

# Summary of 2016 Field Investigation – Faro Creek Diversion Aquifer Testing, Faro Mine Remediation Project

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FIELD SAMPLING PLAN NAME: Faro Creek Diversion Aquifer Testing

This technical memorandum (TM) presents a summary of the investigation activities performed at the Faro Mine Complex (FMC) during 2016 in support of the Faro Valley Seepage investigation. The purpose of this task is to collect information to better characterize the aquifer properties in the Faro Creek Valley and evaluate leakage from the Faro Creek Diversion (FCD). Previous seepage estimates to the Faro Pit indicate a significant proportion of the water input is leakage from the FCD, groundwater flow under the FCD, or a combination of both (AECOM Canada Ltd., March 2009). The proportion of leakage from the FCD in comparison to the quantity of groundwater flow beneath the FCD channel is not known and could not be determined from existing information. An understanding of the source of water to the Faro Pit through the Faro Valley waste rock dumps is necessary to support the design of an effective remediation concept to maintain separation of clean water from mine impacted water. The following primary data gaps will be addressed under this task:

1. Estimate the hydraulic properties of the aquifer in Faro Valley.
2. Quantify leakage of water from or into the FCD.

To support the understanding of hydrostratigraphy, aquifer properties, soil geotechnical and geochemical properties, and hydraulic gradients within the Faro Creek Valley, CH2M HILL Canada Limited (CH2M) initiated this investigation in fall 2015 by advancing 9 boreholes, each completed as a monitoring well and arranged in three well clusters adjacent to the FCD (CH2M, April 2016f). Because of the onset of winter conditions, groundwater and surface water sample collection, stream stage monitoring, and aquifer testing was delayed until spring 2016. The field effort followed guidelines and procedures listed in the project Health, Safety, Security, and Environment Handbook (CH2M, May 2015b).

## Field Investigation

The field investigation program was conducted along the FCD in May and June 2016. The scope of work included the following tasks:

- Monitor groundwater elevations and determine groundwater flow directions.
- Perform aquifer tests at each of three well nests located adjacent to the FCD (Figure 1).
- Collect one groundwater sample from the pumping well at each well nest.
- Measure discharge at two locations on the FCD: FCD-1 and FCD-2.
- Measure discharge of any seeps or springs entering the FCD between FCD-1 and FCD-2.

## Aquifer Testing

Well Clusters 1, 2, and 3 all contain two 2-inch monitoring wells and one 4-inch designated pumping well (Figure 1). Well details are discussed in detail in the Summary of 2015 Field Investigation – Faro Valley Seepage Investigation Technical Memorandum (CH2M, April 2016f).

Groundwater elevations were monitored at all pumping and monitoring wells between June 1 and 7, 2016. Depth to water measurements were made with a Solinst Model 1001 water level probe. Eight pressure transducers (In-Situ Troll 700 models) were used to monitor water levels during aquifer testing and collect continuous data before, during, and after testing. Wells were pumped with a 2-inch Grundfos Redi-Flo pump with check valve and variable speed controller. The pump intake was typically placed 20 to 30 centimetres (cm) from the bottom of the well, with the pressure transducer located 10 to 20 cm above the pump. A portable gas generator supplied power for the pump. A 5/8-inch discharge line was laid out at least 50 metres (m) from the pumping well or any monitoring wells. Discharge was measured with a 1-litre graduated cylinder and stopwatch.

Table 1 presents manual depth to water data and groundwater elevation computations, with manual and pressure transducer groundwater elevations shown in Figure 2. Discharge measurements are shown in Table 2.

### Well Cluster 1

Well Cluster 1 is along the West Valley Interceptor Ditch and includes wells CH15-106-MW001, CH15-106-MW002, and CH15-106-MW007 (Figure 1). Well CH15-106-MW007 was pumped at a very low rate and is not suitable for aquifer testing, as the well was quickly pumped dry (discharge was not measured because of the rapid drawdown). Recovery of water levels at CH15-106-MW007 took several days.

Well CH15-106-MW002 was used as an alternative pumping well. A step-test was performed on June 2, 2016, and an 8-hour constant-rate test was performed on June 6, 2016. The pumping did not induce drawdown in monitoring wells CH15-106-MW007 or CH15-106-MW001 during either test. A groundwater sample was collected from CH15-106-MW002 following the step test. Table 3 summarizes the pumping rates and drawdown; Figure 2 shows the groundwater elevations at each well.

