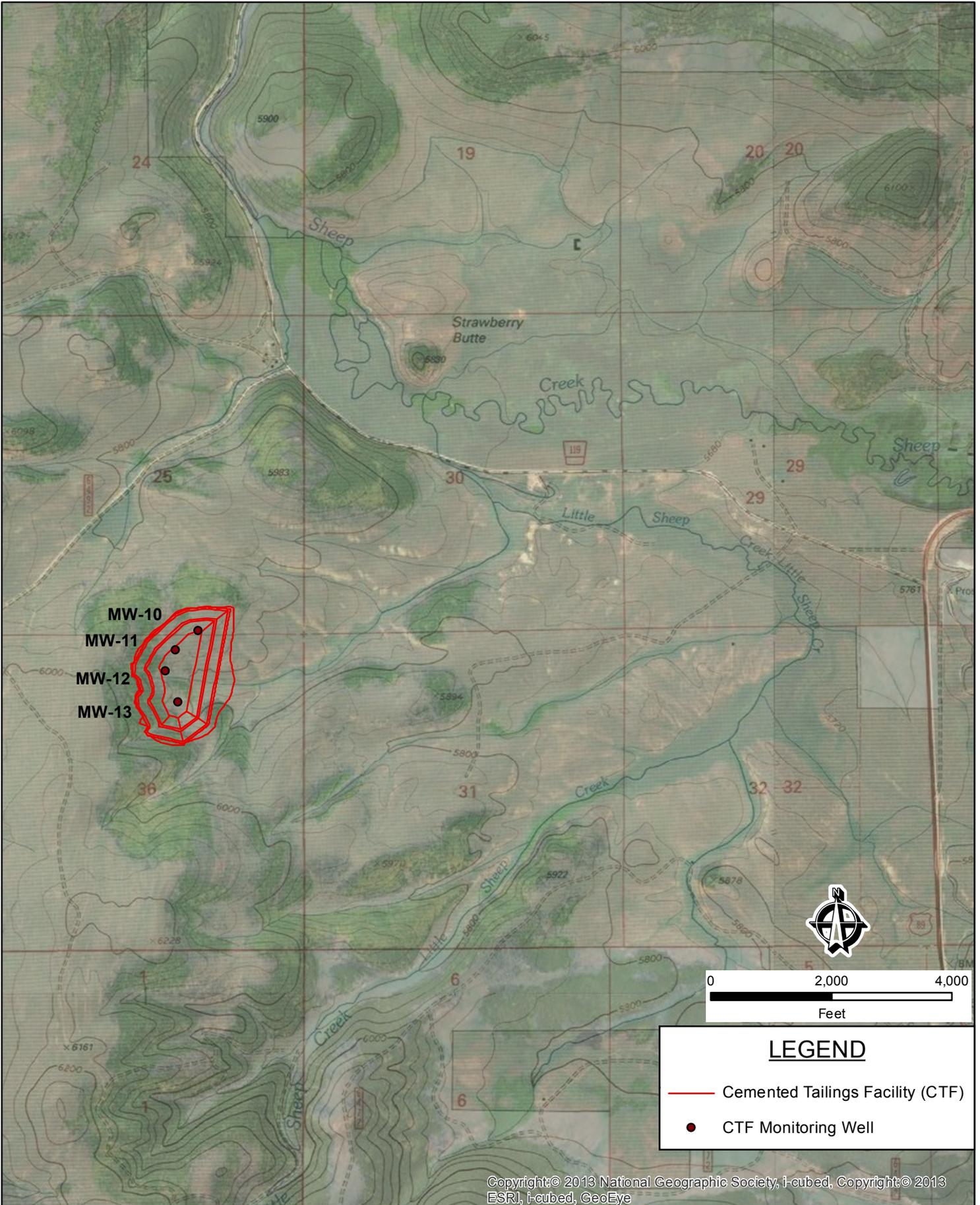


Figure 2
Cemented Tailings Facility
Black Butte Copper Project
Meagher County, Montana

2.0 HYDROGEOLOGIC INVESTIGATION

Hydrometrics conducted this hydrologic field investigation in March of 2016. The field investigation and methods used for well installation and water quality analyses are described in Sections 2.1 and 2.2, respectively.

2.1 WELL INSTALLATION

Four new wells were installed and tested for this investigation (Figure 2); one in the northern portion of the CTF where the excavation will be the deepest (MW-10), two in the middle of the CTF near the geologic contact between the shale and granodiorite (MW-11) and just above spring SP-5 (MW-12), and one near the southern end portion of the CTF in the vicinity of a developed spring (DS-1). The locations of the monitoring wells are shown on Figure 2 and well completion details are summarized in Table 1. *Environmental West Exploration* was contracted to drill the wells using air-rotary (tubex) drilling techniques. All drilling was supervised by a qualified scientist and detailed lithologic and construction logs were recorded on field forms and in a project field book. Well locations and measuring point elevations were surveyed by WWC Engineering the week of March 27, 2016. Well completion details are described in Section 3.1 of this report.

2.2 AQUIFER TESTING

The initial scope of work included conducting pneumatic slug tests on all four wells to estimate the hydraulic conductivity of the units within the excavation of the CTF. However, pneumatic tests could not be conducted on well MW-10 and MW-13 as the static water levels were within the screened interval, which inhibits the use of pneumatic methods. Therefore, other aquifer testing methods were used on MW-10 and MW-13. A standard slug-out test was conducted on well MW-13; however, it was determined that a standard slug-out test at well MW-10 was not feasible as the data from drilling indicated that the formation has a very low transmissivity and the water level would take days to recover after lowering the slug into the water column in preparation for the rising head test. Therefore, a rising head/pump down test was conducted at MW-10. The methods of the aquifer testing are summarized below and the results are summarized in Section 3.2 of this report.

Pneumatic Slug Test: A pneumatic slug test uses air pressure to depress the water in a well, then instantaneously releases the air at which time the water level recovers at a rate that is equivalent to the hydraulic conductivity of the aquifer. The recovery of the water level is monitored to determine the hydraulic conductivity of the aquifer in the vicinity of the well. Below is a summary of the procedures used to conduct pneumatic slug testing at the Black Butte Copper Site:

1. The static water level was measured and compared to the screened interval to determine the amount of water above the well screen.
2. A pneumatic slug test apparatus was used to seal the well and control the pressure in the well throughout the test.
3. The well was instrumented with a pressure transducer set at a depth below the proposed water level displacement; the transducer cable was sealed with a rubber gasket where it passed through the pneumatic slug test apparatus.
4. The transducer was set to record water levels at a 0.5 second interval prior to pressurizing the well.
5. The well was then pressurized using a compressor, which forced the water level downward in the well.
6. The pressure applied to the well was monitored using a pressure gauge that displayed the pressure placed on the wellhead in inches of water.
7. The water level was allowed to stabilize at an elevation above the top of the well screen so that the injected air would not escape from the well via the screen.
8. Once the pressure applied to the well and the transducer readings were stable, the air was then released from the well through a 4-inch diameter gate valve resulting in an instantaneous change in pressure in the well.
9. The water level recovery was recorded with a Solinst-Levelogger pressure transducer.

Multiple tests were conducted to ensure reproducible results. The water level was allowed to fully recover prior to conducting the next test.

The standard slug-out test was conducted by instrumenting the well with a pressure transducer set near the bottom of the well and set to record water levels at a 0.5 second interval. A 20-foot slug (1.5 inch PVC filled with sand) was lowered into the well and the water table was allowed to recover from adding the slug. Once the water table recovered, the slug was quickly removed from the well and the water level was recorded with a Solinst-Levelogger pressure transducer. Multiple tests were conducted to ensure reproducible results; the water level was allowed to fully recover prior to conducting the next test.

The test on MW-10 was performed during groundwater sampling and was conducted in a manner similar to a bail down test, but used a pump instead of a bailer to remove the water from the well. The pump was lowered slowly to near the bottom of the well to limit disturbance to the water level. The pump was turned on at a rate of 1 gpm until the water table reached the pump intake, at which time the pump was removed from the well and the water level recovery was recorded with a Solinst-Levelogger pressure transducer. Only one test was performed on MW-10 as it took approximately three days for the water table to recover to within a foot of the pre-test water level. Analysis of the slug tests is discussed in Section 3.2.

2.3 WATER QUALITY ANALYSES

Groundwater monitoring was conducted at the four new wells on March 29, 2016. Water quality monitoring consisted of collection of field parameters and water quality samples from each CTF monitoring well. The collection of groundwater samples generally consist of the following three steps:

1. Measurement of static water level;
2. Well purging and monitoring for field parameter stabilization; and
3. Water quality sample collection.

2.3.1 Static Water Level Measurement

Prior to collection of samples or removal/introduction of any equipment into the well, the static water level was measured at each well using an electric water level probe to determine

the depth of groundwater below a specified measuring point (top of PVC well casing). Water level measurements were combined with surveyed measuring point elevations to compute groundwater elevations at each monitoring point.

2.3.2 Field Parameters and Water Quality Sample Collection

Field parameters and water quality samples were collected by installing a 12-volt submersible pump to purge and sample all of the CTF monitoring wells. Purging consisted of removing three well volumes while routinely monitoring field parameters (pH, dissolved oxygen, temperature, and specific conductance) during the removal of each well volume. Field instruments were calibrated according to factory instructions, with calibrations results recorded on calibration forms. Well MW-10 went dry soon after purging began, a grab sample was collected from the initial discharge volume and field parameters were collected with the remaining water. In the other three wells, samples for laboratory analysis were collected after a minimum of three well volumes had been removed and successive field parameter measurements agree to within the stability criteria given below.

Criteria for field parameter stabilization are as follows:

Parameter (Units)	Stability Criteria
pH (standard units)	± 0.1 s.u.
Water temperature (°C)	± 0.2 °C
Specific conductance (µmhos/cm)	± 5% (SC ≤ 100 µmhos/cm) ± 3% (SC > 100 µmhos/cm)
Dissolved oxygen (mg/L)	± 0.3 mg/L

NOTE: Stability criteria obtained from USGS *National Field Manual for the Collection of Water Quality Data: Chapter A4, Collection of Water Samples* (September 1999).

Following well purging, final field parameter measurements were collected and recorded, and groundwater quality samples were obtained. Samples for trace constituents were filtered through a 0.45 µm filter prior to preservation to allow analysis for the dissolved fraction. Sample containers were rinsed three times with sample water prior to sample collection, then preserved as appropriate for the intended analysis (e.g., nitric acid preservation to pH <2 for metals analysis), and stored on ice in coolers at approximately 4±2°C during transport.

Groundwater sampling equipment re-used between monitoring locations (12-volt or Grundfos sampling pump and short piece of discharge line) were thoroughly decontaminated between uses. Equipment decontamination consisted of the following steps:

- Rinse with approximately two gallons of soapy water (Alconox or other non-phosphate detergent); and
- Rinse with approximately two gallons of distilled water.

Water quality samples were submitted to Energy Laboratories in Helena, Montana for analysis of physical parameters, common constituents, nutrients, and a comprehensive suite of trace constituents as listed in Table 1.

**TABLE 1. ANALYTICAL METHODS AND DETECTION LIMITS
FOR CTF MONITORING WELL SAMPLES
TINTINA GOLD – BLACK BUTTE PROJECT**

Parameter	Analytical Method ⁽¹⁾	Project-Required Detection Limit (mg/L)
Physical Parameters		
TDS	SM 2540C	10
Common Ions		
Alkalinity	SM 2320B	4
Sulfate	300.0	1
Chloride	300.0/SM 4500CL-B	1
Fluoride	A4500-F C	0.1
Calcium	215.1/200.7	1
Magnesium	242.1/200.7	1
Sodium	273.1/200.7	1
Potassium	258.1/200.7	1
Nutrients		
Nitrate+Nitrite as N	353.2	0.01
Trace Constituents (Dissolved)⁽²⁾		
Aluminum (Al)	200.7/200.8	0.009
Antimony (Sb)	200.7/200.8	0.0005
Arsenic (As)	200.8/SM 3114B	0.001
Arsenic (III/V) ³	E1632A Mod	0.001
Barium (Ba)	200.7/200.8	0.003
Beryllium (Be)	200.7/200.8	0.0008
Cadmium (Cd)	200.7/200.8	0.000003
Chromium (Cr)	200.7/200.8	0.01
Cobalt (Co)	200.7/200.8	0.01
Copper (Cu)	200.7/200.8	0.002
Iron (Fe)	200.7/200.8	0.02
Lead (Pb)	200.7/200.8	0.0003
Manganese (Mn)	200.7/200.8	0.005
Mercury (Hg)	245.2/245.1/200.8/SM 3112B	0.000005
Molybdenum (Mo)	200.7/200.8	0.002
Nickel (Ni)	200.7/200.8	0.001
Selenium (Se)	200.7/200.8/SM 3114B	0.0002
Silver (Ag)	200.7/200.8	0.02
Strontium (Sr)	200.7/200.8	0.0002
Thallium (Tl)	200.7/200.8	0.0002
Uranium	200.7/200.8	0.008
Zinc (Zn)	200.7/200.8	0.002
Field Parameters		
Stream Flow	HF-SOP-37/-44/-46	NA
Iron (II/III) ³	HACH	0.1
Water Temperature	HF-SOP-20	0.1 °C
Dissolved Oxygen (DO)	HF-SOP-22	0.1 mg/L
pH	HF-SOP-20	0.1 s.u.
Specific Conductance (SC)	HF-SOP-79	1 µmhos/cm

(1) Analytical methods are from *Standard Methods for the Examination of Water and Wastewater* (SM) or EPA's *Methods for Chemical Analysis of Water and Waste* (1983).

(2) Samples to be analyzed for dissolved constituents will be field-filtered through a 0.45 µm filter.

(3) Arsenic will be analyzed on select samples as marked on the C-O-C.

3.0 FIELD INVESTIGATION RESULTS

3.1 WELL INSTALLATION

The completion details for the CTF monitoring wells are summarized in Table 2 and well logs are included in Appendix A.

TABLE 2. WELL COMPLETION DETAILS

Well Name	Northing (meters)	Easting (meters)	Ground Surface Elev. (feet, amsl)	Measuring Point Elev. (feet, amsl)	Total Depth (feet, bgs)	Screen Interval (feet, bgs)	Sand Pack Interval (feet, bgs)
	UTM Zone 12 North						
MW-10	5179215.05	506578.57	5882.78	5886.11	90	70-90	67-90
MW-11	5179117.47	506464.72	5854.74	5857.86	70	50-70	46-70
MW-12	5179010.38	506412.82	5841.51	5844.75	60	40-60	37-60
MW-13	5178855.81	506477.79	5819.07	5822.48	40	20-40	17-40

Monitoring well MW-10 encountered granodiorite from the surface to the completion depth. The granodiorite was highly fractured and weathered at the surface with oxidized fractured surfaces on chips; the weathering decreased with depth with more competent (less fractured) granodiorite below 30 feet. The borehole at MW-10 did not encounter any water during drilling; however, the water level came up slightly (about 1 foot) one day after well completion. Eventually, the water level in well MW-10 came up to approximately the middle of the screen (75.88 feet, bmp).

Monitoring wells MW-11 and MW-12 were both advanced through shales at the surface and granodiorite at depth. Well MW-11 has dark grey dolomitic shale from the surface to 20 feet below ground surface (bgs) with weathered shales near the contact with the granodiorite (20-35 feet bgs); no water was encountered in the shale unit. The MW-11 borehole encountered weathered granodiorite from 35-55 feet and dark grey unaltered granodiorite from 55 to 70 bgs. A trace of water (about 0.5 gpm) was observed from the MW-11 borehole at 45 feet; there was no observed increase in water below 45 feet. Similar to MW-11, well MW-12 encountered grey dolomitic shale from the surface to 20 feet bgs. The MW-12 borehole then

encountered layers of dolostone interbedded in dolomitic shales from 20 to 35 feet and granodiorite from 35 to 61 feet. The granodiorite was weathered in the first five feet with unaltered granodiorite from 40 feet to depth. The borehole was dry from the surface to 35 feet at which depth it started to encounter intermittent wet and dry zones, the borehole made about 0.5 gpm at the bottom of the hole.

Monitoring well MW-13 encountered approximately five feet of topsoil, which is underlain by grey and tan weathered dolomitic shale to 20 feet. The shale continues to 30 feet, however, there is no evidence of weathering below 20 feet. The well borehole was advanced through dark grey limestone from 30 to 40 feet. The borehole started making water (<1 gpm) at approximately 29.5 feet, near the contact with the limestone.

The four CTF monitoring wells were constructed with 2-inch ID (inside diameter) NFS-approved schedule 40 PVC with flush threaded joint couplings and 0.020-inch factory slotted screen. The borehole annulus was backfilled with silica sand from the well bottom to three to four feet above the top of the screen to provide a filter pack. The remainder of the borehole annulus was backfilled with bentonite grout and/or chips/pellets to seal the borehole annulus and prevent fluid migration along the outer well casing. All wells were installed by a licensed monitor well constructor and all construction and grouting details were consistent with State of Montana monitoring well construction regulations (ARM 36.21.800). Well completion details are summarized below and well logs are included in the Appendix A.

3.2 SLUG TEST RESULTS

Slug test results were analyzed using AQTESOLV (v.4.50) to estimate aquifer hydraulic conductivities. The data were analyzed using the Bouwer-Rice (1976) straight line solution for slug tests (all solutions can be found in Appendix B). The average hydraulic conductivity estimates from the wells completed in granodiorite (MW-10, -11, and -12) ranged from 0.001 to 9 ft/day (Table 3). Well MW-12 had the highest hydraulic conductivity and MW-10 had the lowest. Well MW-12 is completed near the contact of the granodiorite and shale and exhibited numerous fractures that produced water in the screen interval and represents an highly fractured zone and likely does not represent the bulk permeability of the granodiorite;

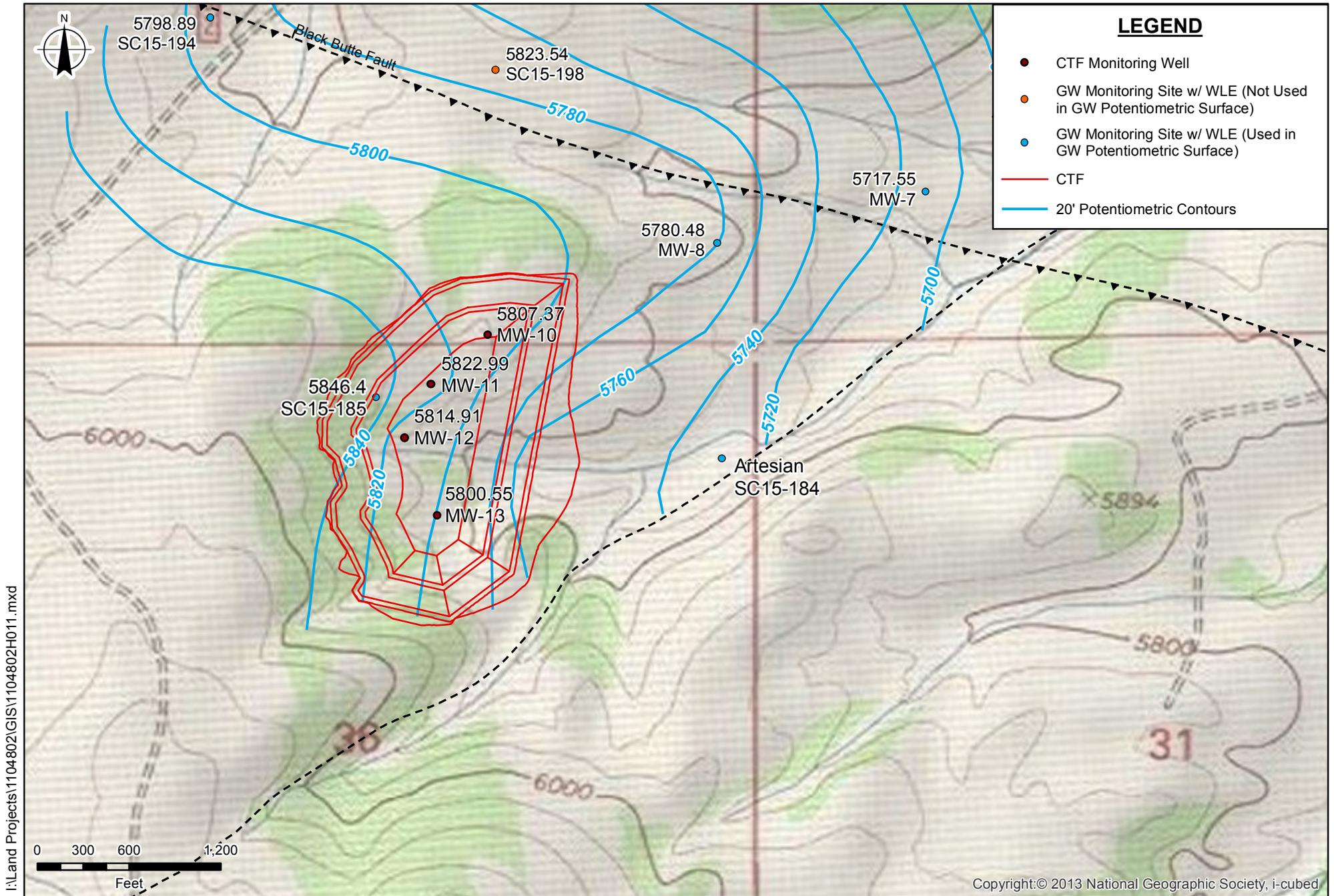
whereas well MW-10 is completed in an area with minimal fracturing and likely represents the primary permeability for granodiorite with only minor secondary permeability. Well MW-11 has an average hydraulic conductivity of 0.4 ft/day, which likely represents a bulk permeability of the shallow/moderately weathered granodiorite. Well MW-13 is the only well completed in shale within the planned CTF excavation. The slug test analysis estimates a hydraulic conductivity of approximately 2 ft/day for the shallow shales encountered by MW-13 in this area.

TABLE 3. SLUG TEST ANALYSIS HYDRAULIC CONDUCTIVITY RESULTS

Well	Hydraulic Conductivity (K) (ft/day)			
	Test 1	Test 2	Test 3	Average
MW-10	0.001	NA	NA	0.001
MW-11	0.4	0.4	0.4	0.4
MW-12	8	9	10	9
MW-13	1.4	1.9	NA	2

3.3 GROUNDWATER MONITORING RESULTS

Water level data collected from the four CTF monitoring wells during slug testing were used with the survey data to determine the water level elevation at each well (Table 4). The water level elevation data was added to the project scale potentiometric map used in the Mine Operating Permit Application (Tintina Montana, 2015), and the potentiometric surface was expanded to the area around the CTF (Figure 3). The water level elevations in the area of the CTF are highly variable, as can be seen in the northern portion of the CTF where well MW-11 appears to be completed near a groundwater divide between wells MW-10 and MW-12. MW-11 sits on a slope below MW-10 and upslope of MW-12, which is an unlikely area for a groundwater divide as less recharge is anticipated on a sloped topography. This suggests the variable water level elevations may be characteristic of a localized surficial groundwater system or may be the result of groundwater occurring in separate perched zones.



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Although there is evidence that the CTF wells are completed in a localized or perched zones where local lithology and fracture controlled permeability affects water levels, the potentiometric map (by definition) assumes the wells are completed in a well-connected groundwater system. The potentiometric surface shows that the groundwater flow potential in the northern portion of the CTF is generally southeast, whereas the flow potential is to the east in the southern portion of the CTF.

TABLE 4. MARCH 2016 WATER LEVEL ELEVATIONS

Well Name	Ground Surface Elev. (feet amsl)	Measuring Point Elev. (feet amsl)	Static Water Level (feet bmp)	Water Level Elevation (feet amsl)
MW-10	5882.78	5886.11	79.21	5806.90
MW-11	5854.74	5857.86	34.70	5823.16
MW-12	5841.51	5844.75	30.26	5814.49
MW-13	5819.07	5822.48	22.32	5800.16

Water quality results from the four monitoring wells are shown in Table 5 and the analytical report is included in Appendix C. The general chemistry shows that water from wells MW-10, -12, and -13 is a calcium bicarbonate water with low concentrations of magnesium and sulfate and other ions being near or below the detection limit. Well MW-11 is also a calcium bicarbonate type water; however, it has elevated sulfate concentrations (31 mg/L) compared to the other wells (8-18 mg/L). All of the wells have near neutral pH and specific conductance concentrations ranging from 364 to 434 $\mu\text{mhos/cm}$. Dissolved metals concentrations were all below the human health standard. Concentrations for most dissolved trace constituents at wells MW-11, -12, and -13 were below or at the detection limit; trace constituents above the detection limit include dissolved barium and strontium in all three wells, selenium in wells MW-12 and -13, and dissolved aluminum, iron, and manganese in MW-11 and MW-13. Dissolved trace constituents were elevated in well MW-10 compared to the other CTF wells. The elevated trace constituents is likely due to sediment present in

TABLE 5. MARCH 2016 GROUNDWATER QUALITY DATA

Site Code	MW-13	MW-12	MW-12 DUP	MW-11	MW-10	Groundwater Human Health Standard
Field Sample ID (BBC-1603-)	300	301	302	303	304	
Date	3/29/2016	3/29/2016	3/29/2016	3/29/2016	3/29/2016	
FIELD PARAMETERS						
Static Water Level (ft)	22.28	30.2	--	34.56	79.1	--
pH (s.u.)	6.74	7.34	--	7.42	7.56	--
Specific Conductance (µmhos/cm)	434	420	--	393	364	--
Temperature (C)	5.9	7	--	7	7.4	--
Dissolved Oxygen (mg/L)	6.32	6.27	--	5.66	6.24	--
GENERAL PARAMETERS (mg/L)						
Total Suspended Solids	26	<10	<10	48	516	--
Total Dissolved Solids	248	227	228	238	244	--
COMMON IONS (mg/L)						
Alkalinity as CaCO3	220	210	210	170	180	--
Sulfate	18	13	13	31	8	--
Chloride	1	<1	<1	2	4	--
Fluoride	0.1	0.1	0.1	0.1	0.4	4
Calcium	59	58	58	41	46	--
Magnesium	20	19	19	11	17	--
Sodium	1	2	2	21	11	--
Potassium	<1	<1	<1	2	7	--
NUTRIENTS (mg/L)						
Nitrate and Nitrite as N	0.18	0.15	0.15	0.38	0.50	10
DISSOLVED TRACE CONSTITUENTS (mg/L)						
Aluminum	0.036	<0.009	<0.009	0.263	3.66	--
Antimony	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.006
Arsenic	<0.001	<0.001	<0.001	<0.001	<0.001	0.01
Barium	0.056	0.054	0.054	0.148	0.211	1
Beryllium	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	0.004
Cadmium	<0.00003	<0.00003	<0.00003	<0.00003	0.00008	0.005
Chromium	<0.01	<0.01	<0.01	<0.01	0.01	0.1
Cobalt	<0.01	<0.01	<0.01	<0.01	<0.01	--
Copper	<0.002	<0.002	<0.002	<0.002	0.01	1.3
Iron	0.02	<0.02	<0.02	0.07	3.58	--
Lead	<0.0003	<0.0003	<0.0003	<0.0003	0.0021	0.015
Manganese	0.010	<0.005	<0.005	0.005	0.168	--
Mercury	<0.000005	<0.000005	<0.000005	<0.000005	0.0000066	0.002
Molybdenum	<0.002	<0.002	<0.002	<0.002	0.012	--
Nickel	<0.001	<0.001	<0.001	<0.001	0.009	0.1
Selenium	0.0002	0.0002	<0.0002	<0.0002	0.0002	0.05
Silver	<0.02	<0.02	<0.02	<0.02	<0.02	0.1
Strontium	0.103	0.141	0.141	0.261	0.796	4
Thallium	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.002
Uranium	<0.008	<0.008	<0.008	<0.008	0.008	0.03
Zinc	<0.002	<0.002	<0.002	<0.002	0.015	2

the sample container as noted in the analytical report (see Appendix C), which states the following:

“Sample H16030522-005 (BBC-1603-304) for dissolved metals had sediment present in the sample container. Per EPA method 200.7 and 200.8, if a precipitate is formed during acidification, transport or storage the sample aliquot must be treated prior to analysis. The sample was digested using EPA 200.2. The sample was analyzed by EPA 200.7 and EPA 200.8 and the results were within duplication. abc 5/4/16”

The concentrations of trace constituents in MW-10 are likely anomalous due to the sediment found in the sample bottle, as it is highly unlikely that concentrations of dissolved aluminum could be 3.66 mg/L in water with a pH of 7.56. Similar observations can be made about the concentrations reported for dissolved iron, manganese, lead, and zinc. Two possible explanations for the “sediment” in the sample and elevated dissolved trace constituents include filter breakthrough or colloidal sediment passing through the filter. Colloidal sediment may also explain wells MW-11 and MW-13 having concentrations of dissolved aluminum above the detection limit. Wells MW-10, -11, and -13 all had elevated suspended solids; concentrations of dissolved aluminum correlate well with the concentrations of suspended solids suggesting that some of the suspended solids may be passing through the 0.45 μ filter and elevating the trace constituents. All of the CTF monitoring wells will be incorporated into the quarterly baseline monitoring program. Sampling procedures will be evaluated in the 2016 second quarter event to determine if the sampling method could be a cause of the sediment and possibly elevated dissolved metals concentrations in the filtered sample.

4.0 GROUNDWATER FLUX ANALYSIS

The results of the CTF groundwater investigation were used to estimate the ambient groundwater flux through the excavation of the CTF and the groundwater capture or inflow to the foundation drain system. Although there is evidence that this may be a surficial localized system or separate perched zones (e.g., water level elevations at MW-10, -11, and -12), the groundwater flux estimates were conducted assuming the groundwater in the area of the CTF is connected between hydro-stratigraphic units (HSUs), which provides a conservative analysis.

4.1 AMBIENT GROUNDWATER FLUX

The groundwater flux within the proposed CTF excavation can be estimated from potentiometric and hydraulic conductivity data using a simple Darcy's Law calculation. The lithology and slug testing in the area suggests there are multiple HSUs in the area of the CTF. For the purpose of estimating groundwater flux, the area within the CTF excavation was divided into three zones (Figure 4). The three zones represent different HSUs as follows:

- Zone 1 – shale encountered at MW-13;
- Zone 2 – higher permeable granodiorite; and
- Zone 3 – moderate permeable granodiorite.

The hydraulic conductivity used for each zone was based on the slug testing. As discussed above, the hydraulic conductivity at MW-10 and MW-12 likely represent the lower and higher permeability ranges for shallow granodiorite, respectively. Since Darcy's Law assumes a porous media, it is necessary to estimate the bulk permeability of the HSUs. It was assumed that the hydraulic conductivity derived from the aquifer tests provide a bulk permeability of the borehole. Zone 1 was assumed to have a bulk permeability based on the hydraulic conductivity at well MW-13 (2 ft/day). Since Zone 2 has a mixture of shale and granodiorite, the hydraulic conductivity of this zone was assumed to be the average conductivity of the four CTF wells (3 ft/day). Zone 3 was assigned a hydraulic conductivity

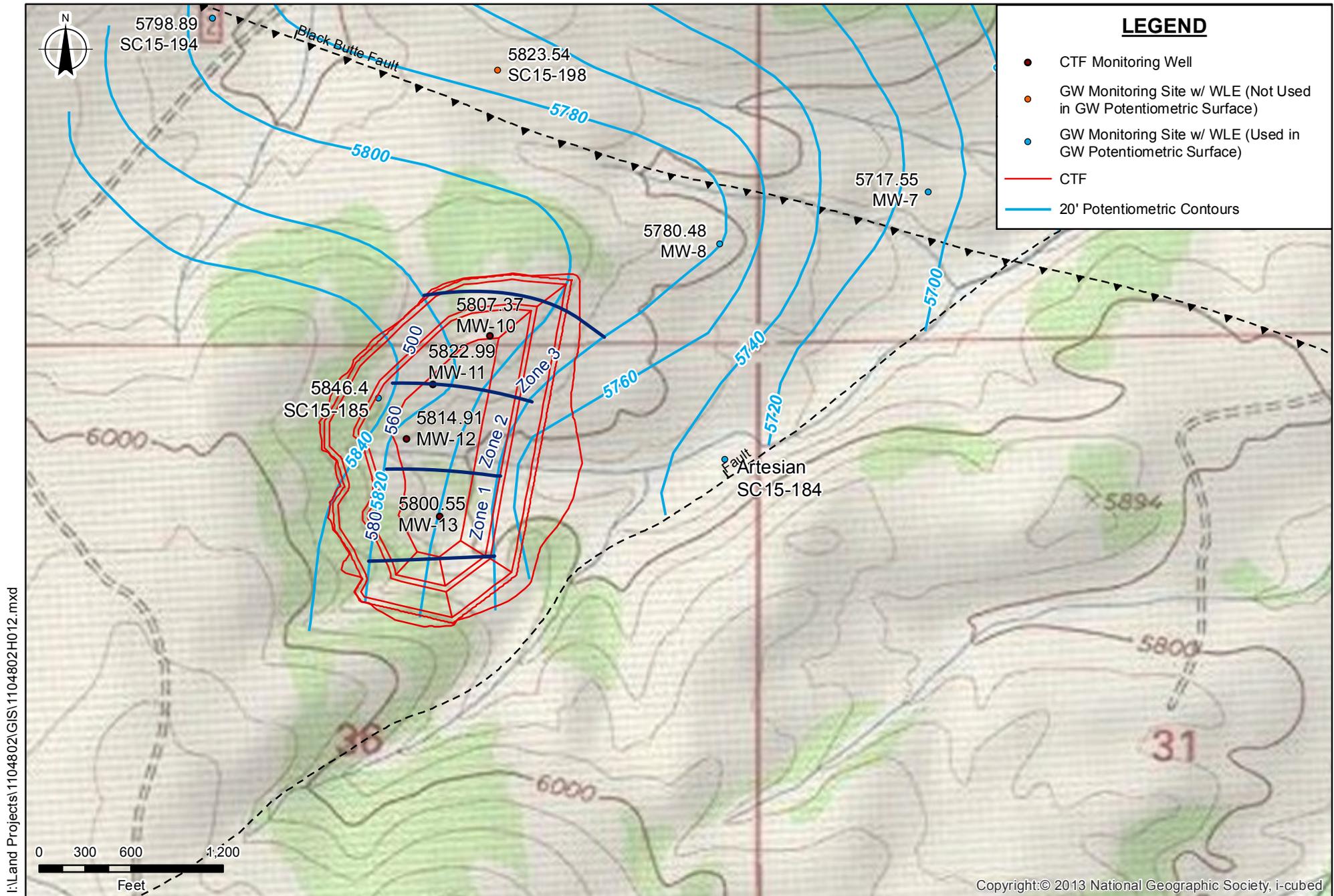


Figure 4
Groundwater Flux Zones
 Black Butte Copper Project
 Meagher County, Montana

(0.4 ft/day) based on the results of the MW-11 slug tests, as this is believed to represent the bulk permeability of the shallow granodiorite. The flux of each zone was calculated based on the width, average saturated thickness, and gradient of each zone as summarized in Table 6. The total ambient flux beneath the CTF is estimated at 20 gpm with Zone 2 providing 60% of the flux and Zones 1 and 3 providing 30% and 10%, respectively.

TABLE 6. AMBIENT GROUNDWATER FLUX ESTIMATES

Parameter	Zone 1	Zone 2	Zone 3
K (ft/day)	2	3	0.4
Gradient	0.06	0.07	0.06
Width (ft)	600	580	600
Thickness (ft)	15	20	25
Flux (gpm)	6	12	2
	Total Flux (gpm)		20

4.2 GROUNDWATER INFLOW TO FOUNDATION DRAIN

The groundwater inflow to the proposed foundation drain system was estimated based on an analytical model analysis using the software AQTESOLV 4.5. Separate analytical analyses were conducted by simulating vertical wells approximately every 100 feet along the foundation drain near the bottom of the CTF excavation for the three different zones within the CTF. Figure 5 shows the design of the well field generated to simulate the foundation drain for each zone. In this model, the wells that are adjacent to the different dewatering zones were used to estimate the dewatering of each of the zones they border. The dewatering assessments were conducted using the Moench (1984) drawdown solution in AQTESOLV to simulate drawdown in the center of each dewatering zone (identified as observation wells in Figure 5). The pumping rates for all of the wells used in each zone were adjusted until the drawdown in the center of the dewatering zone was at or slightly greater than the average saturated thickness of each zone. The analysis assumes the saturated thickness does not change due to dewatering, which is a conservative assumption as the smaller the saturated thickness the less flux can be transmitted through the HSU. Table 7 summarizes the parameters used and the total dewatering rate for the three zones. The AQTESOLV drawdown graphs are provided in Appendix D.

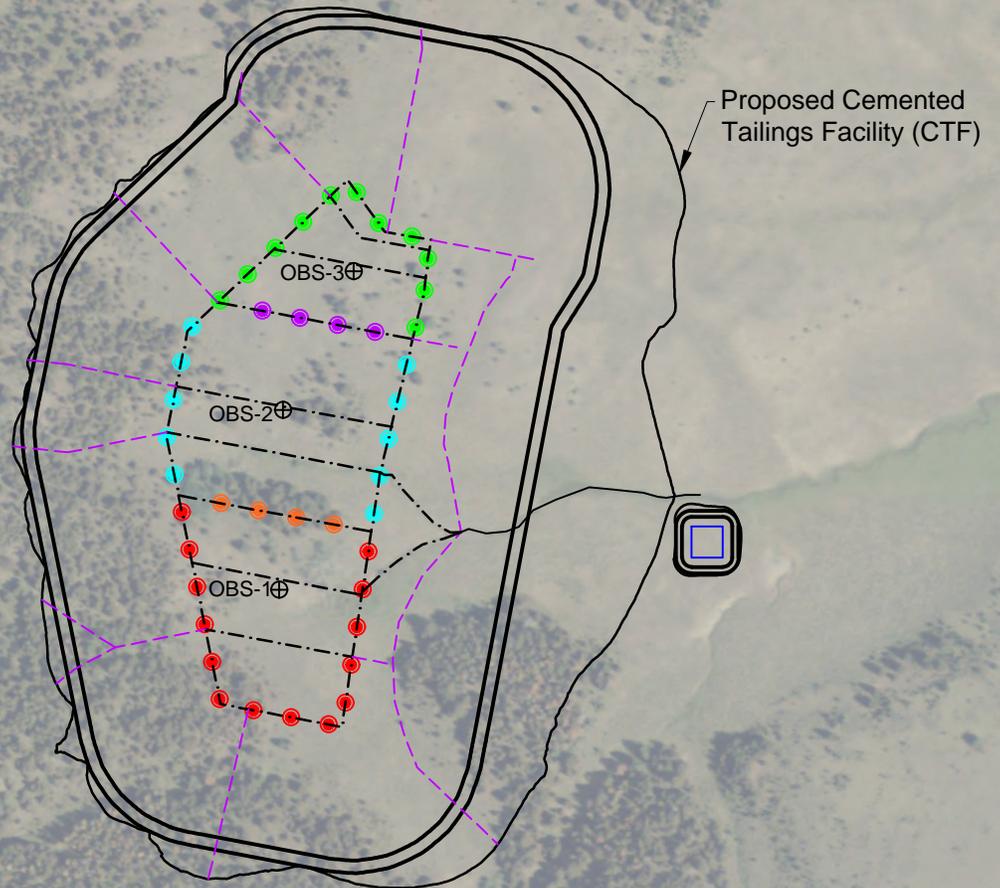


SCALE

0 (In Feet) 500

LEGEND

- Zone 1 Dewatering Wells
- Zone 2 Dewatering Wells
- Zone 3 Dewatering Wells
- Dewatering Wells Used in Zones 1 & 2
- Dewatering Wells Used In Zones 2 & 3
- ⊕ Observation wells



UPDATE TIME: 3:53 PM
SPLITTENBERG\HEL\20160520\1\LAND PROJECTS\1104802\DWG\1104802H005.DWG

Figure 5
Schematic of CTF Dewatering Simulation
Black Butte Copper Project
Meagher County, Montana

**TABLE 7. SIMULATED DEWATERING RATE OF
FOUNDATION DRAIN SYSTEM**

Dewatering Zone	Number of Pumping Wells	Pumping Rate (gpm)	Hydraulic Conductivity (ft/day)	Minimum Drawdown (feet)	Total Dewatering Rate (gpm)
Zone-1	18	0.2	2	15	4
Zone-2	19	0.45	3	20	9
Zone-3	15	0.13	0.4	25	2
Total Dewatering Rate (gpm)					15

Based on the conservative assumptions used in the ambient groundwater flux and dewatering analyses, Tintina should anticipate an average groundwater flux to the foundation drain system ranging between 15 and 20 gpm; which is well within the capacity of the foundation drain system capacity (350 gpm, 22 liters/sec). Short-term higher flows should be anticipated during spring runoff and large precipitation events; however, these should be well within the capacity of the foundation drain system.

5.0 SUMMARY OF RESULTS

The CTF investigation provides some essential information related to the hydrological system that the CTF excavation will encounter and provides assurance that the foundation drain system is sufficient to dewater the groundwater beneath the CTF. The monitoring wells in the northern half of the CTF (MW-10 through MW-12) were all completed in granodiorite; wells completed in this area have a large range in hydraulic conductivity (0.001 ft/day to 9 ft/day). Well MW-13 is located in the southern portion of the CTF and encountered moderately permeable shales, with an average hydraulic conductivity of 2 ft/day. Although there is some evidence that groundwater may be present in the area in a series of perched zones, the water levels in the wells indicate the groundwater table in the vicinity of the CTF is anticipated to range between <10 feet and approximately 30 feet above the base of the proposed CTF excavation.

Groundwater flux through the area of the CTF and the dewatering analyses were estimated assuming the wells are completed in a well-connected aquifer system. Ambient groundwater flux is estimated at approximately 20 gpm. The dewatering analysis estimates an inflow rate to the foundation drain system of approximately 15 gpm; which is well within the design flow rate of the foundation drain system (350 gpm). Although higher flow rates may occur seasonally, the flow rates are not anticipated to exceed the capacity of the foundation drain system based on hydraulic conductivities encountered at the monitoring wells.

Groundwater collected by the foundation drain system is anticipated to be of good quality based on the water quality results from the four monitoring wells. In general, the water is anticipated to be a calcium bicarbonate type water, with possibly a small sulfate signature (31 mg/L) based on the water quality at MW-11. The baseline groundwater quality within the CTF excavation is below the human health standard for all constituents.

6.0 REFERENCES

- Bouwer, H. and R.C. Rice, 1976. A slug test method for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells, *Water Resources Research*, vol. 12, no. 3, pp. 423-428.
- MDEQ, 2010. Circular DEQ-7. Montana Numeric Water Quality Standards, August 2010.
- Moench, A.F., 1984. Double-porosity models for a fissured groundwater reservoir with fracture skin, *Water Resources Research*, vol. 20, no. 7, pp. 831-846.
- Nelson, W.H. 1963. Geology of the Duck Creek Pass quadrangle, U.S. Geological Survey Bulletin 1121J, 56 p.
- Tintina Montana, Inc., 2015. Mine Operating Permit Application Black Butte Copper Project, Meagher County, MT, December 2015

APPENDIX A

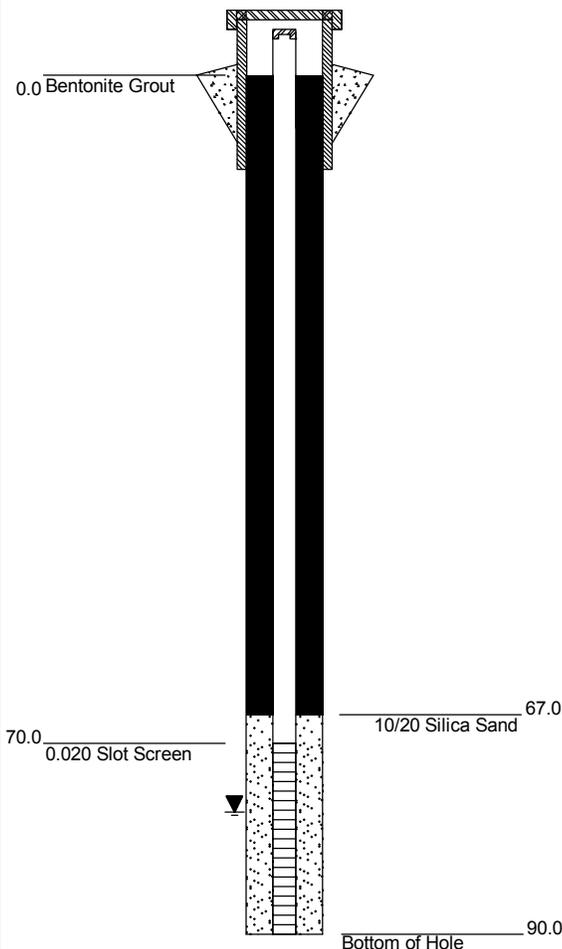
WELL LOGS

Client: Tintina Resources
 Project: Black Butte Copper Project
 County: Meagher State: MT
 Property Owner: Bar Z Ranch Inc
 Legal Description: SE, SW, SW S25, T12N, R06E
 Location Description: North end of CTF toe
 Recorded By: Ashton Montrone
 Drilling Company: Enviromental West
 Driller: Randy
 Drilling Method: Odex
 Drilling Fluids Used: Air
 Purpose of Hole: Install Monitor Well
 Target Aquifer: CTF Toe
 Hole Diameter (in): 6
 Total Depth Drilled (ft): 90

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	+2 to 90
Surface Casing Used?	Y	6-inch, steel casing	+2 to 3
Screen/Perforations?	Y	0.020-inch slot, Sch 40 PVC	70-90
Sand Pack?	Y	10/20 Silica Sand	67-90
Annular Seal?	Y	Bentonite Chips	0.5-67
Surface Seal?	Y	Portland Cement	+0.5-0.5
DEVELOPMENT/SAMPLING			
Well Developed?	N		
Water Samples Taken?	Y	Commons, Nutrients, Metals	
Boring Samples Taken?	Y	chips	Every 5 feet
Northing: 5179215.045		Easting: 506578.567	
Static Water Level Below MP: 79.21		Surface Casing Height (ft): 2	
Date: 3/28/16		Riser Height (ft): 2	
MP Description: Top of PVC		Ground Surface Elevation (ft): 5882.78	
MP Height Above or Below Ground (ft): 2		MP Elevation (ft): 5886.11	

Remarks: Borehole was dry during drilling; water level at 91.4' below measuring point (TD 92.5), water level up to 79.21 ten days after well completion. Insufficient water to develop.