Two streambed piezometers were installed in the FCD near CH15-106-MW002 to determine the nature of groundwater-surface water interactions. These piezometers were constructed of 2-m stainless-steel pipe with a 15-cm screened drive point, driven into the streambed with a slide hammer to depths of 1.135 m and 0.815 m (to the bottom of the drive point). Both piezometers were dry after installation. Stream water was added to the piezometers in an attempt to develop them, but the introduced water took several days to drain. Water levels in the piezometers eventually dropped below the levels of the surface water, indicating a downward hydraulic gradient.

### Well Cluster 2

Well Cluster 2 is located along the FCD and includes wells CH15-106-MW003, CH15-106-MW004, and CH15-106-MW008 (Figure 1). Well CH15-106-MW008 was pumped at a very low rate (less than 2 litres per minute) and is not suitable for aquifer testing.

As CH15-106-MW003 had an insufficient column of water for pumping, CH15-106-MW004 was chosen as an alternative pumping well. However, this well was not able to sustain even very low pumping rates and was quickly pumped dry. Water levels at CH15-106-MW004 did not recover to the pre-pumping levels over the next several days, although recorded similar time-series data as other wells in Well Cluster 2.

A groundwater sample was collected from CH15-106-MW008 on June 7, 2016.

## Well Cluster 3

Well Cluster 3 is located near the convergence of the West Valley Interceptor Ditch and the FCD at FCD-1 and includes wells CH15-106-MW005, CH15-106-MW010, and CH15-106-MW006 (Figure 1). CH15-106-MW006 was the designated pumping well, and a step-test was performed on June 1, and an 8-hour constant-rate test was performed on June 4. A constant-rate test was attempted on June 2, but the pump failed after about 30 minutes of pumping. The effects of the pumping during the constant rate test were observed in monitoring wells CH15-106-MW005 and CH15-106-MW010. A groundwater sample was collected from CH15-106-MW006 following the step test. Table 3 summarizes the pumping rates and drawdown; Figure 2 shows the groundwater elevations at each well.

## Discharge Measurements

Surface water discharge measurements were collected at the following locations (Figure 3), using techniques described in MSR030 (CH2M, June 2012n):

- FCD-1
- FCD-2A (in between FCD-1 and FCD-2)
- FCD-2
- Seeps to the east of the FCD
- West Valley Interceptor Ditch at CH15-106-MW010
- West Valley Interceptor Ditch between Well Clusters 2 and 3, above and below tributary inflow
- West Valley Interceptor Ditch near Well Cluster 1
- Along Faro Creek

At FCD-1, FCD-2A, and FCD-2, the six-tenths depth method was used with a March McBirney Model 2000 flow meter, wading rod, and measuring tape suspended across the stream. Velocity readings were taken over 20-second intervals, and the average reported. Tables 4, 5, and 6 list the depth and velocity measurements and discharge computations at FCD-1, FCD-2, and FCD-2A, respectively. It should be noted that there was no infrastructure present at FCD-2 (i.e., stage gauge, pressure transducer) with the exception of one steel fencepost (along the section for discharge measurements), and it was presumed to have been destroyed during freshet.

For the seeps along the eastern FCD bank, flow was measured with a 1-litre graduated cylinder and stopwatch. In some cases, a plastic cone was used to funnel seep flow into the cylinder. Table 7 contains volume and time measurements and discharge computations. In most cases, 100 percent capture of the seep was not possible because of the uneven terrain. The field team estimated that approximately 75 percent of the observed seep discharge along the east FCD bank was captured in measurements.

For the West Valley Interceptor Ditch locations, the streambed was gently modified to create a relatively uniform depth (between 0.06 and 0.09 m; just sufficient depth for the velocity meter). The exception was near Well Cluster 1, where the channel was modified slightly to create a relatively uniform depth of 0.02 m and width of 0.2 m along a 2-m reach, and the floating object method was used to estimate stream velocity. Depth and velocity measurements and discharge computation for these locations are compiled in Table 8.