WELL CONSTRUCTION



SAMPLE NOTES

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 30.0' **Granodiorite**
 Granodiorite, grey and tan with mafic minerals, clay seam from 4-5' and 19.5-20', highly weathered near surface with less weathering with depth. Dry

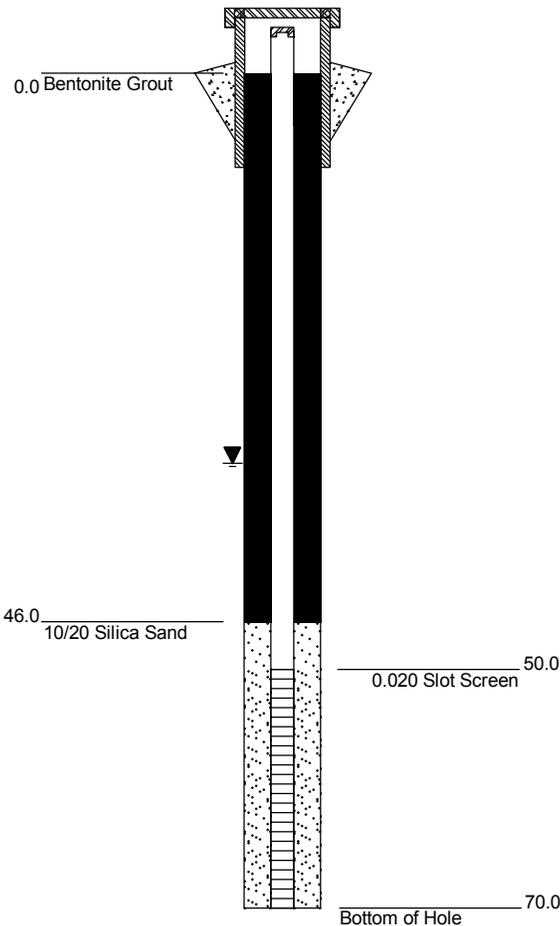
30.0 - 90.0' **Granodiorite**
 Granodiorite, grey and tan, redish staining 45 to 55 feet, drilling hard. Dry during drilling.

Client: Tintina Resources
 Project: Black Butte Copper Project
 County: Meagher State: MT
 Property Owner: Bar Z Ranch Inc
 Legal Description: NE, NW, NW S26, T12N, R06E
 Location Description: Middle of CTF toe
 Recorded By: Ashton Montrone
 Drilling Company: Enviromental West
 Driller: Randy
 Drilling Method: Odex
 Drilling Fluids Used: Air
 Purpose of Hole: Install Monitor Well
 Target Aquifer: CTF Toe
 Hole Diameter (in): 6
 Total Depth Drilled (ft): 70

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	+2 to 70
Surface Casing Used?	Y	6-inch, steel casing	+2 to 3
Screen/Perforations?	Y	0.020-inch slot, Sch 40 PVC	50-70
Sand Pack?	Y	10/20 Silica Sand	46-70
Annular Seal?	Y	Bentonite Chips	0.5-46
Surface Seal?	Y	Portland Cement	+0.5-0.5
DEVELOPMENT/SAMPLING			
Well Developed?	Y	surge and pump	
Water Samples Taken?	Y	Commons, Nutrients, Metals	
Boring Samples Taken?	Y	chips	Every 5 feet
Northing: 5179117.473		Easting: 506464.724	
Static Water Level Below MP: 34.70		Surface Casing Height (ft): 2	
Date: 3/28/16		Riser Height (ft): 2	
MP Description: Top of PVC		Ground Surface Elevation (ft): 5854.74	
MP Height Above or Below Ground (ft): 2		MP Elevation (ft): 5857.86	

Remarks:

WELL CONSTRUCTION



SAMPLE NOTES

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 2.0' **Topsoil**
Dark brown, soil transitioning to shale with depth, dry.

2.0 - 20.0' **Shale**
Blue grey, dolomitic shale, small fracture located at 11 feet with no water associated, dry.

20.0 - 35.0' **Weathered Shale**
Tan, reddish brown, weathered/altered shale. Dry

35.0 - 55.0' **Granodiorite**
Grey, reddish orange weathered granodiorite. making water at 45 feet (0.5 gpm).

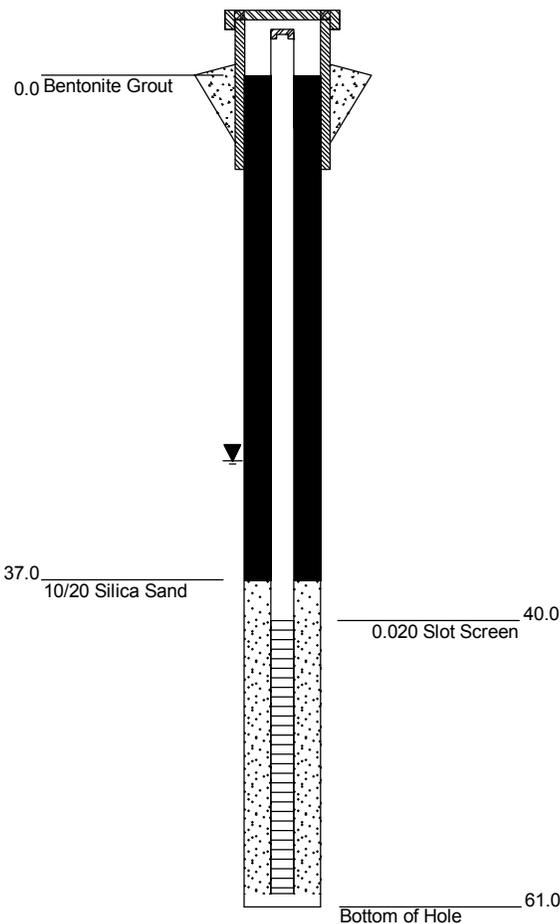
55.0 - 70.0' **Granodiorite**
Dark grey, highly competent granodiorite. No increase in flow.

Client: Tintina Resources
 Project: Black Butte Copper Project
 County: Meagher State: MT
 Property Owner: Bar Z Ranch Inc
 Legal Description: NE, NW, NW S26, T12N, R06E
 Location Description: Middle of CTF toe
 Recorded By: Ashton Montrone
 Drilling Company: Enviromental West
 Driller: Randy
 Drilling Method: Odex
 Drilling Fluids Used: Air
 Purpose of Hole: Install Monitor Well
 Target Aquifer: CTF Toe
 Hole Diameter (in): 6
 Total Depth Drilled (ft): 61

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	+2 to 60
Surface Casing Used?	Y	6-inch, steel casing	+2 to 3
Screen/Perforations?	Y	0.020-inch slot, Sch 40 PVC	40-60
Sand Pack?	Y	10/20 Silica Sand	37-60
Annular Seal?	Y	Bentonite Chips	0.5-37
Surface Seal?	Y	Portland Cement	+0.5-0.5
DEVELOPMENT/SAMPLING			
Well Developed?	Y	surge and pump	
Water Samples Taken?	Y	Commons, Nutrients, Metals	
Boring Samples Taken?	Y	chips	Every 5 feet
Northing: 5179010.377		Easting: 506412.822	
Static Water Level Below MP: 30.26		Surface Casing Height (ft): 2	
Date: 3/28/16		Riser Height (ft): 2	
MP Description: Top of PVC		Ground Surface Elevation (ft): 5841.51	
MP Height Above or Below Ground (ft): 2		MP Elevation (ft): 5844.75	

Remarks:

WELL CONSTRUCTION



SAMPLE NOTES

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 20.0' **Shale**
Bluish grey, dolomitic shale, Dry

5.0 - 35.0' **Shale/Dolostone**
Grey/Blue shale and dolostone, Dry

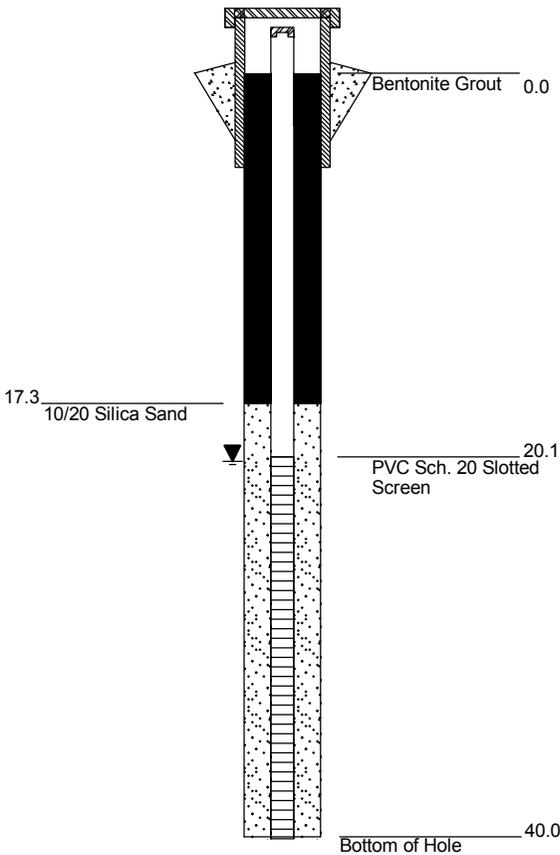
35.0 - 61.0' **Granodiorite**
Grey, granodiorite; weathered from 35-40 feet, competent granodiorite from 40-45 feet. Making water at 35 feet., dry from 40-45 feet, wet from 45-70. making 0.5 gpm at bottom of hole.

Client: Tintina Resources
 Project: Black Butte Copper Project
 County: Meagher State: MT
 Property Owner: Bar Z Ranch Inc
 Legal Description: SE, NW, NW S26, T12N, R06E
 Location Description: South of CTF toe
 Recorded By: Ashton Montrone
 Drilling Company: Enviromental West
 Driller: Randy
 Drilling Method: Odex
 Drilling Fluids Used: Air
 Purpose of Hole: Install Monitor Well
 Target Aquifer: CTF Toe
 Hole Diameter (in): 6
 Total Depth Drilled (ft): 40

WELL COMPLETION	Y/N	DESCRIPTION	INTERVAL
Well Installed?	Y	2-inch, flush threaded, Sch 40, PVC	+2 to 40
Surface Casing Used?	Y	6-inch, steel casing	+2 to 3
Screen/Perforations?	Y	0.020-inch slot, Sch 40 PVC	20-40
Sand Pack?	Y	10/20 Silica Sand	17-40
Annular Seal?	Y	Bentonite Chips	0.5-17
Surface Seal?	Y	Portland Cement	+0.5-0.5
DEVELOPMENT/SAMPLING			
Well Developed?	Y	surge and pump	
Water Samples Taken?	Y	Commons, Nutrients, Metals	
Boring Samples Taken?	Y	chips	Every 5 feet
Northing: 5178855.811		Easting: 506477.787	
Static Water Level Below MP: 22.32		Surface Casing Height (ft): 2	
Date: 3/28/16		Riser Height (ft): 2	
MP Description: Top of PVC		Ground Surface Elevation (ft): 5819.07	
MP Height Above or Below Ground (ft): 2		MP Elevation (ft): 5822.48	

Remarks:

WELL CONSTRUCTION



SAMPLE NOTES

GRAPHICS

GEOLOGICAL DESCRIPTION

0.0 - 5.0' **Topsoil**
Brown, fine to coarse, angular sand with silt, dry

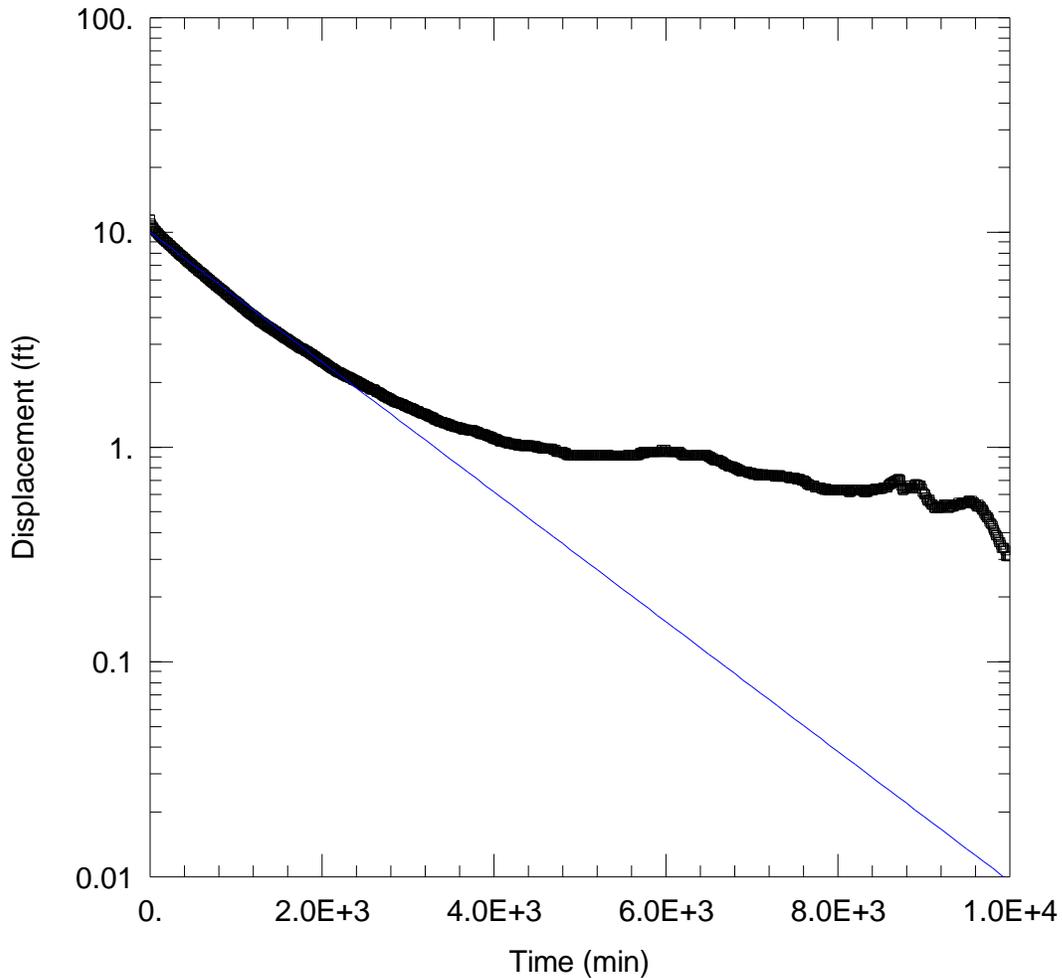
5.0 - 20.0' **Shale**
Grey, tan weathered dolomitic shale, dry

20.0 - 30.0' **Shale**
Bluish grey, dolomitic shale. Making water at 29.5 feet.

30.0 - 40.0' **Limestone**
Dark grey, limestone. Making very little water.

APPENDIX B

SLUG TEST ANALYSES



WELL TEST ANALYSIS

Data Set: K:\...\MW-10_BouwerRice.aqt
 Date: 05/20/16

Time: 11:54:15

PROJECT INFORMATION

Company: Hydrometrics
 Project: 11048
 Test Well: MW-10
 Test Date: Forward

AQUIFER DATA

Saturated Thickness: 11.47 ft

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (MW-10)

Initial Displacement: 11.47 ft
 Total Well Penetration Depth: 13.4 ft
 Casing Radius: 0.0833 ft

Static Water Column Height: 11.47 ft
 Screen Length: 13.4 ft
 Well Radius: 0.0833 ft

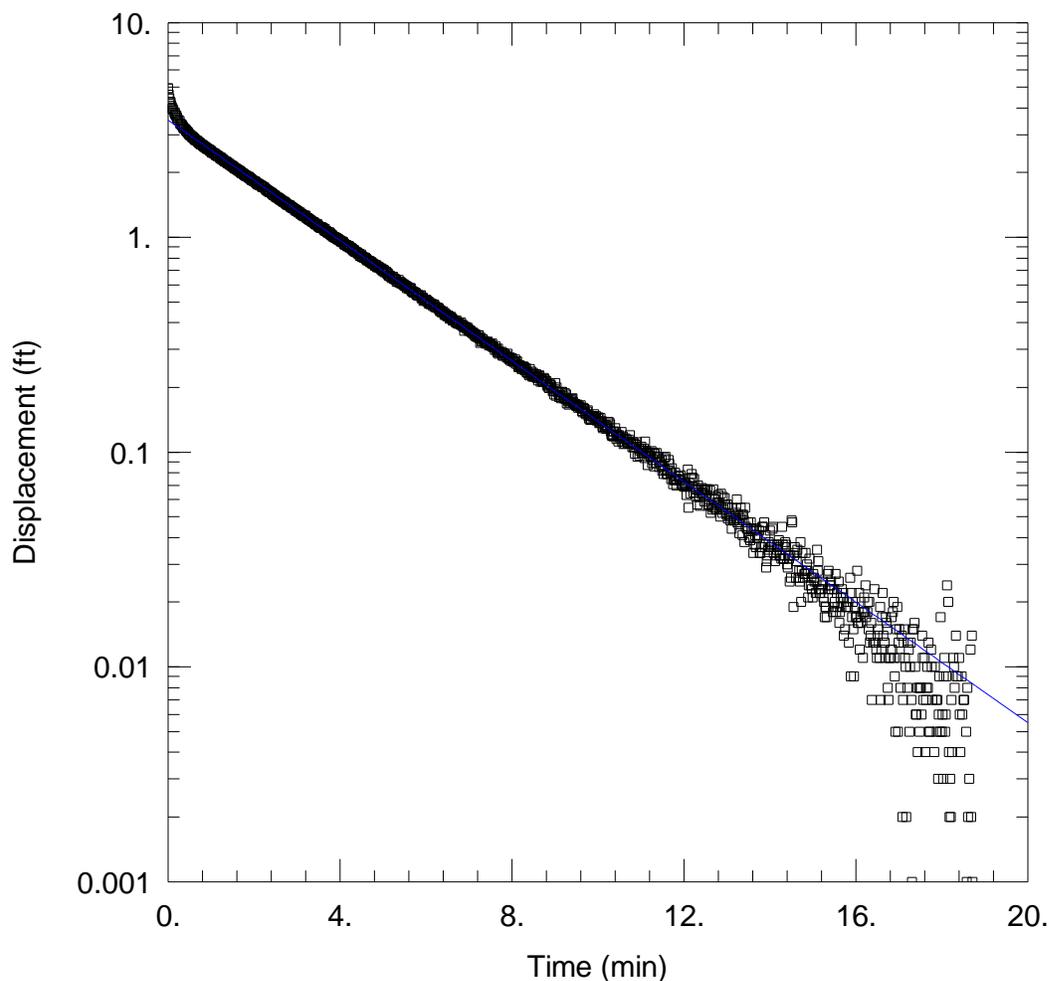
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

$K = 0.001022$ ft/day

$y_0 = 10.01$ ft



WELL TEST ANALYSIS

Data Set: K:\...\MW_11_BouwerRice.aqt

Date: 05/20/16

Time: 11:54:59

PROJECT INFORMATION

Company: Hydrometrics

Project: 11048

Test Well: MW-11

Test Date: Forward

AQUIFER DATA

Saturated Thickness: 30. ft

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (MW-11)

Initial Displacement: 4.948 ft

Static Water Column Height: 37.8 ft

Total Well Penetration Depth: 37.8 ft

Screen Length: 20. ft

Casing Radius: 0.0833 ft

Well Radius: 0.08333 ft

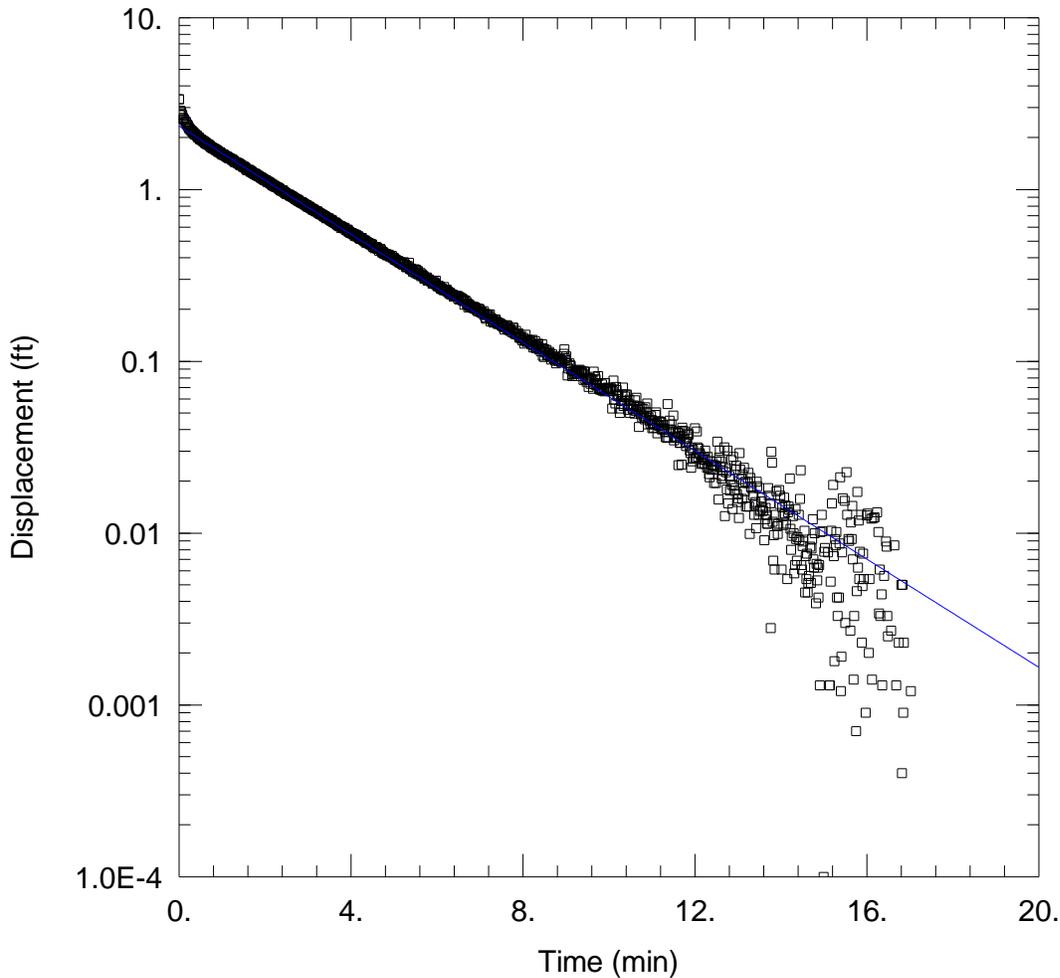
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

$K = 0.3809$ ft/day

$y_0 = 3.519$ ft



WELL TEST ANALYSIS

Data Set: K:\...\MW_11_Bouwer_Rice.aqt

Date: 05/20/16

Time: 11:55:43

PROJECT INFORMATION

Company: Hydrometrics

Project: 11048

Test Well: MW-11

Test Date: Forward

AQUIFER DATA

Saturated Thickness: 30. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-11)

Initial Displacement: 3.355 ft

Static Water Column Height: 37.8 ft

Total Well Penetration Depth: 37.8 ft

Screen Length: 20. ft

Casing Radius: 0.0833 ft

Well Radius: 0.08333 ft

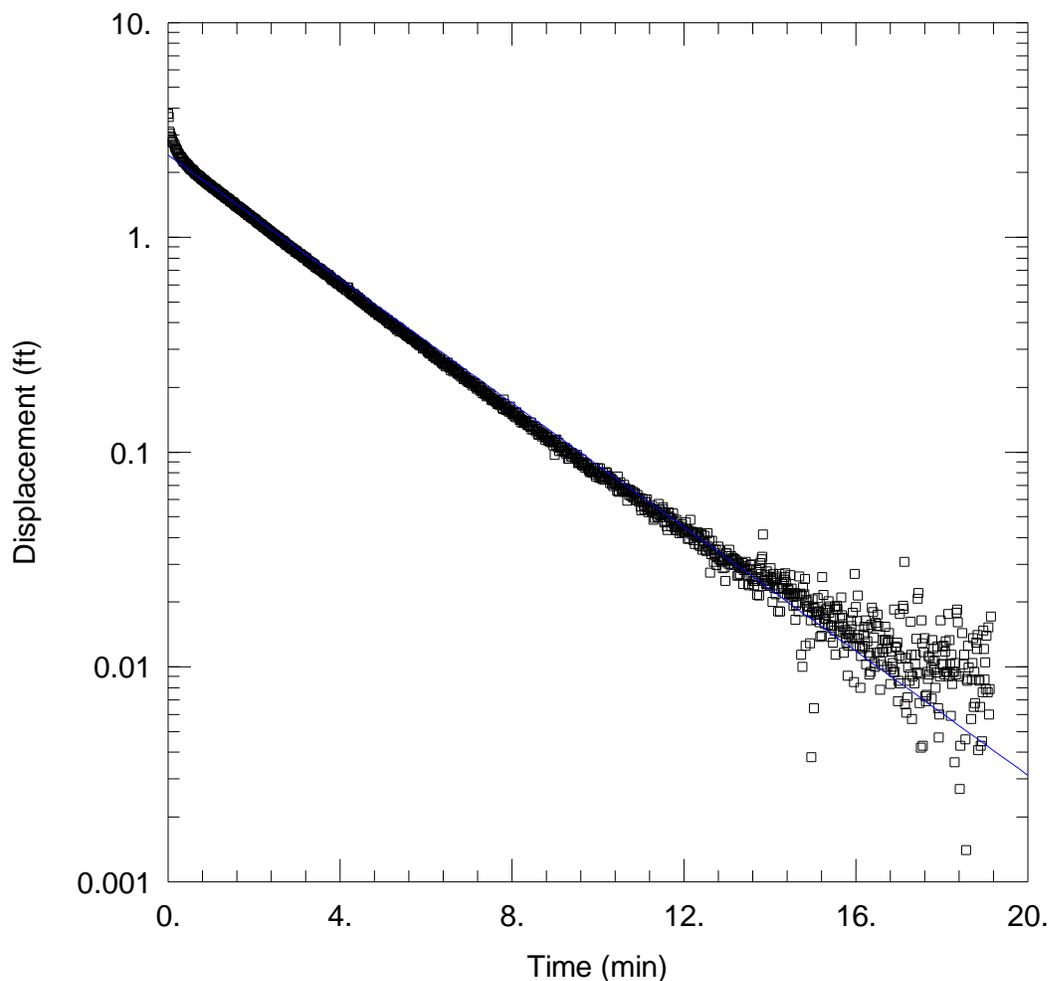
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 0.4275 ft/day

y0 = 2.328 ft



WELL TEST ANALYSIS

Data Set: K:\...\MW_11_Bouwer_Rice.aqt

Date: 05/20/16

Time: 11:56:16

PROJECT INFORMATION

Company: Hydrometrics

Project: 11048

Test Well: MW-11

Test Date: Forward

AQUIFER DATA

Saturated Thickness: 30. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-11)

Initial Displacement: 3.753 ft

Static Water Column Height: 37.8 ft

Total Well Penetration Depth: 37.8 ft

Screen Length: 20. ft

Casing Radius: 0.0833 ft

Well Radius: 0.08333 ft

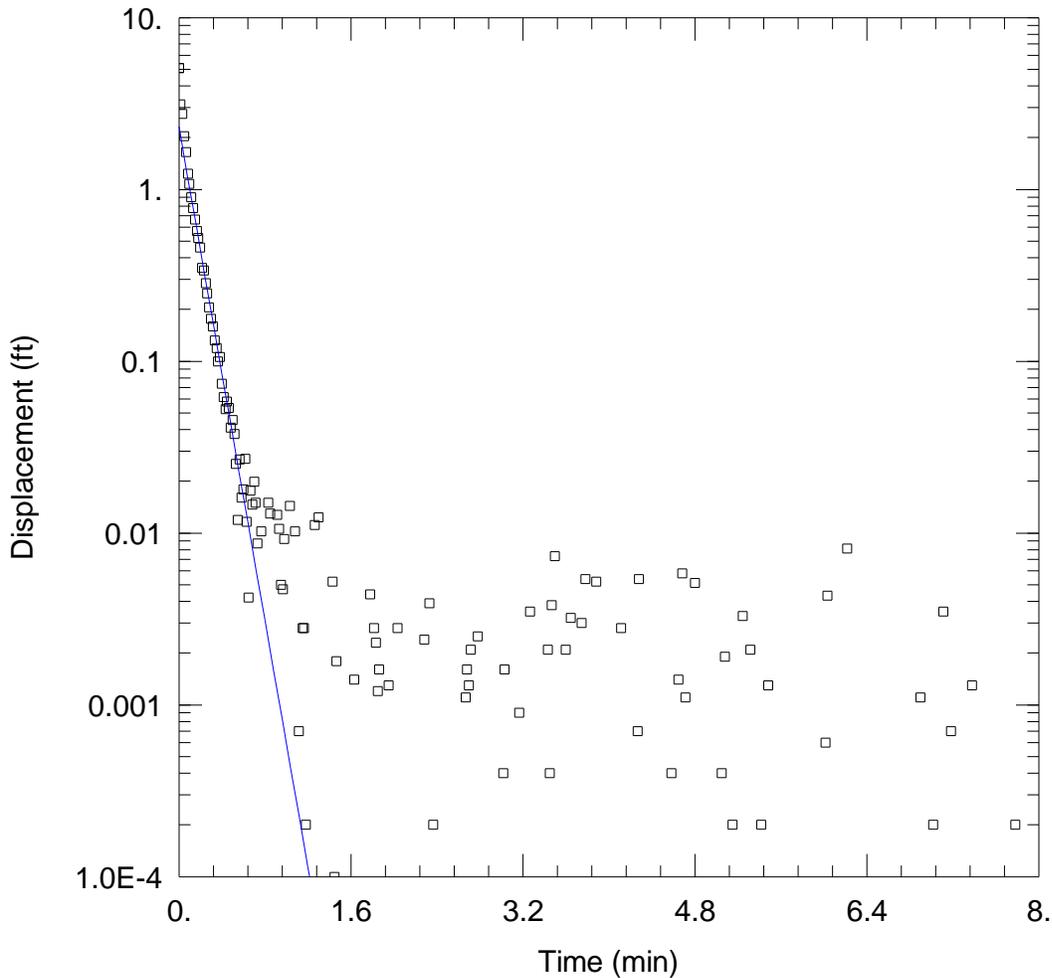
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 0.392 ft/day

y0 = 2.415 ft



WELL TEST ANALYSIS

Data Set: K:\...\MW_12_Bower_Rice.aqt

Date: 05/20/16

Time: 12:02:43

PROJECT INFORMATION

Company: Hydrometrics

Project: 11048

Test Well: MW-12

Test Date: Forward

AQUIFER DATA

Saturated Thickness: 20. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-12)

Initial Displacement: 5.095 ft

Static Water Column Height: 32.24 ft

Total Well Penetration Depth: 32.24 ft

Screen Length: 20. ft

Casing Radius: 0.0833 ft

Well Radius: 0.2 ft

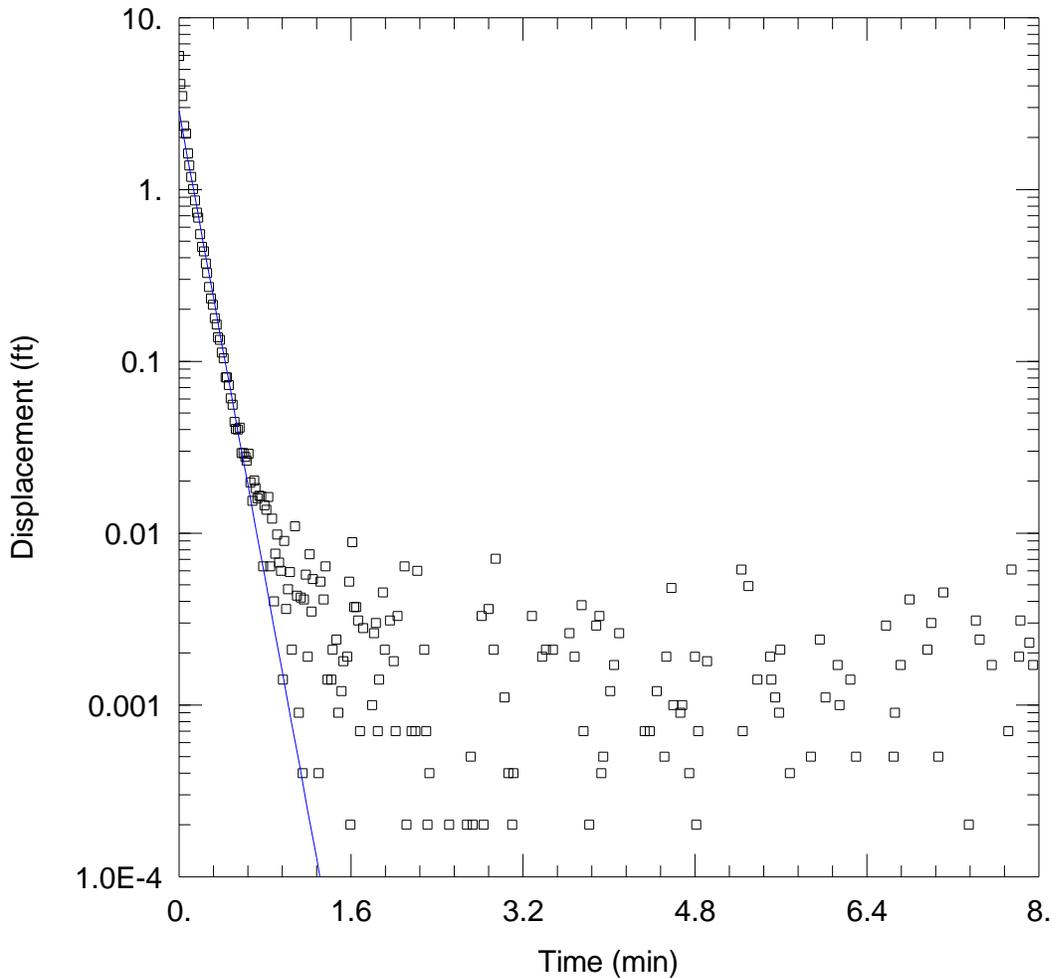
SOLUTION

Aquifer Model: Confined

Solution Method: Bower-Rice

K = 7.949 ft/day

y0 = 2.308 ft



WELL TEST ANALYSIS

Data Set: K:\...\MW_12_Bower_Rice.aqt

Date: 05/20/16

Time: 12:03:30

PROJECT INFORMATION

Company: Hydrometrics

Project: 11048

Test Well: MW-12

Test Date: Forward

AQUIFER DATA

Saturated Thickness: 30. ft

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (MW-12)

Initial Displacement: 5.95 ft

Static Water Column Height: 32.24 ft

Total Well Penetration Depth: 32.24 ft

Screen Length: 20. ft

Casing Radius: 0.0833 ft

Well Radius: 0.0833 ft

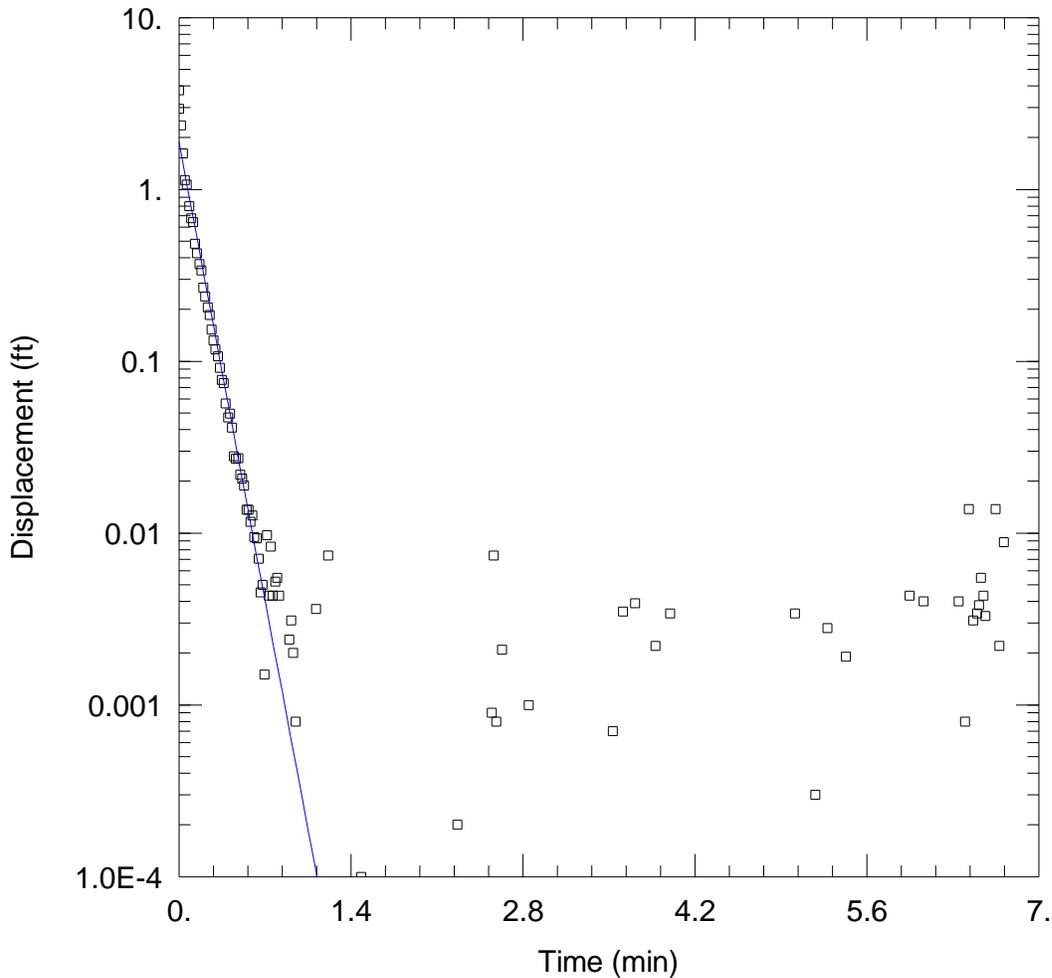
SOLUTION

Aquifer Model: Confined

Solution Method: Bower-Rice

$K = 9.028$ ft/day

$y_0 = 2.877$ ft



WELL TEST ANALYSIS

Data Set: K:\...\MW_12_BouwerRice.aqt

Date: 05/20/16

Time: 12:04:07

PROJECT INFORMATION

Company: Hydrometrics

Project: 11048

Test Well: MW-12

Test Date: Forward

AQUIFER DATA

Saturated Thickness: 30. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-12)

Initial Displacement: 3.762 ft

Static Water Column Height: 32.24 ft

Total Well Penetration Depth: 32.24 ft

Screen Length: 20. ft

Casing Radius: 0.0833 ft

Well Radius: 0.0833 ft

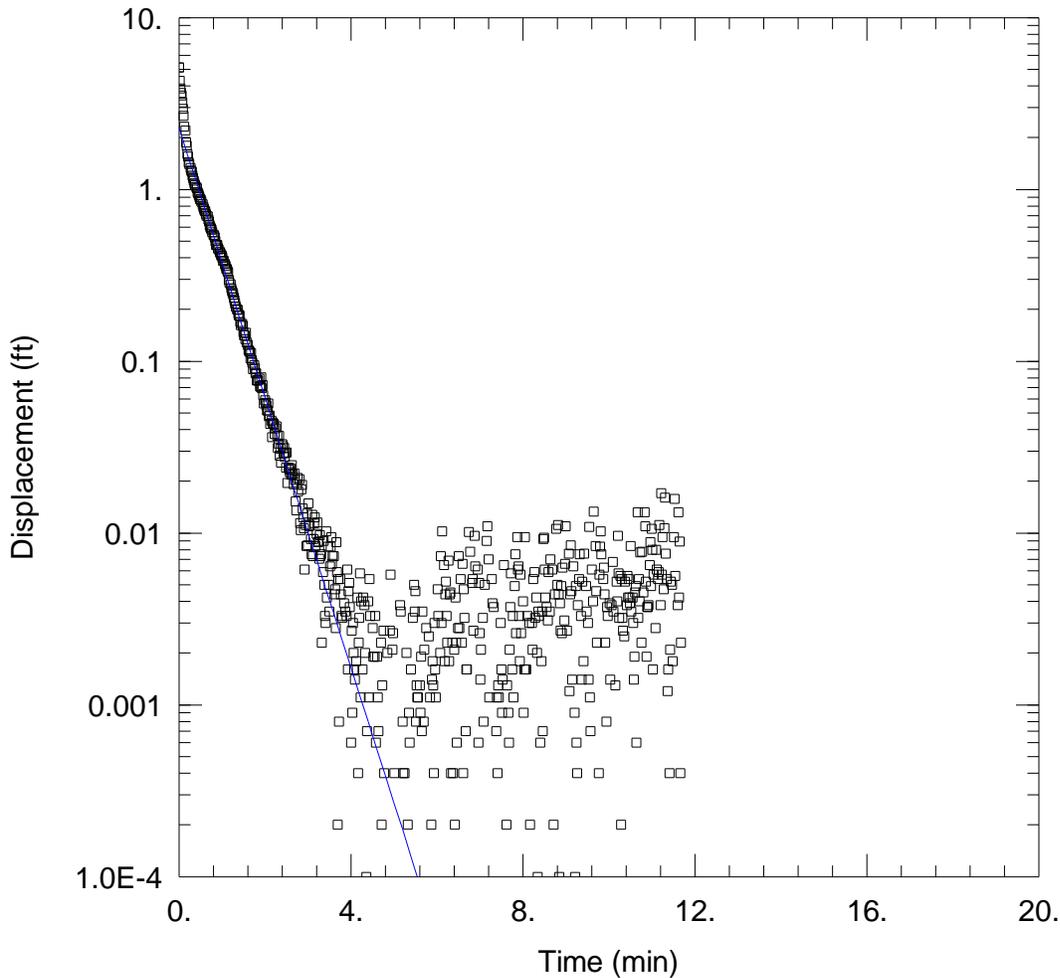
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 10.11 ft/day

y0 = 1.881 ft



WELL TEST ANALYSIS

Data Set: K:\...\MW-13_Bouwer_Rice.aqt

Date: 05/20/16

Time: 12:07:09

PROJECT INFORMATION

Company: Hydrometrics

Project: 11048

Test Well: MW-13

Test Date: Forward

AQUIFER DATA

Saturated Thickness: 20. ft

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (MW-13)

Initial Displacement: 5.129 ft

Static Water Column Height: 20. ft

Total Well Penetration Depth: 20. ft

Screen Length: 20. ft

Casing Radius: 0.0833 ft

Well Radius: 0.0833 ft

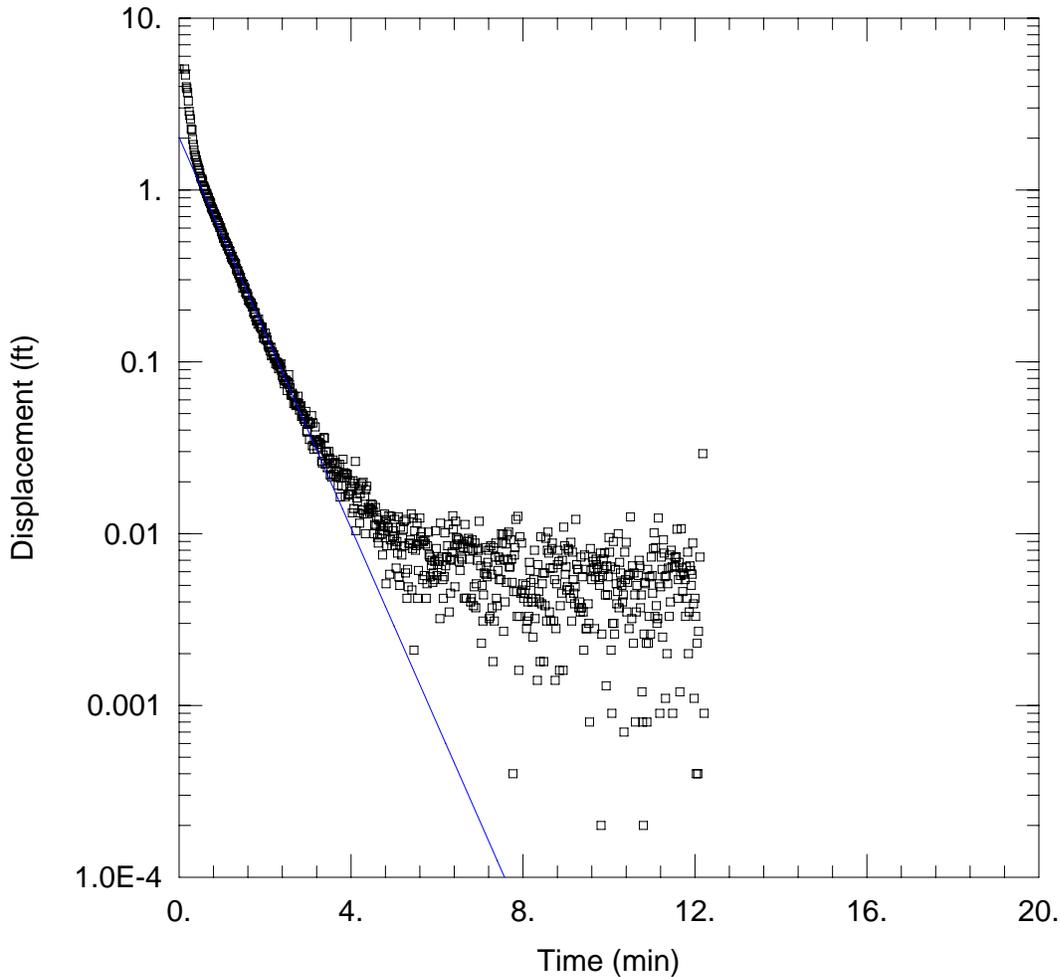
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 1.943$ ft/day

$y_0 = 2.294$ ft



WELL TEST ANALYSIS

Data Set: K:\...\MW-13_BouwerRice.aqt
 Date: 05/31/16

Time: 11:11:58

PROJECT INFORMATION

Company: Hydrometrics
 Project: 11048
 Test Well: MW-13
 Test Date: Forward

AQUIFER DATA

Saturated Thickness: 20. ft

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (MW-13)

Initial Displacement: 5.064 ft
 Total Well Penetration Depth: 20. ft
 Casing Radius: 0.08333 ft

Static Water Column Height: 20. ft
 Screen Length: 20. ft
 Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined
 $K =$ 1.407 ft/day

Solution Method: Bouwer-Rice
 $y_0 =$ 2.022 ft

APPENDIX C

LABORATORY ANALYTICAL REPORT



ANALYTICAL SUMMARY REPORT

April 11, 2016

Tintina Resources Inc
PO Box 431
White Sulphur Springs, MT 59645

Work Order: H16030522 Quote ID: H1216 - Surface and Groundwater Sampling
Project Name: 11048 Black Butte Copper Project

Energy Laboratories Inc Helena MT received the following 9 samples for Tintina Resources Inc on 3/31/2016 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
H16030522-001	BBC-1603-300	03/29/16 10:45	03/31/16	Groundwater	Metals by ICP/ICPMS, Dissolved Alkalinity Conductivity Mercury, Dissolved Fluoride Anions by Ion Chromatography Nitrogen, Nitrate + Nitrite Digestion, Mercury by CVAA Solids, Total Dissolved Solids, Total Suspended
H16030522-002	BBC-1603-301	03/29/16 11:25	03/31/16	Groundwater	Same As Above
H16030522-003	BBC-1603-302	03/29/16 11:40	03/31/16	Groundwater	Same As Above
H16030522-004	BBC-1603-303	03/29/16 12:20	03/31/16	Groundwater	Same As Above
H16030522-005	BBC-1603-304	03/29/16 13:30	03/31/16	Groundwater	Metals by ICP/ICPMS, Dissolved Alkalinity Conductivity Mercury, Dissolved Fluoride Anions by Ion Chromatography Nitrogen, Nitrate + Nitrite Metals Digestion by EPA 200.2 Digestion, Mercury by CVAA Solids, Total Dissolved Solids, Total Suspended
H16030522-006	BBC-1603-407	03/30/16 11:40	03/31/16	Groundwater	Metals by ICP/ICPMS, Dissolved Alkalinity Conductivity Mercury, Dissolved Fluoride Anions by Ion Chromatography Nitrogen, Nitrate + Nitrite Digestion, Mercury by CVAA Solids, Total Dissolved Solids, Total Suspended
H16030522-007	BBC-1603-409	03/30/16 12:45	03/31/16	Groundwater	Same As Above
H16030522-008	BBC-1603-410	03/30/16 13:00	03/31/16	Groundwater	Same As Above
H16030522-009	BBC-1603-411	03/30/16 14:30	03/31/16	Groundwater	Same As Above

The analyses presented in this report were performed by Energy Laboratories, Inc., 3161 E. Lyndale Ave., Helena, MT 59604, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.