Along the Faro Creek Channel, discharge was measured at 3 points: at established Station FCO; at Faro Creek Original (located at the pond upstream of Faro Valley Dumps on the original Faro Creek alignment), at the West Ditch entering just above FCO; and at the primary spring source noted as “Faro Creek Spring (Main Source)” on Figure 3. Measurements at the West Ditch and Faro Creek source were measured with a 5-gallon bucket calibrated with 1-litre markings; measurements and discharge computation for these locations are compiled in Table 7. FCO is a 120-degree, v-notch weir. Computation for flow was based on information provided in Shen (1981). The seep emanating from the roadway along the east flowed into the FCO channel, but mostly through a gravel bar where it was not

possible to directly measure flow. The discharge was estimated to be about 25 percent of the flow in the FCO channel, or approximately 1.5 litres per second (L/s).

## Water Quality

Samples were collected from the three pumped wells: CH15-106-M002, CH15-106-MW006, and CH15-106-MW008. Field pH, temperature, conductivity, dissolved oxygen, oxidation reduction potential and turbidity were measured in the field before sampling was conducted. Table 9 provides the field measurements for each monitoring well, as well as readings in surface water. Field efforts followed procedures described in CH2M, September 2012d.

Groundwater sample from each well was analyzed for the following parameters:

- Dissolved metals
- General chemistry parameters: pH, hardness, total suspended solids, and total dissolved solids
- Anions and nutrients: acidity, alkalinity, ammonia, chloride, fluoride, nitrite/nitrate, phosphorous, sulphate, and dissolved organic carbon

Table 10 presents the analytical data for the groundwater samples. Attachment 1 provides the analytical reports. A summary of the validation methodologies, issues encountered, and flags assigned to data are provided in the *2016 Faro Creek Diversion Seepage Aquifer Testing Data Quality Evaluation Report* (CH2M, August 2016i), included as Attachment 2. Photographs taken during the field effort are compiled in Attachment 3.

## Findings

### Groundwater Elevation and Flow Direction

June 1, 2016, data (9:00 a.m.) were used to generate contours of groundwater elevation at the site (Figure 4). The contours in Figure 4 also reflect approximate elevations of surface water bodies, including the West Valley Interceptor Ditch, the FCD, the Faro Creek Channel leading to FCO, and the FCO pond. The surface data are from 2011 Light Detection and Ranging (LIDAR) survey, and are used to generate a more realistic depiction of groundwater flow (Critigen, February 2013). This was determined to be a reasonable approach, as the LIDAR elevation at FCD-1 was nearly identical (1310.39 m) as the observed value on June 1, 2016 (1310.38 m). In addition, Faro Creek was observed to be sourced by groundwater springs, suggesting groundwater flow toward this feature.

Groundwater flow directions are generally toward the Faro Creek Channel at the bottom of the valley. The most notable anomaly was at CH15-106-MW008, where the groundwater elevation was more than 3 m higher than at nearby wells CH15-106-MW003 and CH15-106-MW004, suggesting localized eastward flow. Groundwater conditions in this area are unusual, noting the occasional 1-m decrease in heads at CH15-106-MW004 after pumping. Depth to bedrock in this area is extraordinarily deep, not reached at the 29-m maximum drilling depth at CH15-106-MW003 nor at the other wells in the cluster, and this may be a factor in the unusual groundwater conditions here.

### Aquifer Testing

The aquifer test data were evaluated using the MLU computer program (Hemker and Randall, 2013; Carlson and Randall, 2012). MLU is a semi-analytical groundwater model that can solve for hydraulic conductivity (K) and storage coefficients (S) in multi-layered aquifer systems. Pumping rates and drawdown from pumping and observation wells are entered into MLU and the user can either assign parameter values or program MLU to inversely solve for selected parameter values. The primary assumptions, as with other common techniques (e.g., curve matching), is that each simulated layer is

infinite in extent and has uniform hydraulic properties. The thicknesses of the layers were dependent upon the complexity of the lithology encountered, screen intervals and saturated thicknesses.

Pressure transducer datasets were reduced to 50 to 70 points per well for evaluation in the models.

### Well Cluster 1

Pumping well CH15-106-MW002 is completed in silty gravel with sand transitioning to weathered bedrock at depth. An MLU model was constructed with four layers, described in Table 11. Figure 5 shows the observed and simulated drawdown at CH15-106-MW002 during the step and constant rate tests. The best fit to the observed data was with the hydraulic conductivity and storativity as listed in Table 9. The horizontal to vertical hydraulic conductivity ratio ( $K_h:K_v$  ratio) was uniform at 10:1, and the horizontal values are listed in Table 11. These values ranged from 10 metres per day (m/d) in the upper (sandy) layer and 5 m/d in the silty gravel layer 1, to 0.1 m/d in the weathered bedrock.