ANALYTICAL SUMMARY REPORT

If you have any questions regarding these test results, please call.

Report Approved By:



CLIENT: Tintina Resources Inc
Project: 11048 Black Butte Copper Project
Work Order: H16030522

Report Date: 04/12/16

CASE NARRATIVE

Sample H16030522-005 (BBC-1603-304) for dissolved metals had sediment present in the sample container. Per EPA method 200.7 and 200.8, if a precipitate is formed during acidification, transport or storage the sample aliquot must be treated prior to analysis. The sample was digested using EPA 200.2. The sample was analyzed by EPA 200.7 and EPA 200.8 and the results were within duplication. abc 5/4/16



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Tintina Resources Inc
Project: 11048 Black Butte Copper Project
Lab ID: H16030522-001
Client Sample ID: BBC-1603-300

Report Date: 04/11/16
Collection Date: 03/29/16 10:45
Date Received: 03/31/16
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	26	mg/L		10		A2540 D	03/31/16 14:19 / SRW
Solids, Total Dissolved TDS @ 180 C	248	mg/L		10		A2540 C	03/31/16 14:12 / SRW
INORGANICS							
Alkalinity, Total as CaCO3	220	mg/L		4		A2320 B	03/31/16 15:18 / SRW
Chloride	1	mg/L		1		E300.0	03/31/16 19:22 / SRW
Sulfate	18	mg/L		1		E300.0	03/31/16 19:22 / SRW
Fluoride	0.1	mg/L		0.1	4	A4500-F C	04/04/16 12:26 / SRW
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.18	mg/L		0.01		E353.2	04/01/16 09:55 / cmm
METALS, DISSOLVED							
Aluminum	0.036	mg/L		0.009		E200.8	04/01/16 12:21 / dck
Antimony	ND	mg/L		0.0005		E200.8	04/01/16 12:21 / dck
Arsenic	ND	mg/L		0.001		E200.8	04/01/16 12:21 / dck
Barium	0.056	mg/L		0.003		E200.8	04/01/16 12:21 / dck
Beryllium	ND	mg/L		0.0008		E200.8	04/01/16 12:21 / dck
Cadmium	ND	mg/L		0.00003		E200.8	04/01/16 12:21 / dck
Calcium	59	mg/L		1		E200.7	04/04/16 14:21 / sld
Chromium	ND	mg/L		0.01		E200.8	04/01/16 12:21 / dck
Cobalt	ND	mg/L		0.01		E200.8	04/01/16 12:21 / dck
Copper	ND	mg/L		0.002		E200.8	04/01/16 12:21 / dck
Iron	0.02	mg/L		0.02		E200.8	04/01/16 12:21 / dck
Lead	ND	mg/L		0.0003		E200.8	04/01/16 12:21 / dck
Magnesium	20	mg/L		1		E200.8	04/01/16 12:21 / dck
Manganese	0.010	mg/L		0.005		E200.8	04/01/16 12:21 / dck
Mercury	ND	mg/L		5E-06		E245.1	04/04/16 16:16 / rgk
Molybdenum	ND	mg/L		0.002		E200.8	04/01/16 12:21 / dck
Nickel	ND	mg/L		0.001		E200.8	04/01/16 12:21 / dck
Potassium	ND	mg/L		1		E200.8	04/01/16 12:21 / dck
Selenium	0.0002	mg/L		0.0002		E200.8	04/01/16 12:21 / dck
Silver	ND	mg/L		0.02		E200.8	04/01/16 12:21 / dck
Sodium	1	mg/L		1		E200.8	04/01/16 12:21 / dck
Strontium	0.103	mg/L		0.0002		E200.8	04/01/16 12:21 / dck
Thallium	ND	mg/L		0.0002		E200.8	04/01/16 12:21 / dck
Uranium	ND	mg/L		0.008		E200.8	04/01/16 12:21 / dck
Zinc	ND	mg/L		0.002		E200.8	04/01/16 12:21 / dck

Report RL - Analyte reporting limit.
Definitions: QCL - Quality control limit.

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Tintina Resources Inc
Project: 11048 Black Butte Copper Project
Lab ID: H16030522-002
Client Sample ID: BBC-1603-301

Report Date: 04/11/16
Collection Date: 03/29/16 11:25
Date Received: 03/31/16
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	ND	mg/L		10		A2540 D	03/31/16 14:19 / SRW
Solids, Total Dissolved TDS @ 180 C	227	mg/L		10		A2540 C	03/31/16 14:12 / SRW
INORGANICS							
Alkalinity, Total as CaCO3	210	mg/L		4		A2320 B	03/31/16 15:26 / SRW
Chloride	ND	mg/L		1		E300.0	03/31/16 19:33 / SRW
Sulfate	13	mg/L		1		E300.0	03/31/16 19:33 / SRW
Fluoride	0.1	mg/L		0.1	4	A4500-F C	04/04/16 12:26 / SRW
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.15	mg/L		0.01		E353.2	04/01/16 09:59 / cmm
METALS, DISSOLVED							
Aluminum	ND	mg/L		0.009		E200.8	04/01/16 12:34 / dck
Antimony	ND	mg/L		0.0005		E200.8	04/01/16 12:34 / dck
Arsenic	ND	mg/L		0.001		E200.8	04/01/16 12:34 / dck
Barium	0.054	mg/L		0.003		E200.8	04/01/16 12:34 / dck
Beryllium	ND	mg/L		0.0008		E200.8	04/01/16 12:34 / dck
Cadmium	ND	mg/L		0.00003		E200.8	04/01/16 12:34 / dck
Calcium	58	mg/L		1		E200.7	04/04/16 14:43 / sld
Chromium	ND	mg/L		0.01		E200.8	04/01/16 12:34 / dck
Cobalt	ND	mg/L		0.01		E200.8	04/01/16 12:34 / dck
Copper	ND	mg/L		0.002		E200.8	04/01/16 12:34 / dck
Iron	ND	mg/L		0.02		E200.8	04/01/16 12:34 / dck
Lead	ND	mg/L		0.0003		E200.8	04/01/16 12:34 / dck
Magnesium	19	mg/L		1		E200.8	04/01/16 12:34 / dck
Manganese	ND	mg/L		0.005		E200.8	04/01/16 12:34 / dck
Mercury	ND	mg/L		5E-06		E245.1	04/04/16 16:19 / rgk
Molybdenum	ND	mg/L		0.002		E200.8	04/01/16 12:34 / dck
Nickel	ND	mg/L		0.001		E200.8	04/01/16 12:34 / dck
Potassium	ND	mg/L		1		E200.8	04/01/16 12:34 / dck
Selenium	0.0002	mg/L		0.0002		E200.8	04/01/16 12:34 / dck
Silver	ND	mg/L		0.02		E200.8	04/01/16 12:34 / dck
Sodium	2	mg/L		1		E200.8	04/01/16 12:34 / dck
Strontium	0.141	mg/L		0.0002		E200.8	04/01/16 12:34 / dck
Thallium	ND	mg/L		0.0002		E200.8	04/01/16 12:34 / dck
Uranium	ND	mg/L		0.008		E200.8	04/01/16 12:34 / dck
Zinc	ND	mg/L		0.002		E200.8	04/01/16 12:34 / dck

Report RL - Analyte reporting limit.
Definitions: QCL - Quality control limit.

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Tintina Resources Inc
Project: 11048 Black Butte Copper Project
Lab ID: H16030522-003
Client Sample ID: BBC-1603-302

Report Date: 04/11/16
Collection Date: 03/29/16 11:40
Date Received: 03/31/16
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	ND	mg/L		10		A2540 D	03/31/16 14:20 / SRW
Solids, Total Dissolved TDS @ 180 C	228	mg/L		10		A2540 C	03/31/16 14:12 / SRW
INORGANICS							
Alkalinity, Total as CaCO3	210	mg/L		4		A2320 B	03/31/16 15:42 / SRW
Chloride	ND	mg/L		1		E300.0	03/31/16 19:44 / SRW
Sulfate	13	mg/L		1		E300.0	03/31/16 19:44 / SRW
Fluoride	0.1	mg/L		0.1	4	A4500-F C	04/04/16 12:27 / SRW
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.15	mg/L		0.01		E353.2	04/01/16 10:00 / cmm
METALS, DISSOLVED							
Aluminum	ND	mg/L		0.009		E200.8	04/01/16 12:37 / dck
Antimony	ND	mg/L		0.0005		E200.8	04/01/16 12:37 / dck
Arsenic	ND	mg/L		0.001		E200.8	04/01/16 12:37 / dck
Barium	0.054	mg/L		0.003		E200.8	04/01/16 12:37 / dck
Beryllium	ND	mg/L		0.0008		E200.8	04/01/16 12:37 / dck
Cadmium	ND	mg/L		0.00003		E200.8	04/01/16 12:37 / dck
Calcium	58	mg/L		1		E200.7	04/04/16 14:47 / sld
Chromium	ND	mg/L		0.01		E200.8	04/01/16 12:37 / dck
Cobalt	ND	mg/L		0.01		E200.8	04/01/16 12:37 / dck
Copper	ND	mg/L		0.002		E200.8	04/01/16 12:37 / dck
Iron	ND	mg/L		0.02		E200.8	04/01/16 12:37 / dck
Lead	ND	mg/L		0.0003		E200.8	04/01/16 12:37 / dck
Magnesium	19	mg/L		1		E200.8	04/01/16 12:37 / dck
Manganese	ND	mg/L		0.005		E200.8	04/01/16 12:37 / dck
Mercury	ND	mg/L		5E-06		E245.1	04/04/16 16:28 / rgk
Molybdenum	ND	mg/L		0.002		E200.8	04/01/16 12:37 / dck
Nickel	ND	mg/L		0.001		E200.8	04/01/16 12:37 / dck
Potassium	ND	mg/L		1		E200.8	04/01/16 12:37 / dck
Selenium	ND	mg/L		0.0002		E200.8	04/01/16 12:37 / dck
Silver	ND	mg/L		0.02		E200.8	04/01/16 12:37 / dck
Sodium	2	mg/L		1		E200.8	04/01/16 12:37 / dck
Strontium	0.141	mg/L		0.0002		E200.8	04/01/16 12:37 / dck
Thallium	ND	mg/L		0.0002		E200.8	04/01/16 12:37 / dck
Uranium	ND	mg/L		0.008		E200.8	04/01/16 12:37 / dck
Zinc	ND	mg/L		0.002		E200.8	04/01/16 12:37 / dck

Report RL - Analyte reporting limit.
Definitions: QCL - Quality control limit.

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Tintina Resources Inc
Project: 11048 Black Butte Copper Project
Lab ID: H16030522-004
Client Sample ID: BBC-1603-303

Report Date: 04/11/16
Collection Date: 03/29/16 12:20
Date Received: 03/31/16
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	48	mg/L		10		A2540 D	03/31/16 14:20 / SRW
Solids, Total Dissolved TDS @ 180 C	238	mg/L		10		A2540 C	03/31/16 14:12 / SRW
INORGANICS							
Alkalinity, Total as CaCO3	170	mg/L		4		A2320 B	03/31/16 15:50 / SRW
Chloride	2	mg/L		1		E300.0	03/31/16 19:55 / SRW
Sulfate	31	mg/L		1		E300.0	03/31/16 19:55 / SRW
Fluoride	0.1	mg/L		0.1	4	A4500-F C	04/04/16 12:27 / SRW
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.38	mg/L		0.01		E353.2	04/01/16 10:01 / cmm
METALS, DISSOLVED							
Aluminum	0.263	mg/L		0.009		E200.8	04/01/16 12:41 / dck
Antimony	ND	mg/L		0.0005		E200.8	04/01/16 12:41 / dck
Arsenic	ND	mg/L		0.001		E200.8	04/01/16 12:41 / dck
Barium	0.148	mg/L		0.003		E200.8	04/01/16 12:41 / dck
Beryllium	ND	mg/L		0.0008		E200.8	04/01/16 12:41 / dck
Cadmium	ND	mg/L		0.00003		E200.8	04/01/16 12:41 / dck
Calcium	41	mg/L		1		E200.8	04/01/16 12:41 / dck
Chromium	ND	mg/L		0.01		E200.8	04/01/16 12:41 / dck
Cobalt	ND	mg/L		0.01		E200.8	04/01/16 12:41 / dck
Copper	ND	mg/L		0.002		E200.8	04/01/16 12:41 / dck
Iron	0.07	mg/L		0.02		E200.8	04/01/16 12:41 / dck
Lead	ND	mg/L		0.0003		E200.8	04/01/16 12:41 / dck
Magnesium	11	mg/L		1		E200.8	04/01/16 12:41 / dck
Manganese	0.005	mg/L		0.005		E200.8	04/01/16 12:41 / dck
Mercury	ND	mg/L		5E-06		E245.1	04/04/16 16:31 / rgk
Molybdenum	ND	mg/L		0.002		E200.8	04/01/16 12:41 / dck
Nickel	ND	mg/L		0.001		E200.8	04/01/16 12:41 / dck
Potassium	2	mg/L		1		E200.8	04/01/16 12:41 / dck
Selenium	ND	mg/L		0.0002		E200.8	04/01/16 12:41 / dck
Silver	ND	mg/L		0.02		E200.8	04/01/16 12:41 / dck
Sodium	21	mg/L		1		E200.8	04/01/16 12:41 / dck
Strontium	0.261	mg/L		0.0002		E200.8	04/01/16 12:41 / dck
Thallium	ND	mg/L		0.0002		E200.8	04/01/16 12:41 / dck
Uranium	ND	mg/L		0.008		E200.8	04/01/16 12:41 / dck
Zinc	ND	mg/L		0.002		E200.8	04/01/16 12:41 / dck

Report RL - Analyte reporting limit.
Definitions: QCL - Quality control limit.

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Tintina Resources Inc
Project: 11048 Black Butte Copper Project
Lab ID: H16030522-005
Client Sample ID: BBC-1603-304

Report Date: 04/11/16
Collection Date: 03/29/16 13:30
Date Received: 03/31/16
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	516	mg/L	D	40		A2540 D	03/31/16 14:20 / SRW
Solids, Total Dissolved TDS @ 180 C	244	mg/L		40		A2540 C	03/31/16 14:13 / SRW
INORGANICS							
Alkalinity, Total as CaCO3	180	mg/L		4		A2320 B	03/31/16 15:56 / SRW
Chloride	4	mg/L		1		E300.0	03/31/16 20:06 / SRW
Sulfate	8	mg/L		1		E300.0	03/31/16 20:06 / SRW
Fluoride	0.4	mg/L		0.1	4	A4500-F C	04/04/16 12:27 / SRW
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.50	mg/L		0.01		E353.2	04/01/16 10:02 / cmm
METALS, DISSOLVED							
Aluminum	3.66	mg/L	D	0.02		E200.7	04/05/16 10:27 / sld
Antimony	ND	mg/L		0.0005		E200.8	04/05/16 15:13 / dck
Arsenic	ND	mg/L		0.001		E200.8	04/05/16 15:13 / dck
Barium	0.211	mg/L		0.003		E200.8	04/05/16 15:13 / dck
Beryllium	ND	mg/L		0.0008		E200.8	04/05/16 15:13 / dck
Cadmium	0.00008	mg/L		0.00003		E200.8	04/05/16 15:13 / dck
Calcium	46	mg/L		1		E200.7	04/05/16 10:27 / sld
Chromium	0.01	mg/L		0.01		E200.8	04/05/16 15:13 / dck
Cobalt	ND	mg/L		0.01		E200.8	04/05/16 15:13 / dck
Copper	0.010	mg/L		0.002		E200.8	04/05/16 15:13 / dck
Iron	3.58	mg/L		0.02		E200.7	04/05/16 10:27 / sld
Lead	0.0021	mg/L		0.0003		E200.8	04/05/16 15:13 / dck
Magnesium	17	mg/L		1		E200.7	04/05/16 10:27 / sld
Manganese	0.168	mg/L		0.005		E200.7	04/05/16 10:27 / sld
Mercury	6.6E-06	mg/L		5E-06		E245.1	04/04/16 16:34 / rgk
Molybdenum	0.012	mg/L		0.002		E200.8	04/05/16 15:13 / dck
Nickel	0.009	mg/L		0.001		E200.8	04/05/16 15:13 / dck
Potassium	7	mg/L		1		E200.7	04/05/16 10:27 / sld
Selenium	0.0002	mg/L		0.0002		E200.8	04/06/16 15:55 / dck
Silver	ND	mg/L		0.02		E200.8	04/05/16 15:13 / dck
Sodium	11	mg/L		1		E200.7	04/05/16 10:27 / sld
Strontium	0.796	mg/L		0.0002		E200.7	04/05/16 10:27 / sld
Thallium	ND	mg/L		0.0002		E200.8	04/05/16 15:13 / dck
Uranium	0.008	mg/L		0.008		E200.8	04/05/16 15:13 / dck
Zinc	0.015	mg/L		0.002		E200.8	04/05/16 15:13 / dck

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Tintina Resources Inc
Project: 11048 Black Butte Copper Project
Lab ID: H16030522-006
Client Sample ID: BBC-1603-407

Report Date: 04/11/16
Collection Date: 03/30/16 11:40
Date Received: 03/31/16
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	ND	mg/L		10		A2540 D	03/31/16 14:20 / SRW
Solids, Total Dissolved TDS @ 180 C	257	mg/L		10		A2540 C	03/31/16 14:13 / SRW
INORGANICS							
Alkalinity, Total as CaCO3	200	mg/L		4		A2320 B	03/31/16 16:03 / SRW
Chloride	1	mg/L		1		E300.0	03/31/16 20:17 / SRW
Sulfate	40	mg/L		1		E300.0	03/31/16 20:17 / SRW
Fluoride	0.2	mg/L		0.1	4	A4500-F C	04/04/16 12:28 / SRW
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.25	mg/L		0.01		E353.2	04/01/16 10:03 / cmm
METALS, DISSOLVED							
Aluminum	ND	mg/L		0.009		E200.8	04/01/16 12:57 / dck
Antimony	ND	mg/L		0.0005		E200.8	04/01/16 12:57 / dck
Arsenic	ND	mg/L		0.001		E200.8	04/01/16 12:57 / dck
Barium	0.109	mg/L		0.003		E200.8	04/01/16 12:57 / dck
Beryllium	ND	mg/L		0.0008		E200.8	04/01/16 12:57 / dck
Cadmium	ND	mg/L		0.00003		E200.8	04/01/16 12:57 / dck
Calcium	49	mg/L		1		E200.8	04/01/16 12:57 / dck
Chromium	ND	mg/L		0.01		E200.8	04/01/16 12:57 / dck
Cobalt	ND	mg/L		0.01		E200.8	04/01/16 12:57 / dck
Copper	ND	mg/L		0.002		E200.8	04/01/16 12:57 / dck
Iron	ND	mg/L		0.02		E200.8	04/01/16 12:57 / dck
Lead	ND	mg/L		0.0003		E200.8	04/01/16 12:57 / dck
Magnesium	26	mg/L		1		E200.8	04/01/16 12:57 / dck
Manganese	0.006	mg/L		0.005		E200.8	04/01/16 12:57 / dck
Mercury	ND	mg/L		5E-06		E245.1	04/04/16 16:36 / rgk
Molybdenum	ND	mg/L		0.002		E200.8	04/01/16 12:57 / dck
Nickel	ND	mg/L		0.001		E200.8	04/01/16 12:57 / dck
Potassium	2	mg/L		1		E200.8	04/01/16 12:57 / dck
Selenium	0.0005	mg/L		0.0002		E200.8	04/01/16 12:57 / dck
Silver	ND	mg/L		0.02		E200.8	04/01/16 12:57 / dck
Sodium	2	mg/L		1		E200.8	04/01/16 12:57 / dck
Strontium	0.0711	mg/L		0.0002		E200.8	04/01/16 12:57 / dck
Thallium	0.0003	mg/L		0.0002		E200.8	04/01/16 12:57 / dck
Uranium	ND	mg/L		0.008		E200.8	04/01/16 12:57 / dck
Zinc	0.002	mg/L		0.002		E200.8	04/01/16 12:57 / dck

Report RL - Analyte reporting limit.
Definitions: QCL - Quality control limit.

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Tintina Resources Inc
Project: 11048 Black Butte Copper Project
Lab ID: H16030522-007
Client Sample ID: BBC-1603-409

Report Date: 04/11/16
Collection Date: 03/30/16 12:45
Date Received: 03/31/16
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	ND	mg/L		10		A2540 D	03/31/16 14:21 / SRW
Solids, Total Dissolved TDS @ 180 C	231	mg/L		10		A2540 C	03/31/16 14:13 / SRW
INORGANICS							
Alkalinity, Total as CaCO3	210	mg/L		4		A2320 B	03/31/16 16:09 / SRW
Chloride	ND	mg/L		1		E300.0	03/31/16 20:28 / SRW
Sulfate	16	mg/L		1		E300.0	03/31/16 20:28 / SRW
Fluoride	0.1	mg/L		0.1	4	A4500-F C	04/04/16 12:28 / SRW
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.26	mg/L		0.01		E353.2	04/01/16 10:05 / cmm
METALS, DISSOLVED							
Aluminum	ND	mg/L		0.009		E200.8	04/01/16 13:00 / dck
Antimony	ND	mg/L		0.0005		E200.8	04/01/16 13:00 / dck
Arsenic	ND	mg/L		0.001		E200.8	04/01/16 13:00 / dck
Barium	0.046	mg/L		0.003		E200.8	04/01/16 13:00 / dck
Beryllium	ND	mg/L		0.0008		E200.8	04/01/16 13:00 / dck
Cadmium	ND	mg/L		0.00003		E200.8	04/01/16 13:00 / dck
Calcium	56	mg/L		1		E200.7	04/04/16 14:51 / sld
Chromium	ND	mg/L		0.01		E200.8	04/01/16 13:00 / dck
Cobalt	ND	mg/L		0.01		E200.8	04/01/16 13:00 / dck
Copper	ND	mg/L		0.002		E200.8	04/01/16 13:00 / dck
Iron	ND	mg/L		0.02		E200.8	04/01/16 13:00 / dck
Lead	ND	mg/L		0.0003		E200.8	04/01/16 13:00 / dck
Magnesium	20	mg/L		1		E200.8	04/01/16 13:00 / dck
Manganese	ND	mg/L		0.005		E200.8	04/01/16 13:00 / dck
Mercury	ND	mg/L		5E-06		E245.1	04/04/16 16:39 / rgk
Molybdenum	ND	mg/L		0.002		E200.8	04/01/16 13:00 / dck
Nickel	ND	mg/L		0.001		E200.8	04/01/16 13:00 / dck
Potassium	ND	mg/L		1		E200.8	04/01/16 13:00 / dck
Selenium	0.0002	mg/L		0.0002		E200.8	04/01/16 13:00 / dck
Silver	ND	mg/L		0.02		E200.8	04/01/16 13:00 / dck
Sodium	1	mg/L		1		E200.8	04/01/16 13:00 / dck
Strontium	0.0991	mg/L		0.0002		E200.8	04/01/16 13:00 / dck
Thallium	ND	mg/L		0.0002		E200.8	04/01/16 13:00 / dck
Uranium	ND	mg/L		0.008		E200.8	04/01/16 13:00 / dck
Zinc	0.020	mg/L		0.002		E200.8	04/01/16 13:00 / dck

Report RL - Analyte reporting limit.
Definitions: QCL - Quality control limit.

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Tintina Resources Inc
Project: 11048 Black Butte Copper Project
Lab ID: H16030522-008
Client Sample ID: BBC-1603-410

Report Date: 04/11/16
Collection Date: 03/30/16 13:00
Date Received: 03/31/16
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	ND	mg/L		10		A2540 D	03/31/16 14:21 / SRW
Solids, Total Dissolved TDS @ 180 C	230	mg/L		10		A2540 C	03/31/16 14:13 / SRW
INORGANICS							
Alkalinity, Total as CaCO3	210	mg/L		4		A2320 B	03/31/16 16:16 / SRW
Chloride	ND	mg/L		1		E300.0	03/31/16 20:40 / SRW
Sulfate	16	mg/L		1		E300.0	03/31/16 20:40 / SRW
Fluoride	0.1	mg/L		0.1	4	A4500-F C	04/04/16 12:29 / SRW
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.26	mg/L		0.01		E353.2	04/01/16 10:06 / cmm
METALS, DISSOLVED							
Aluminum	ND	mg/L		0.009		E200.8	04/01/16 13:10 / dck
Antimony	ND	mg/L		0.0005		E200.8	04/01/16 13:10 / dck
Arsenic	ND	mg/L		0.001		E200.8	04/01/16 13:10 / dck
Barium	0.044	mg/L		0.003		E200.8	04/01/16 13:10 / dck
Beryllium	ND	mg/L		0.0008		E200.8	04/01/16 13:10 / dck
Cadmium	ND	mg/L		0.00003		E200.8	04/01/16 13:10 / dck
Calcium	56	mg/L		1		E200.7	04/04/16 14:54 / sld
Chromium	ND	mg/L		0.01		E200.8	04/01/16 13:10 / dck
Cobalt	ND	mg/L		0.01		E200.8	04/01/16 13:10 / dck
Copper	ND	mg/L		0.002		E200.8	04/01/16 13:10 / dck
Iron	ND	mg/L		0.02		E200.8	04/01/16 13:10 / dck
Lead	ND	mg/L		0.0003		E200.8	04/01/16 13:10 / dck
Magnesium	20	mg/L		1		E200.8	04/01/16 13:10 / dck
Manganese	ND	mg/L		0.005		E200.8	04/01/16 13:10 / dck
Mercury	ND	mg/L		5E-06		E245.1	04/04/16 16:42 / rgk
Molybdenum	ND	mg/L		0.002		E200.8	04/01/16 13:10 / dck
Nickel	ND	mg/L		0.001		E200.8	04/01/16 13:10 / dck
Potassium	ND	mg/L		1		E200.8	04/01/16 13:10 / dck
Selenium	0.0002	mg/L		0.0002		E200.8	04/01/16 13:10 / dck
Silver	ND	mg/L		0.02		E200.8	04/01/16 13:10 / dck
Sodium	1	mg/L		1		E200.8	04/01/16 13:10 / dck
Strontium	0.0977	mg/L		0.0002		E200.8	04/01/16 13:10 / dck
Thallium	ND	mg/L		0.0002		E200.8	04/01/16 13:10 / dck
Uranium	ND	mg/L		0.008		E200.8	04/01/16 13:10 / dck
Zinc	0.021	mg/L		0.002		E200.8	04/01/16 13:10 / dck

Report RL - Analyte reporting limit.
Definitions: QCL - Quality control limit.

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.



LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Tintina Resources Inc
Project: 11048 Black Butte Copper Project
Lab ID: H16030522-009
Client Sample ID: BBC-1603-411

Report Date: 04/11/16
Collection Date: 03/30/16 14:30
Date Received: 03/31/16
Matrix: Groundwater

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	ND	mg/L		10		A2540 D	03/31/16 14:21 / SRW
Solids, Total Dissolved TDS @ 180 C	187	mg/L		10		A2540 C	03/31/16 14:13 / SRW
INORGANICS							
Alkalinity, Total as CaCO3	170	mg/L		4		A2320 B	03/31/16 16:23 / SRW
Chloride	1	mg/L		1		E300.0	03/31/16 20:51 / SRW
Sulfate	11	mg/L		1		E300.0	03/31/16 20:51 / SRW
Fluoride	0.3	mg/L		0.1	4	A4500-F C	04/04/16 12:31 / SRW
NUTRIENTS							
Nitrogen, Nitrate+Nitrite as N	0.32	mg/L		0.01		E353.2	04/01/16 10:07 / cmm
METALS, DISSOLVED							
Aluminum	ND	mg/L		0.009		E200.8	04/01/16 13:13 / dck
Antimony	ND	mg/L		0.0005		E200.8	04/01/16 13:13 / dck
Arsenic	0.004	mg/L		0.001		E200.8	04/01/16 13:13 / dck
Barium	0.112	mg/L		0.003		E200.8	04/01/16 13:13 / dck
Beryllium	ND	mg/L		0.0008		E200.8	04/01/16 13:13 / dck
Cadmium	ND	mg/L		0.00003		E200.8	04/01/16 13:13 / dck
Calcium	43	mg/L		1		E200.8	04/01/16 13:13 / dck
Chromium	ND	mg/L		0.01		E200.8	04/01/16 13:13 / dck
Cobalt	ND	mg/L		0.01		E200.8	04/01/16 13:13 / dck
Copper	ND	mg/L		0.002		E200.8	04/01/16 13:13 / dck
Iron	ND	mg/L		0.02		E200.8	04/01/16 13:13 / dck
Lead	ND	mg/L		0.0003		E200.8	04/01/16 13:13 / dck
Magnesium	15	mg/L		1		E200.8	04/01/16 13:13 / dck
Manganese	ND	mg/L		0.005		E200.8	04/01/16 13:13 / dck
Mercury	ND	mg/L		5E-06		E245.1	04/04/16 16:45 / rgk
Molybdenum	ND	mg/L		0.002		E200.8	04/01/16 13:13 / dck
Nickel	ND	mg/L		0.001		E200.8	04/01/16 13:13 / dck
Potassium	3	mg/L		1		E200.8	04/01/16 13:13 / dck
Selenium	0.0004	mg/L		0.0002		E200.8	04/01/16 13:13 / dck
Silver	ND	mg/L		0.02		E200.8	04/01/16 13:13 / dck
Sodium	4	mg/L		1		E200.8	04/01/16 13:13 / dck
Strontium	0.165	mg/L		0.0002		E200.8	04/01/16 13:13 / dck
Thallium	0.0010	mg/L		0.0002		E200.8	04/01/16 13:13 / dck
Uranium	ND	mg/L		0.008		E200.8	04/01/16 13:13 / dck
Zinc	ND	mg/L		0.002		E200.8	04/01/16 13:13 / dck

Report RL - Analyte reporting limit.
Definitions: QCL - Quality control limit.

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Tintina Resources Inc

Report Date: 04/11/16

Project: 11048 Black Butte Copper Project

Work Order: H16030522

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Batch: R114128
Lab ID: MB		Method Blank								Run: PHSC_101-H_160331A 03/31/16 13:38
Alkalinity, Total as CaCO3	2	mg/L		0.2						
Lab ID: LCS		Laboratory Control Sample								Run: PHSC_101-H_160331A 03/31/16 13:44
Alkalinity, Total as CaCO3	600	mg/L		4.0	100	90	110			
Lab ID: H16030519-003ADUP		Sample Duplicate								Run: PHSC_101-H_160331A 03/31/16 14:19
Alkalinity, Total as CaCO3	260	mg/L		4.0				0.6	10	
Lab ID: H16030522-002ADUP		Sample Duplicate								Run: PHSC_101-H_160331A 03/31/16 15:34
Alkalinity, Total as CaCO3	220	mg/L		4.0				1.1	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Tintina Resources Inc

Report Date: 04/11/16

Project: 11048 Black Butte Copper Project

Work Order: H16030522

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 C Batch: TDS160331A										
Lab ID: MB-1_160331A		Method Blank						Run: ACCU-124 (14410200)_16033	03/31/16 14:11	
Solids, Total Dissolved TDS @ 180 C	3		mg/L	3						
Lab ID: LCS-2_160331A		Laboratory Control Sample						Run: ACCU-124 (14410200)_16033	03/31/16 14:11	
Solids, Total Dissolved TDS @ 180 C	2020		mg/L	20	101	90	110			
Lab ID: H16030522-001A DUP		Sample Duplicate						Run: ACCU-124 (14410200)_16033	03/31/16 14:12	
Solids, Total Dissolved TDS @ 180 C	256		mg/L	10				3.2	5	
Lab ID: H16030519-001A DUP		Sample Duplicate						Run: ACCU-124 (14410200)_16033	03/31/16 14:14	
Solids, Total Dissolved TDS @ 180 C	776		mg/L	20				0.0	5	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Tintina Resources Inc

Report Date: 04/11/16

Project: 11048 Black Butte Copper Project

Work Order: H16030522

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 D								Batch: TSS160331A		
Lab ID: MB-1_160331A		Method Blank						Run: ACCU-124 (14410200)_16033	03/31/16 14:18	
Solids, Total Suspended TSS @ 105 C		ND	mg/L	0.1						
Lab ID: LCS-2_160331A		Laboratory Control Sample						Run: ACCU-124 (14410200)_16033	03/31/16 14:19	
Solids, Total Suspended TSS @ 105 C		93.0	mg/L	10	93	80	120			
Lab ID: H16030522-001ADUP		Sample Duplicate						Run: ACCU-124 (14410200)_16033	03/31/16 14:19	
Solids, Total Suspended TSS @ 105 C		25.0	mg/L	10				3.9	5	
Lab ID: H16030517-001BDUP		Sample Duplicate						Run: ACCU-124 (14410200)_16033	03/31/16 14:22	
Solids, Total Suspended TSS @ 105 C		103	mg/L	33				3.3	5	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Tintina Resources Inc

Report Date: 04/11/16

Project: 11048 Black Butte Copper Project

Work Order: H16030522

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-F C										Analytical Run: PH2_160404A
Lab ID: ICV1_160404A		Initial Calibration Verification Standard								04/04/16 12:22
Fluoride		0.8	mg/L	0.1	104	90	110			
Lab ID: CCV1_160404A		Continuing Calibration Verification Standard								04/04/16 12:29
Fluoride		0.2	mg/L	0.1	92	90	110			
Method: A4500-F C										Batch: 160404A-F-ISE-W
Lab ID: MBLK1_160404A		Method Blank					Run: PH2_160404A			04/04/16 12:23
Fluoride		ND	mg/L	0.01						
Lab ID: H16030504-001AMS		Sample Matrix Spike					Run: PH2_160404A			04/04/16 12:24
Fluoride		0.8	mg/L	0.1	106	85	115			
Lab ID: H16030504-002ADUP		Sample Duplicate					Run: PH2_160404A			04/04/16 12:25
Fluoride		0.4	mg/L	0.1				0.0	10	
Lab ID: H16030527-001BDUP		Sample Duplicate					Run: PH2_160404A			04/04/16 12:33
Fluoride		0.6	mg/L	0.1				1.5	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Tintina Resources Inc

Report Date: 04/11/16

Project: 11048 Black Butte Copper Project

Work Order: H16030522

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
Method: E200.7										Analytical Run: ICP2-HE_160404B	
Lab ID: ICV		Initial Calibration Verification Standard								04/04/16 13:02	
Calcium		40.5	mg/L	1.0	101	95	105				
Lab ID: CCV-1		Continuing Calibration Verification Standard								04/04/16 13:05	
Calcium		25.3	mg/L	1.0	101	95	105				
Lab ID: ICSA		Interference Check Sample A								04/04/16 13:40	
Calcium		470	mg/L	1.0	94	80	120				
Lab ID: ICSAB		Interference Check Sample AB								04/04/16 13:44	
Calcium		471	mg/L	1.0	94	80	120				
Lab ID: CCV		Continuing Calibration Verification Standard								04/04/16 13:52	
Calcium		25.8	mg/L	1.0	103	90	110				
Lab ID: CCV		Continuing Calibration Verification Standard								04/04/16 14:36	
Calcium		24.9	mg/L	1.0	100	90	110				
Method: E200.7										Batch: R114224	
Lab ID: MB		Method Blank								Run: ICP2-HE_160404B	04/04/16 13:59
Calcium		0.06	mg/L	0.02							
Lab ID: LFB		Laboratory Fortified Blank								Run: ICP2-HE_160404B	04/04/16 14:03
Calcium		50.7	mg/L	1.0	101	85	115				
Lab ID: H16030515-001BMS2		Sample Matrix Spike								Run: ICP2-HE_160404B	04/04/16 14:14
Calcium		107	mg/L	1.0	100	70	130				
Lab ID: H16030515-001BMSD		Sample Matrix Spike Duplicate								Run: ICP2-HE_160404B	04/04/16 14:18
Calcium		106	mg/L	1.0	98	70	130	1.0	20		
Lab ID: H16030522-001BMS2		Sample Matrix Spike								Run: ICP2-HE_160404B	04/04/16 14:29
Calcium		109	mg/L	1.0	99	70	130				
Lab ID: H16030522-001BMSD		Sample Matrix Spike Duplicate								Run: ICP2-HE_160404B	04/04/16 14:32
Calcium		108	mg/L	1.0	97	70	130	0.8	20		

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Tintina Resources Inc

Report Date: 04/11/16

Project: 11048 Black Butte Copper Project

Work Order: H16030522

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7								Analytical Run: ICP2-HE_160405A		
Lab ID: ICV	8	Initial Calibration Verification Standard								04/05/16 08:57
Aluminum		4.04	mg/L	0.10	101	95	105			
Calcium		41.1	mg/L	1.0	103	95	105			
Iron		4.08	mg/L	0.020	102	95	105			
Magnesium		40.7	mg/L	1.0	102	95	105			
Manganese		4.04	mg/L	0.010	101	95	105			
Potassium		40.5	mg/L	1.0	101	95	105			
Sodium		40.4	mg/L	1.0	101	95	105			
Strontium		0.799	mg/L	0.10	100	95	105			
Lab ID: CCV-1	8	Continuing Calibration Verification Standard								04/05/16 09:00
Aluminum		2.52	mg/L	0.10	101	95	105			
Calcium		25.8	mg/L	1.0	103	95	105			
Iron		2.56	mg/L	0.020	102	95	105			
Magnesium		25.4	mg/L	1.0	102	95	105			
Manganese		2.52	mg/L	0.010	101	95	105			
Potassium		25.1	mg/L	1.0	101	95	105			
Sodium		25.1	mg/L	1.0	100	95	105			
Strontium		2.51	mg/L	0.10	100	95	105			
Lab ID: ICSA	8	Interference Check Sample A								04/05/16 09:35
Aluminum		521	mg/L	0.10	104	80	120			
Calcium		487	mg/L	1.0	97	80	120			
Iron		192	mg/L	0.020	96	80	120			
Magnesium		513	mg/L	1.0	103	80	120			
Manganese		-0.00211	mg/L	0.010		0	0			
Potassium		-0.0129	mg/L	1.0		0	0			
Sodium		0.0587	mg/L	1.0		0	0			
Strontium		0.00486	mg/L	0.10		0	0			
Lab ID: ICSAB	8	Interference Check Sample AB								04/05/16 09:39
Aluminum		528	mg/L	0.10	106	80	120			
Calcium		496	mg/L	1.0	99	80	120			
Iron		195	mg/L	0.020	98	80	120			
Magnesium		523	mg/L	1.0	105	80	120			
Manganese		0.491	mg/L	0.010	98	80	120			
Potassium		19.8	mg/L	1.0	99	80	120			
Sodium		19.7	mg/L	1.0	99	80	120			
Strontium		1.03	mg/L	0.10	103	80	120			
Lab ID: CCV	8	Continuing Calibration Verification Standard								04/05/16 09:47
Aluminum		2.55	mg/L	0.10	102	90	110			
Calcium		26.2	mg/L	1.0	105	90	110			
Iron		2.60	mg/L	0.020	104	90	110			
Magnesium		25.7	mg/L	1.0	103	90	110			
Manganese		2.53	mg/L	0.010	101	90	110			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Tintina Resources Inc

Report Date: 04/11/16

Project: 11048 Black Butte Copper Project

Work Order: H16030522

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7 Analytical Run: ICP2-HE_160405A										
Lab ID: CCV	8	Continuing Calibration Verification Standard								04/05/16 09:47
Potassium		24.6	mg/L	1.0	98	90	110			
Sodium		24.4	mg/L	1.0	98	90	110			
Strontium		2.55	mg/L	0.10	102	90	110			
<hr/>										
Method: E200.7 Batch: 32458										
Lab ID: MB-32458	8	Method Blank								04/05/16 10:19
		Run: ICP2-HE_160405A								
Aluminum		ND	mg/L	0.02						
Calcium		ND	mg/L	0.04						
Iron		0.004	mg/L	0.003						
Magnesium		ND	mg/L	0.01						
Manganese		ND	mg/L	0.0007						
Potassium		ND	mg/L	0.04						
Sodium		0.02	mg/L	0.02						
Strontium		ND	mg/L	0.0003						
Lab ID: LCS-32458	8	Laboratory Control Sample								04/05/16 10:23
		Run: ICP2-HE_160405A								
Aluminum		2.65	mg/L	0.030	106	85	115			
Calcium		27.8	mg/L	1.0	111	85	115			
Iron		2.72	mg/L	0.020	109	85	115			
Magnesium		27.1	mg/L	1.0	109	85	115			
Manganese		2.69	mg/L	0.0010	108	85	115			
Potassium		26.9	mg/L	1.0	107	85	115			
Sodium		26.6	mg/L	1.0	106	85	115			
Strontium		0.540	mg/L	0.010	108	85	115			
Lab ID: H16040010-001CMS3	8	Sample Matrix Spike								04/05/16 10:45
		Run: ICP2-HE_160405A								
Aluminum		2.67	mg/L	0.030	105	70	130			
Calcium		89.6	mg/L	1.0	108	70	130			
Iron		2.70	mg/L	0.020	107	70	130			
Magnesium		64.1	mg/L	1.0	107	70	130			
Manganese		2.62	mg/L	0.0010	105	70	130			
Potassium		30.0	mg/L	1.0	105	70	130			
Sodium		71.2	mg/L	1.0	106	70	130			
Strontium		2.84	mg/L	0.010		70	130			A
Lab ID: H16040010-001CMSD	8	Sample Matrix Spike Duplicate								04/05/16 10:49
		Run: ICP2-HE_160405A								
Aluminum		2.75	mg/L	0.030	108	70	130	3.2	20	
Calcium		89.3	mg/L	1.0	107	70	130	0.4	20	
Iron		2.75	mg/L	0.020	109	70	130	2.0	20	
Magnesium		64.1	mg/L	1.0	108	70	130	0.1	20	
Manganese		2.67	mg/L	0.0010	107	70	130	1.9	20	
Potassium		30.3	mg/L	1.0	106	70	130	0.7	20	
Sodium		70.4	mg/L	1.0	103	70	130	1.1	20	
Strontium		2.83	mg/L	0.010		70	130	0.4	20	A

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Tintina Resources Inc

Report Date: 04/11/16

Project: 11048 Black Butte Copper Project

Work Order: H16030522

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS204-B_160401A		
Lab ID: ICV STD	24 Initial Calibration Verification Standard									04/01/16 10:50
Aluminum		0.292	mg/L	0.10	97	90	110			
Antimony		0.0562	mg/L	0.050	94	90	110			
Arsenic		0.0586	mg/L	0.0050	98	90	110			
Barium		0.0571	mg/L	0.10	95	90	110			
Beryllium		0.0298	mg/L	0.0010	100	90	110			
Cadmium		0.0291	mg/L	0.0010	97	90	110			
Calcium		2.93	mg/L	0.50	98	90	110			
Chromium		0.0580	mg/L	0.010	97	90	110			
Cobalt		0.0586	mg/L	0.010	98	90	110			
Copper		0.0598	mg/L	0.010	100	90	110			
Iron		0.291	mg/L	0.020	97	90	110			
Lead		0.0575	mg/L	0.010	96	90	110			
Magnesium		2.97	mg/L	0.50	99	90	110			
Manganese		0.293	mg/L	0.010	98	90	110			
Molybdenum		0.0558	mg/L	0.0050	93	90	110			
Nickel		0.0590	mg/L	0.010	98	90	110			
Potassium		2.91	mg/L	0.50	97	90	110			
Selenium		0.0601	mg/L	0.0050	100	90	110			
Silver		0.0288	mg/L	0.0050	96	90	110			
Sodium		3.00	mg/L	0.50	100	90	110			
Strontium		0.0583	mg/L	0.10	97	90	110			
Thallium		0.0581	mg/L	0.10	97	90	110			
Uranium		0.0570	mg/L	0.0010	95	90	110			
Zinc		0.0602	mg/L	0.010	100	90	110			
Lab ID: ICSA	24 Interference Check Sample A									04/01/16 10:53
Aluminum		40.5	mg/L	0.10	101	70	130			
Antimony		0.000213	mg/L	0.050						
Arsenic		1.60E-05	mg/L	0.0050						
Barium		0.000142	mg/L	0.10						
Beryllium		1.00E-06	mg/L	0.0010						
Cadmium		0.000575	mg/L	0.0010						
Calcium		119	mg/L	0.50	99	70	130			
Chromium		0.00133	mg/L	0.010						
Cobalt		2.70E-05	mg/L	0.010						
Copper		0.000376	mg/L	0.010						
Iron		97.8	mg/L	0.020	98	70	130			
Lead		0.000237	mg/L	0.010						
Magnesium		40.6	mg/L	0.50	102	70	130			
Manganese		8.90E-05	mg/L	0.010						
Molybdenum		0.830	mg/L	0.0050	104	70	130			
Nickel		0.000234	mg/L	0.010						
Potassium		40.4	mg/L	0.50	101	70	130			
Selenium		1.80E-05	mg/L	0.0050						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Tintina Resources Inc

Report Date: 04/11/16

Project: 11048 Black Butte Copper Project

Work Order: H16030522

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
Method: E200.8								Analytical Run: ICPMS204-B_160401A			
Lab ID: ICSA	24	Interference Check Sample A						04/01/16 10:53			
Silver		0.000155	mg/L	0.0050							
Sodium		102	mg/L	0.50	102	70	130				
Strontium		0.000813	mg/L	0.10							
Thallium		4.50E-05	mg/L	0.10							
Uranium		0.000107	mg/L	0.0010							
Zinc		0.000431	mg/L	0.010							
Lab ID: ICSAB	24	Interference Check Sample AB						04/01/16 10:56			
Aluminum		40.5	mg/L	0.10	101	70	130				
Antimony		0.000130	mg/L	0.050		0	0				
Arsenic		0.0105	mg/L	0.0050	105	70	130				
Barium		0.000127	mg/L	0.10		0	0				
Beryllium		1.00E-06	mg/L	0.0010		0	0				
Cadmium		0.0106	mg/L	0.0010	106	70	130				
Calcium		119	mg/L	0.50	99	70	130				
Chromium		0.0218	mg/L	0.010	109	70	130				
Cobalt		0.0206	mg/L	0.010	103	70	130				
Copper		0.0205	mg/L	0.010	103	70	130				
Iron		98.5	mg/L	0.020	98	70	130				
Lead		0.000229	mg/L	0.010		0	0				
Magnesium		40.6	mg/L	0.50	101	70	130				
Manganese		0.0204	mg/L	0.010	102	70	130				
Molybdenum		0.838	mg/L	0.0050	105	70	130				
Nickel		0.0206	mg/L	0.010	103	70	130				
Potassium		39.8	mg/L	0.50	99	70	130				
Selenium		0.0106	mg/L	0.0050	105	70	130				
Silver		0.0194	mg/L	0.0050	97	70	130				
Sodium		102	mg/L	0.50	102	70	130				
Strontium		0.000747	mg/L	0.10		0	0				
Thallium		1.70E-05	mg/L	0.10		0	0				
Uranium		1.40E-05	mg/L	0.0010		0	0				
Zinc		0.0104	mg/L	0.010	104	70	130				
Method: E200.8								Batch: R114185			
Lab ID: LRB	24	Method Blank						Run: ICPMS204-B_160401A 04/01/16 12:04			
Aluminum		0.0007	mg/L	0.0005							
Antimony		4E-05	mg/L	3E-05							
Arsenic		ND	mg/L	6E-05							
Barium		ND	mg/L	0.0001							
Beryllium		ND	mg/L	5E-05							
Cadmium		ND	mg/L	1E-05							
Calcium		ND	mg/L	0.006							
Chromium		5E-05	mg/L	3E-05							
Cobalt		ND	mg/L	2E-05							

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Tintina Resources Inc

Report Date: 04/11/16

Project: 11048 Black Butte Copper Project

Work Order: H16030522

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8 Batch: R114185										
Lab ID: LRB	24	Method Blank				Run: ICPMS204-B_160401A			04/01/16 12:04	
Copper		8E-05	mg/L	6E-05						
Iron		0.002	mg/L	0.0002						
Lead		6E-06	mg/L	5E-06						
Magnesium		ND	mg/L	0.0009						
Manganese		ND	mg/L	6E-05						
Molybdenum		6E-05	mg/L	2E-05						
Nickel		ND	mg/L	4E-05						
Potassium		ND	mg/L	0.01						
Selenium		ND	mg/L	4E-05						
Silver		3E-05	mg/L	9E-06						
Sodium		0.02	mg/L	0.002						
Strontium		ND	mg/L	2E-05						
Thallium		ND	mg/L	5E-06						
Uranium		ND	mg/L	6E-06						
Zinc		ND	mg/L	0.0002						
Lab ID: LFB	24	Laboratory Fortified Blank				Run: ICPMS204-B_160401A			04/01/16 12:08	
Aluminum		0.0478	mg/L	0.10	94	85	115			
Antimony		0.0441	mg/L	0.050	88	85	115			
Arsenic		0.0471	mg/L	0.0050	94	85	115			
Barium		0.0474	mg/L	0.10	95	85	115			
Beryllium		0.0475	mg/L	0.0010	95	85	115			
Cadmium		0.0480	mg/L	0.0010	96	85	115			
Calcium		0.983	mg/L	0.50	98	85	115			
Chromium		0.0474	mg/L	0.010	95	85	115			
Cobalt		0.0482	mg/L	0.010	96	85	115			
Copper		0.0488	mg/L	0.010	97	85	115			
Iron		0.140	mg/L	0.020	92	85	115			
Lead		0.0488	mg/L	0.010	98	85	115			
Magnesium		0.966	mg/L	0.50	97	85	115			
Manganese		0.0470	mg/L	0.010	94	85	115			
Molybdenum		0.0448	mg/L	0.0050	89	85	115			
Nickel		0.0484	mg/L	0.010	97	85	115			
Potassium		0.950	mg/L	0.50	95	85	115			
Selenium		0.0484	mg/L	0.0050	97	85	115			
Silver		0.0196	mg/L	0.0050	98	85	115			
Sodium		0.972	mg/L	0.50	96	85	115			
Strontium		0.0475	mg/L	0.10	95	85	115			
Thallium		0.0488	mg/L	0.10	98	85	115			
Uranium		0.0471	mg/L	0.0010	94	85	115			
Zinc		0.0497	mg/L	0.010	99	85	115			
Lab ID: H16030522-001BMS	24	Sample Matrix Spike				Run: ICPMS204-B_160401A			04/01/16 12:24	
Aluminum		0.0787	mg/L	0.030	86	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Tintina Resources Inc

Report Date: 04/11/16

Project: 11048 Black Butte Copper Project

Work Order: H16030522

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8 Batch: R114185										
Lab ID:	H16030522-001BMS	24 Sample Matrix Spike			Run: ICPMS204-B_160401A				04/01/16 12:24	
Antimony		0.0450	mg/L	0.0010	90	70	130			
Arsenic		0.0557	mg/L	0.0010	111	70	130			
Barium		0.101	mg/L	0.050	90	70	130			
Beryllium		0.0480	mg/L	0.0010	96	70	130			
Cadmium		0.0483	mg/L	0.0010	97	70	130			
Calcium		56.7	mg/L	1.0		70	130			AE
Chromium		0.0472	mg/L	0.0050	94	70	130			
Cobalt		0.0470	mg/L	0.0050	94	70	130			
Copper		0.0476	mg/L	0.0050	95	70	130			
Iron		0.159	mg/L	0.020	92	70	130			
Lead		0.0473	mg/L	0.0010	94	70	130			
Magnesium		20.4	mg/L	1.0		70	130			A
Manganese		0.0569	mg/L	0.0010	93	70	130			
Molybdenum		0.0461	mg/L	0.0010	91	70	130			
Nickel		0.0475	mg/L	0.0050	95	70	130			
Potassium		1.75	mg/L	1.0	94	70	130			
Selenium		0.0625	mg/L	0.0010	124	70	130			
Silver		0.0184	mg/L	0.0010	92	70	130			
Sodium		2.36	mg/L	1.0	89	70	130			
Strontium		0.145	mg/L	0.010	84	70	130			
Thallium		0.0480	mg/L	0.00050	96	70	130			
Uranium		0.0459	mg/L	0.00030	90	70	130			
Zinc		0.0501	mg/L	0.010	98	70	130			
Lab ID:	H16030522-001BMSD	24 Sample Matrix Spike Duplicate			Run: ICPMS204-B_160401A				04/01/16 12:27	
Aluminum		0.0763	mg/L	0.030	81	70	130	3.1	20	
Antimony		0.0456	mg/L	0.0010	91	70	130	1.4	20	
Arsenic		0.0562	mg/L	0.0010	112	70	130	1.0	20	
Barium		0.0999	mg/L	0.050	89	70	130	0.8	20	
Beryllium		0.0487	mg/L	0.0010	97	70	130	1.3	20	
Cadmium		0.0483	mg/L	0.0010	97	70	130	0.0	20	
Calcium		56.6	mg/L	1.0		70	130	0.2	20	AE
Chromium		0.0478	mg/L	0.0050	95	70	130	1.3	20	
Cobalt		0.0478	mg/L	0.0050	95	70	130	1.7	20	
Copper		0.0478	mg/L	0.0050	95	70	130	0.5	20	
Iron		0.160	mg/L	0.020	93	70	130	1.0	20	
Lead		0.0472	mg/L	0.0010	94	70	130	0.0	20	
Magnesium		20.3	mg/L	1.0		70	130	0.2	20	A
Manganese		0.0578	mg/L	0.0010	95	70	130	1.5	20	
Molybdenum		0.0464	mg/L	0.0010	91	70	130	0.6	20	
Nickel		0.0480	mg/L	0.0050	96	70	130	1.0	20	
Potassium		1.75	mg/L	1.0	95	70	130	0.2	20	
Selenium		0.0641	mg/L	0.0010	128	70	130	2.5	20	
Silver		0.0191	mg/L	0.0010	96	70	130	3.5	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

E - Estimated value. Result exceeds the instrument upper quantitation limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Tintina Resources Inc

Report Date: 04/11/16

Project: 11048 Black Butte Copper Project

Work Order: H16030522

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: R114185
Lab ID: H16030522-001BMSD	24	Sample Matrix Spike Duplicate					Run: ICPMS204-B_160401A			04/01/16 12:27
Sodium		2.37	mg/L	1.0	91	70	130	0.8	20	
Strontium		0.145	mg/L	0.010	85	70	130	0.4	20	
Thallium		0.0484	mg/L	0.00050	97	70	130	0.9	20	
Uranium		0.0460	mg/L	0.00030	91	70	130	0.3	20	
Zinc		0.0505	mg/L	0.010	99	70	130	0.8	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Tintina Resources Inc

Report Date: 04/11/16

Project: 11048 Black Butte Copper Project

Work Order: H16030522

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS204-B_160405A		
Lab ID: ICV STD	15 Initial Calibration Verification Standard								04/05/16 11:04	
Antimony		0.0575	mg/L	0.050	96	90	110			
Arsenic		0.0616	mg/L	0.0050	103	90	110			
Barium		0.0590	mg/L	0.10	98	90	110			
Beryllium		0.0296	mg/L	0.0010	99	90	110			
Cadmium		0.0301	mg/L	0.0010	100	90	110			
Chromium		0.0604	mg/L	0.010	101	90	110			
Cobalt		0.0606	mg/L	0.010	101	90	110			
Copper		0.0614	mg/L	0.010	102	90	110			
Lead		0.0589	mg/L	0.010	98	90	110			
Molybdenum		0.0574	mg/L	0.0050	96	90	110			
Nickel		0.0611	mg/L	0.010	102	90	110			
Silver		0.0302	mg/L	0.0050	101	90	110			
Thallium		0.0590	mg/L	0.10	98	90	110			
Uranium		0.0561	mg/L	0.0010	94	90	110			
Zinc		0.0610	mg/L	0.010	102	90	110			
Lab ID: ICSA	15 Interference Check Sample A								04/05/16 11:07	
Antimony		0.000188	mg/L	0.050						
Arsenic		0.000109	mg/L	0.0050						
Barium		0.000125	mg/L	0.10						
Beryllium		2.40E-05	mg/L	0.0010						
Cadmium		0.000634	mg/L	0.0010						
Chromium		0.00138	mg/L	0.010						
Cobalt		3.60E-05	mg/L	0.010						
Copper		0.000479	mg/L	0.010						
Lead		0.000220	mg/L	0.010						
Molybdenum		0.832	mg/L	0.0050	104	70	130			
Nickel		0.000233	mg/L	0.010						
Silver		0.000179	mg/L	0.0050						
Thallium		3.70E-05	mg/L	0.10						
Uranium		7.50E-05	mg/L	0.0010						
Zinc		0.000629	mg/L	0.010						
Lab ID: ICSAB	15 Interference Check Sample AB								04/05/16 11:10	
Antimony		0.000126	mg/L	0.050		0	0			
Arsenic		0.0108	mg/L	0.0050	107	70	130			
Barium		0.000129	mg/L	0.10		0	0			
Beryllium		1.50E-05	mg/L	0.0010		0	0			
Cadmium		0.0107	mg/L	0.0010	107	70	130			
Chromium		0.0226	mg/L	0.010	113	70	130			
Cobalt		0.0214	mg/L	0.010	107	70	130			
Copper		0.0213	mg/L	0.010	107	70	130			
Lead		0.000228	mg/L	0.010		0	0			
Molybdenum		0.866	mg/L	0.0050	108	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Tintina Resources Inc

Report Date: 04/11/16

Project: 11048 Black Butte Copper Project

Work Order: H16030522

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
Method: E200.8								Analytical Run: ICPMS204-B_160405A			
Lab ID: ICSAB	15	Interference Check Sample AB						04/05/16 11:10			
Nickel		0.0210	mg/L	0.010	105	70	130				
Silver		0.0202	mg/L	0.0050	101	70	130				
Thallium		1.90E-05	mg/L	0.10		0	0				
Uranium		1.50E-05	mg/L	0.0010		0	0				
Zinc		0.00999	mg/L	0.010	100	70	130				
Method: E200.8								Batch: 32458			
Lab ID: MB-32458	24	Method Blank						Run: ICPMS204-B_160405A 04/05/16 15:00			
Aluminum		ND	mg/L	0.002							
Antimony		0.0001	mg/L	6E-05							
Arsenic		7E-05	mg/L	7E-05							
Barium		5E-05	mg/L	5E-05							
Beryllium		ND	mg/L	7E-05							
Cadmium		ND	mg/L	1E-05							
Calcium		ND	mg/L	0.009							
Chromium		0.0001	mg/L	4E-05							
Cobalt		ND	mg/L	3E-05							
Copper		0.0003	mg/L	5E-05							
Iron		0.003	mg/L	0.002							
Lead		2E-05	mg/L	2E-05							
Magnesium		ND	mg/L	0.002							
Manganese		0.0002	mg/L	0.0002							
Molybdenum		5E-05	mg/L	3E-05							
Nickel		ND	mg/L	3E-05							
Potassium		ND	mg/L	0.01							
Selenium		ND	mg/L	0.0003							
Silver		5E-05	mg/L	1E-05							
Sodium		0.01	mg/L	0.005							
Strontium		2E-05	mg/L	1E-05							
Thallium		ND	mg/L	2E-05							
Uranium		ND	mg/L	1E-05							
Zinc		0.0009	mg/L	0.0003							
Lab ID: LCS-32458	24	Laboratory Control Sample						Run: ICPMS204-B_160405A 04/05/16 15:03			
Aluminum		2.52	mg/L	0.030	101	85	115				
Antimony		0.529	mg/L	0.0010	106	85	115				
Arsenic		0.531	mg/L	0.0010	106	85	115				
Barium		0.531	mg/L	0.050	106	85	115				
Beryllium		0.256	mg/L	0.0010	102	85	115				
Cadmium		0.265	mg/L	0.0010	106	85	115				
Calcium		26.1	mg/L	1.0	104	85	115				
Chromium		0.520	mg/L	0.0050	104	85	115				
Cobalt		0.524	mg/L	0.0050	105	85	115				
Copper		0.518	mg/L	0.0050	104	85	115				

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Tintina Resources Inc

Report Date: 04/11/16

Project: 11048 Black Butte Copper Project

Work Order: H16030522

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
Method: E200.8										Batch: 32458	
Lab ID: LCS-32458	24 Laboratory Control Sample				Run: ICPMS204-B_160405A				04/05/16 15:03		
Iron		2.59	mg/L	0.020	103	85	115				
Lead		0.548	mg/L	0.0010	110	85	115				
Magnesium		26.0	mg/L	1.0	104	85	115				
Manganese		2.58	mg/L	0.0010	103	85	115				
Molybdenum		0.533	mg/L	0.0010	107	85	115				
Nickel		0.519	mg/L	0.0050	104	85	115				
Potassium		26.1	mg/L	1.0	104	85	115				
Selenium		0.517	mg/L	0.0010	103	85	115				
Silver		0.0533	mg/L	0.0010	106	85	115				
Sodium		26.3	mg/L	1.0	105	85	115				
Strontium		0.514	mg/L	0.010	103	85	115				
Thallium		0.553	mg/L	0.00050	111	85	115				
Uranium		0.521	mg/L	0.00030	104	85	115				
Zinc		0.513	mg/L	0.010	102	85	115				
Lab ID: H16040010-001CMS3	24 Sample Matrix Spike				Run: ICPMS204-B_160405A				04/05/16 15:19		
Aluminum		2.43	mg/L	0.030	95	70	130				
Antimony		0.512	mg/L	0.0010	102	70	130				
Arsenic		0.504	mg/L	0.0010	100	70	130				
Barium		0.656	mg/L	0.050	102	70	130				
Beryllium		0.234	mg/L	0.0010	93	70	130				
Cadmium		0.244	mg/L	0.0010	98	70	130				
Calcium		83.8	mg/L	1.0	107	70	130				
Chromium		0.497	mg/L	0.0050	99	70	130				
Cobalt		0.493	mg/L	0.0050	99	70	130				
Copper		0.482	mg/L	0.0050	96	70	130				
Iron		2.48	mg/L	0.020	98	70	130				
Lead		0.513	mg/L	0.0010	103	70	130				
Magnesium		58.0	mg/L	1.0	97	70	130				
Manganese		2.46	mg/L	0.0010	98	70	130				
Molybdenum		0.525	mg/L	0.0010	104	70	130				
Nickel		0.487	mg/L	0.0050	97	70	130				
Potassium		28.4	mg/L	1.0	99	70	130				
Selenium		0.476	mg/L	0.0010	94	70	130				
Silver		0.0493	mg/L	0.0010	99	70	130				
Sodium		66.8	mg/L	1.0	99	70	130				
Strontium		2.63	mg/L	0.010		70	130			A	
Thallium		0.521	mg/L	0.00050	104	70	130				
Uranium		0.521	mg/L	0.00030	102	70	130				
Zinc		0.463	mg/L	0.010	92	70	130				
Lab ID: H16040010-001CMSD	24 Sample Matrix Spike Duplicate				Run: ICPMS204-B_160405A				04/05/16 15:23		
Aluminum		2.53	mg/L	0.030	100	70	130	4.3	20		
Antimony		0.510	mg/L	0.0010	102	70	130	0.4	20		

Qualifiers:

RL - Analyte reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Tintina Resources Inc

Report Date: 04/11/16

Project: 11048 Black Butte Copper Project

Work Order: H16030522

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
Method: E200.8										Batch: 32458	
Lab ID:	H16040010-001CMSD				24	Sample Matrix Spike Duplicate			Run: ICPMS204-B_160405A		04/05/16 15:23
Arsenic		0.517	mg/L	0.0010	103	70	130	2.6	20		
Barium		0.665	mg/L	0.050	104	70	130	1.5	20		
Beryllium		0.240	mg/L	0.0010	96	70	130	2.9	20		
Cadmium		0.250	mg/L	0.0010	100	70	130	2.2	20		
Calcium		83.4	mg/L	1.0	106	70	130	0.4	20		
Chromium		0.511	mg/L	0.0050	102	70	130	2.7	20		
Cobalt		0.503	mg/L	0.0050	101	70	130	2.1	20		
Copper		0.493	mg/L	0.0050	98	70	130	2.3	20		
Iron		2.56	mg/L	0.020	101	70	130	2.8	20		
Lead		0.525	mg/L	0.0010	105	70	130	2.3	20		
Magnesium		58.5	mg/L	1.0	99	70	130	0.9	20		
Manganese		2.51	mg/L	0.0010	100	70	130	2.2	20		
Molybdenum		0.534	mg/L	0.0010	106	70	130	1.6	20		
Nickel		0.499	mg/L	0.0050	100	70	130	2.4	20		
Potassium		29.1	mg/L	1.0	102	70	130	2.6	20		
Selenium		0.495	mg/L	0.0010	97	70	130	3.8	20		
Silver		0.0507	mg/L	0.0010	101	70	130	2.7	20		
Sodium		67.5	mg/L	1.0	102	70	130	1.1	20		
Strontium		2.63	mg/L	0.010		70	130	0.0	20	A	
Thallium		0.536	mg/L	0.00050	107	70	130	2.8	20		
Uranium		0.522	mg/L	0.00030	103	70	130	0.2	20		
Zinc		0.474	mg/L	0.010	95	70	130	2.5	20		

Qualifiers:

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ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Tintina Resources Inc

Report Date: 04/11/16

Project: 11048 Black Butte Copper Project

Work Order: H16030522

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
Method: E200.8								Analytical Run: ICPMS204-B_160406B			
Lab ID: ICV STD	Initial Calibration Verification Standard										
Selenium		0.0577	mg/L	0.0050	96	90	110			04/06/16 11:10	
Lab ID: ICSA	Interference Check Sample A										
Selenium		0.000430	mg/L	0.0050						04/06/16 11:13	
Lab ID: ICSAB	Interference Check Sample AB										
Selenium		0.0103	mg/L	0.0050	103	70	130			04/06/16 11:16	
Method: E200.8								Batch: 32458			
Lab ID: MB-32458	24 Method Blank										
						Run: ICPMS204-B_160406B				04/06/16 15:51	
Aluminum		0.002	mg/L	0.0005							
Antimony		ND	mg/L	3E-05							
Arsenic		ND	mg/L	6E-05							
Barium		ND	mg/L	0.0001							
Beryllium		ND	mg/L	5E-05							
Cadmium		ND	mg/L	1E-05							
Calcium		0.008	mg/L	0.006							
Chromium		ND	mg/L	3E-05							
Cobalt		ND	mg/L	2E-05							
Copper		ND	mg/L	6E-05							
Iron		ND	mg/L	0.0002							
Lead		1E-05	mg/L	5E-06							
Magnesium		0.0009	mg/L	0.0009							
Manganese		ND	mg/L	6E-05							
Molybdenum		ND	mg/L	2E-05							
Nickel		ND	mg/L	4E-05							
Potassium		0.02	mg/L	0.01							
Selenium		ND	mg/L	4E-05							
Silver		ND	mg/L	9E-06							
Sodium		ND	mg/L	0.002							
Strontium		ND	mg/L	2E-05							
Thallium		ND	mg/L	5E-06							
Uranium		ND	mg/L	6E-06							
Zinc		0.001	mg/L	0.0002							

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Tintina Resources Inc

Report Date: 04/11/16

Project: 11048 Black Butte Copper Project

Work Order: H16030522

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E245.1										Analytical Run: HGCV202-H_160404A
Lab ID: ICV		Initial Calibration Verification Standard								04/04/16 15:50
Mercury		0.000210	mg/L	0.00010	105	90	110			
Lab ID: CCV1		Continuing Calibration Verification Standard								04/04/16 16:01
Mercury		0.000206	mg/L	0.00010	103	90	110			
Method: E245.1										Batch: 32459
Lab ID: MB-32459		Method Blank								04/04/16 16:10
Mercury		2E-06	mg/L	1E-06						Run: HGCV202-H_160404A
Lab ID: LCS-32459		Laboratory Control Sample								04/04/16 16:13
Mercury		0.000154	mg/L	0.00010	101	90	110			Run: HGCV202-H_160404A
Lab ID: H16030522-002BMS		Sample Matrix Spike								04/04/16 16:22
Mercury		0.000159	mg/L	0.00010	105	70	130			Run: HGCV202-H_160404A
Lab ID: H16030522-002BMSD		Sample Matrix Spike Duplicate								04/04/16 16:25
Mercury		0.000147	mg/L	0.00010	97	70	130	7.7	20	Run: HGCV202-H_160404A
Lab ID: H16030539-002BMS		Sample Matrix Spike								04/04/16 16:57
Mercury		0.00015	mg/L	0.00010	101	70	130			Run: HGCV202-H_160404A
Lab ID: H16030539-002BMSD		Sample Matrix Spike Duplicate								04/04/16 17:00
Mercury		0.00016	mg/L	0.00010	104	70	130	3.4	20	Run: HGCV202-H_160404A

Qualifiers:

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ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Tintina Resources Inc

Report Date: 04/11/16

Project: 11048 Black Butte Copper Project

Work Order: H16030522

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
Method: E300.0 Analytical Run: IC102-H_160331A											
Lab ID: ICV	2	Initial Calibration Verification Standard									03/31/16 13:48
Chloride		103	mg/L	1.0	103	90	110				
Sulfate		402	mg/L	1.0	100	90	110				
Lab ID: CCV033116-3	2	Continuing Calibration Verification Standard									03/31/16 18:37
Chloride		102	mg/L	1.0	102	90	110				
Sulfate		402	mg/L	1.0	101	90	110				
Method: E300.0 Batch: R114169											
Lab ID: ICB	2	Method Blank									Run: IC102-H_160331A 03/31/16 13:37
Chloride		0.04	mg/L	0.006							
Sulfate		ND	mg/L	0.05							
Lab ID: LFB	2	Laboratory Fortified Blank									Run: IC102-H_160331A 03/31/16 13:59
Chloride		47.7	mg/L	1.0	95	90	110				
Sulfate		209	mg/L	1.0	104	90	110				
Lab ID: H16030519-009AMS	2	Sample Matrix Spike									Run: IC102-H_160331A 03/31/16 18:15
Chloride		112	mg/L	1.0	99	90	110				
Sulfate		293	mg/L	1.0	101	90	110				
Lab ID: H16030519-009AMSD	2	Sample Matrix Spike Duplicate									Run: IC102-H_160331A 03/31/16 18:26
Chloride		114	mg/L	1.0	103	90	110	1.7	20		
Sulfate		296	mg/L	1.0	102	90	110	1.0	20		
Lab ID: H16030522-009AMS	2	Sample Matrix Spike									Run: IC102-H_160331A 03/31/16 21:02
Chloride		49.8	mg/L	1.0	97	90	110				
Sulfate		219	mg/L	1.0	104	90	110				
Lab ID: H16030522-009AMSD	2	Sample Matrix Spike Duplicate									Run: IC102-H_160331A 03/31/16 21:13
Chloride		50.7	mg/L	1.0	98	90	110	1.7	20		
Sulfate		221	mg/L	1.0	105	90	110	0.8	20		

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Tintina Resources Inc

Report Date: 04/11/16

Project: 11048 Black Butte Copper Project

Work Order: H16030522

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E353.2								Analytical Run: FIA203-HE_160401A		
Lab ID: ICV	Initial Calibration Verification Standard									
Nitrogen, Nitrate+Nitrite as N		0.915	mg/L	0.010	91	90	110			04/01/16 09:50
Lab ID: ICB	Initial Calibration Blank, Instrument Blank									
Nitrogen, Nitrate+Nitrite as N		-0.00841	mg/L	0.010		0	0			04/01/16 09:51
Method: E353.2								Batch: R114171		
Lab ID: LFB	Laboratory Fortified Blank									
Nitrogen, Nitrate+Nitrite as N		1.02	mg/L	0.011	102	90	110			04/01/16 09:53
Lab ID: H16030522-001CMS	Sample Matrix Spike									
Nitrogen, Nitrate+Nitrite as N		1.24	mg/L	0.011	106	90	110			04/01/16 09:56
Lab ID: H16030522-001CMSD	Sample Matrix Spike Duplicate									
Nitrogen, Nitrate+Nitrite as N		1.25	mg/L	0.011	106	90	110	0.6	20	04/01/16 09:57
Lab ID: H16030527-001CMS	Sample Matrix Spike									
Nitrogen, Nitrate+Nitrite as N		1.72	mg/L	0.011	108	90	110			04/01/16 10:12
Lab ID: H16030527-001CMSD	Sample Matrix Spike Duplicate									
Nitrogen, Nitrate+Nitrite as N		1.70	mg/L	0.011	105	90	110	1.4	20	04/01/16 10:13

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.



Work Order Receipt Checklist

Tintina Resources Inc

H16030522

Login completed by: Stephanie Dull

Date Received: 3/31/2016

Reviewed by: BL2000\rwilliams

Received by: bjs

Reviewed Date: 4/4/2016

Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on all shipping container(s)/cooler(s)?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Custody seals intact on all sample bottles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody agrees with sample labels?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Samples in proper container/bottle?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Applicable <input type="checkbox"/>
Container/Temp Blank temperature:	-0.6°C On Ice		
Water - VOA vials have zero headspace?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Applicable <input checked="" type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Applicable <input type="checkbox"/>

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Contact and Corrective Action Comments:

Collection date on COC for samples 407, 409, 410, and 411 is 3/20/2016. Date on sample bottles is 3/30/2016. Logged in with date from sample bottles. Sample ID on COC is BBC-1603-304 collected on 3/29/2016 at 13:30. ID on bottle is BBC1603303 collected on 3/29/2016 at 13:30. Logged in with ID from COC. Sample IDs on bottles do not contain dashes between numbers. Logged in with IDs from COC. 3/31/2016 sld

CHAIN OF CUSTODY RECORD



Hydrometrics, Inc.

3020 Bozeman Ave. • Helena, MT 59601 • (406) 443-4150

PROJ. NO. 11048 PROJECT NAME Black Butte

SAMPLERS: (Signature) *[Signature]*

DATE	TIME	COMP	GRAB	SAMPLE NUMBER
3/29/16	1045		X	133C-1603-300
	1125			301
	1146			302
	1228			303
	1330		X	304
3/29/16	1140		X	133C-1603-407
	1245			409
	1300			410
	1430		X	411

NO. OF CONTAINERS	ANALYSIS						
	Commons UF / RAW	Nutrients UF / H ₂ SO ₄	Diss. Metal F / HNO ₃	CN UF / NaOH	Total Metals UF / HNO ₃	Total Recoverable Metals UF / HNO ₃	BTEX
3	X	X	X	X	X	X	X

REMARKS
H16030522

Relinquished (Signature) *[Signature]* Date / Time 3/31/16 10:30 Received by (Signature) *[Signature]* Date / Time 3/31/16 10:30

Relinquished (Signature) *[Signature]* Date / Time 3/31/16 10:30 Received for Laboratory by (Signature) *[Signature]* Date / Time 3/31/16 10:30

Lab Energy Lab P.O. # 13111 Shipped via: Bus FedEx UPS
Remarks - O.L.O. cooler for ice hand del.

Enclosed: Parameter sheet w/detection limits
 QA / AC standard mixing instructions Cover letter
 Split Samples: Accepted Declined
 Signature _____

Return results & electronic copy to:
QA / QC Dept. at address at top of page

TABLE 3. ANALYTICAL METHODS AND DETECTION LIMITS FOR SURFACE WATER AND GROUNDWATER SAMPLES

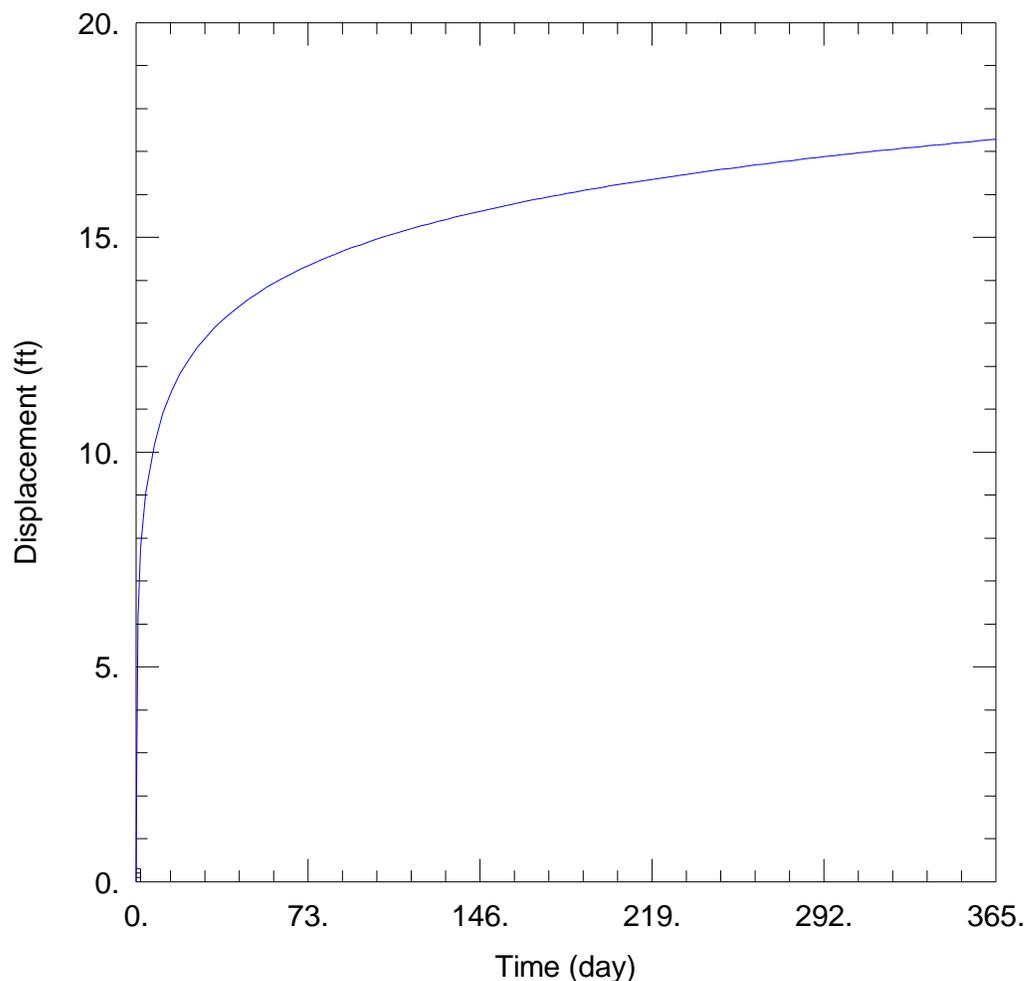
Parameter	Analytical Method ⁽¹⁾	Project-Required Detection Limit (mg/L)
Physical Parameters		
TDS	SM 2540C	10
TSS	SM 2540C	10
Common Ions		
Alkalinity	SM 2320B	4
Sulfate	300.0	1
Chloride	300.0/SM 4500CL-B	1
Fluoride	A4500-F C	0.1
Calcium	215.1/200.7	1
Magnesium	242.1/200.7	1
Sodium	273.1/200.7	1
Potassium	258.1/200.7	1
Nutrients		
Nitrate+Nitrite as N	353.2	0.01
Trace Constituents (SW - Total Recoverable except Aluminum [Dissolved], GW - Dissolved)⁽²⁾		
Aluminum (Al)	200.7/200.8	0.009
Antimony (Sb)	200.7/200.8	0.0005
Arsenic (As)	200.8/SM 3114B	0.001
Barium (Ba)	200.7/200.8	0.003
Beryllium (Be)	200.7/200.8	0.0008
Cadmium (Cd)	200.7/200.8	0.00003
Chromium (Cr)	200.7/200.8	0.01
Cobalt (Co)	200.7/200.8	0.01
Copper (Cu)	200.7/200.8	0.002
Iron (Fe)	200.7/200.8	0.02
Lead (Pb)	200.7/200.8	0.0003
Manganese (Mn)	200.7/200.8	0.005
Mercury (Hg)	245.2/245.1/200.8/SM 3112B	0.000005
Molybdenum (Mo)	200.7/200.8	0.002
Nickel (Ni)	200.7/200.8	0.001
Selenium (Se)	200.7/200.8/SM 3114B	0.0002
Silver (Ag)	200.7/200.8	0.02
Strontium (Sr)	200.7/200.8	0.0002
Thallium (Tl)	200.7/200.8	0.0002
Uranium	200.7/200.8	0.008
Zinc (Zn)	200.7/200.8	0.002
Other Parameters		
Stream Flow	HF-SOP-37/-44/-46	NA
Water Temperature	HF-SOP-20	0.1 °C
Dissolved Oxygen (DO)	HF-SOP-22	0.1 mg/L
pH	HF-SOP-20	0.1 s.u.
Specific Conductance (SC)	HF-SOP-79	1 µmhos/cm

(1) Analytical methods are from *Standard Methods for the Examination of Water and Wastewater* (SM) or EPA's *Methods for Chemical Analysis of Water and Waste* (1983).

(2) Samples to be analyzed for dissolved constituents will be field-filtered through a 0.45 µm filter.

APPENDIX D

CTF DEWATERING ANALYSES



WELL TEST ANALYSIS

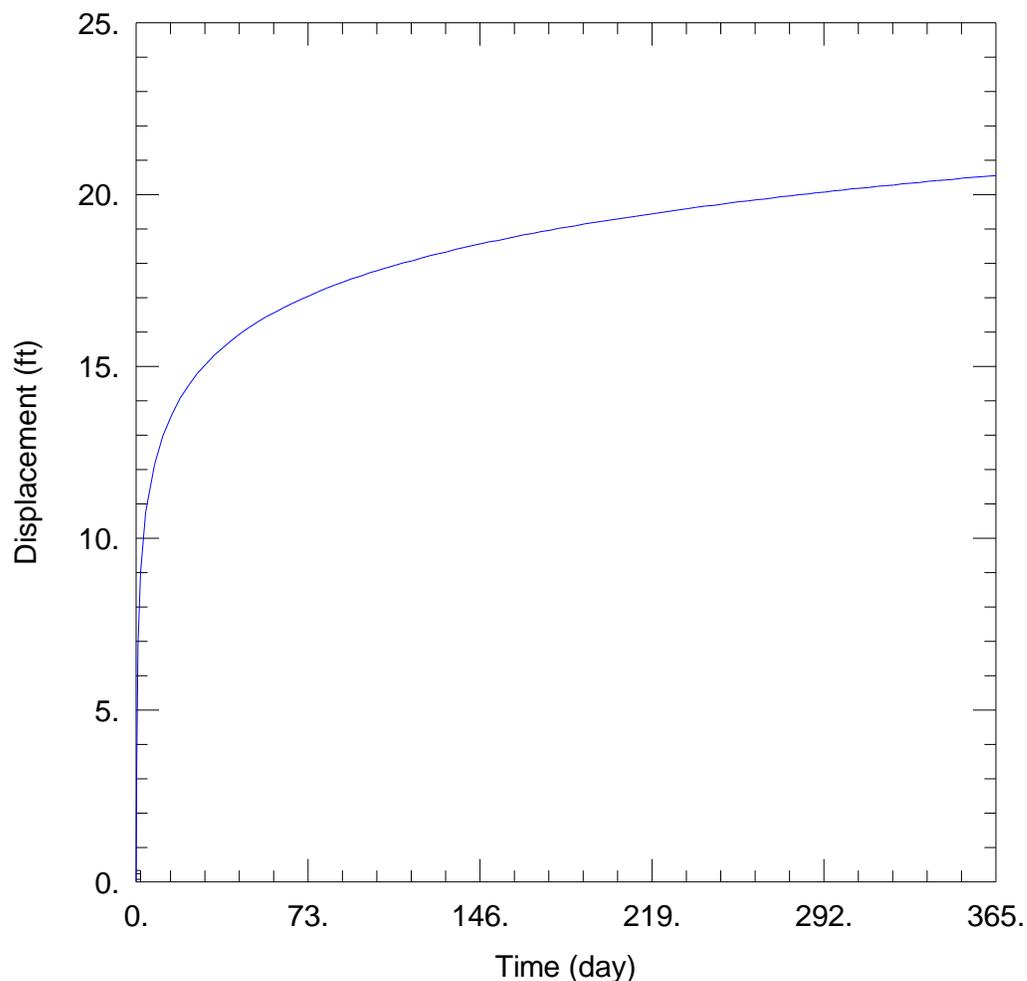
Data Set: K:\project\11048\GW\2016 CTF Monitoring Wells\CTFZone1Moench.aqt
 Date: 05/20/16 Time: 08:14:31

AQUIFER DATA

Saturated Thickness: 15. ft Slab Block Thickness: 1. ft

SOLUTION

Aquifer Model: <u>Fractured</u>	Solution Method: <u>Moench w/slab blocks</u>
K = <u>2. ft/day</u>	Ss = <u>1.0E-6 ft⁻¹</u>
K' = <u>3.0E-6 ft/day</u>	Ss' = <u>1.0E-6 ft⁻¹</u>
Sw = <u>-3.225</u>	Sf = <u>20.</u>
r(w) = <u>0.5 ft</u>	r(c) = <u>0.5 ft</u>



WELL TEST ANALYSIS

Data Set: K:\project\11048\GW\2016 CTF Monitoring Wells\CTFZone2_Moench.aqt
 Date: 05/20/16 Time: 11:26:23

AQUIFER DATA

Saturated Thickness: 20. ft

Slab Block Thickness: 1. ft

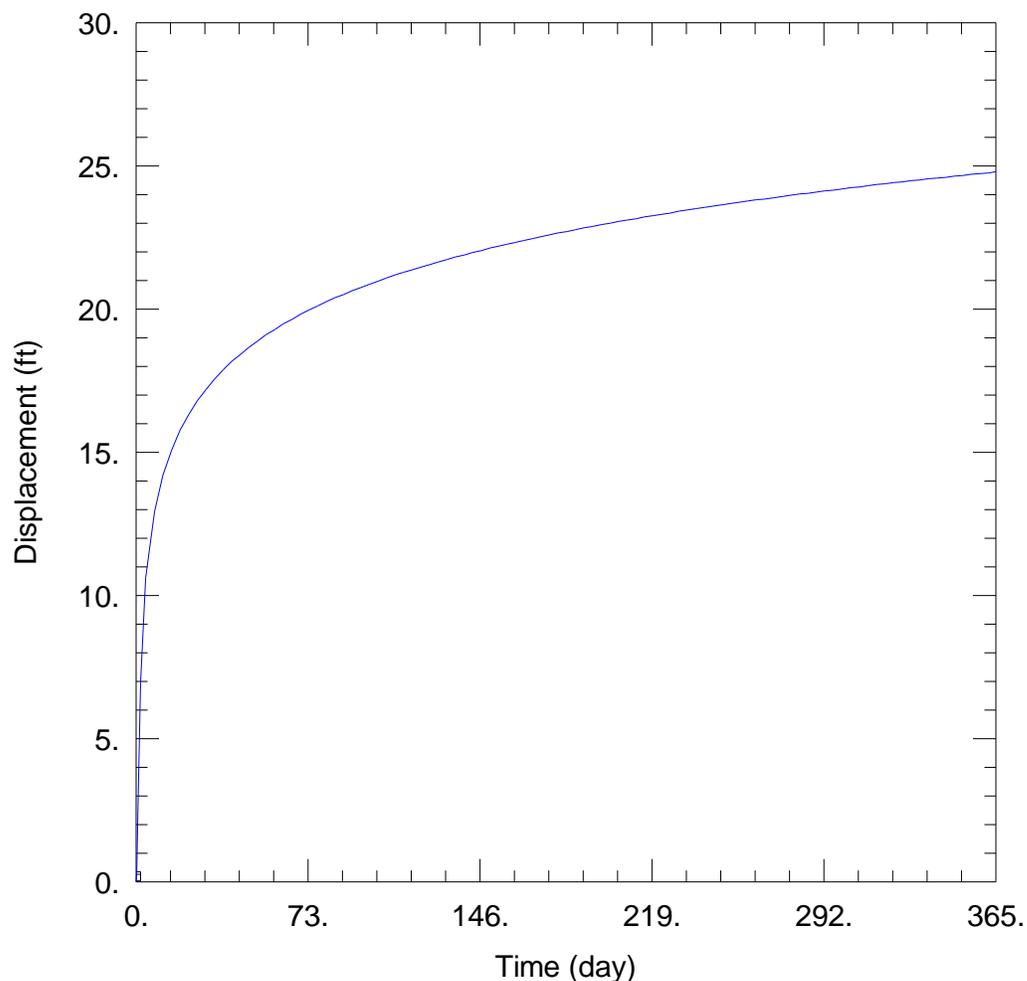
SOLUTION

Aquifer Model: Fractured

Solution Method: Moench w/slab blocks

K = 3. ft/day
 K' = 10. ft/day
 Sw = -3.225
 r(w) = 0.5 ft

Ss = 1.0E-6 ft⁻¹
 Ss' = 1.0E-6 ft⁻¹
 Sf = 20.
 r(c) = 0.5 ft



WELL TEST ANALYSIS

Data Set: K:\project\11048\GW\2016 CTF Monitoring Wells\CTFZone3Moench.aqt
 Date: 05/20/16 Time: 11:28:01

AQUIFER DATA

Saturated Thickness: 25. ft

Slab Block Thickness: 1. ft

SOLUTION

Aquifer Model: Fractured

Solution Method: Moench w/slab blocks

K = 0.4 ft/day

Ss = 1.0E-6 ft⁻¹

K' = 0.001 ft/day

Ss' = 1.0E-6 ft⁻¹

Sw = -3.225

Sf = 20.

r(w) = 0.5 ft

r(c) = 0.5 ft