### Well Cluster 2

There were no successful aquifer tests performed at Well Cluster 2 because of poor production or limited water column in the wells.

### Well Cluster 3

Pumping well CH15-106-MW006 is completed in sand and gravel with similar materials below and increasing fines above. An MLU model was constructed with three layers, described in Table 11. Figure 6 shows the observed and simulated drawdown at CH15-106-MW006 for the step and constant-rate tests and at CH15-106-MW005 and CH15-106-MW010 during constant-rate tests. The best fit to the observed data was with the hydraulic conductivity and storativity as listed in Table 11. The  $K_h:K_v$  ratio was uniform at 10:1.

The same set of solutions was able to match observed drawdown in both CH15-106-MW006 and CH15-106-MW005, with the exception of an order of magnitude change in storage in layer 2 (Table 11). These solutions included a very high hydraulic conductivity (300-m/d) layer below the screened interval. This may be representative of a localized preferential flow path, perhaps aligned along the ancestral Faro Creek.

To simulate drawdown at CH15-106-MW010, the high hydraulic conductivity layer was removed, the values in the middle layer increased slightly, and the storage term increased in layer 2.

## Stream Discharge

The following subsections discuss the results of the stream discharge measurement survey by the area of investigation: FCD main stem, West Valley Interceptor Ditch, and Faro Creek Channel.

### Faro Creek Diversion

Reporting of discharge measurements along the FCD should take into account the error associated with the measurements. Table 12 summarizes flow and error computations at FCD-1, FCD-2A, and FCD2, taking into account errors associated the reproducibility of the data as well as standard errors computed for stream discharge measurements as compiled by Sauer and Meyer (1992). The standard error is based on the depth (less than 1.22 m) and streambed characteristics (e.g., stable, rocky, or cobbly).

Figure 7 shows the average discharge for each station and associated error bars. Because all of the error bars overlap all of the data points, the conclusion is that there is no significant difference between measured flow at the three stations.

The seep discharge effort quantified 1.4 L/s of water entering the FCD in the area shown on Figure 3. Generously rounding this figure up to 2 L/s results in discharge of approximately 0.5 percent of the discharge of the FCD in this area.

Upstream of the area of visible seeps, the FCD lining was exposed in some areas, but appeared to be intact. There were also some depressions along the eastern side of the channel that did not appear to be lined and were visibly lower than the stream elevation, but which were dry. This suggests that in some areas the lining is robust and is limiting leakage to the groundwater. However, at higher stream discharge, the observed depressions would be flooded and may lead to a bypassing of the lining.

### West Valley Interceptor Ditch

During the period of study, the West Valley Interceptor Ditch began flowing about 350 m upstream of Well Cluster 1 (Figure 3), and flow remained stable at 1.1 to 1.2 L/s (Table 8). An unnamed tributary enters the Upper FCD in a steep, rocky channel. Discharge from this tributary was estimated by measuring the West Valley Interceptor Ditch discharge above (1.1 L/s) and below (13.5 L/s) and computing the difference (12.4 L/s). Discharge near the confluence with the FCD was measured at 13.8 L/s, essentially the same value as below the tributary, suggesting very limited groundwater–surface water interactions are occurring in the West Valley Interceptor Ditch. The low permeability of the streambed observed in the two piezometers installed near Well Cluster 1 corroborate this assessment, although the streambed piezometer effort was limited in scope and not a listed objective of the study.

### Faro Creek Channel

At the time of the study, surface water flow in the Faro Creek Channel began at the spring labeled as the Faro Creek source on Figure 3. This spring was located about 5 m northwest of the main channel. Other pools of surface water were visible upstream from this point, but there was no surface flow other than the spring at this point in the channel. Flow measured at the spring was about 5 to 7 L/s (average 6.1 L/s), flow entering the Faro Creek channel at the Seep Tributary was estimated to be approximately 1.5 L/s, and discharge from the West Ditch was measured to be about 0.5 L/s. These all add up to about 8 L/s, about 1.5 L/s higher than the 6.6 L/s measured at FCO. The discrepancy is likely caused by measurement or estimation errors, although there could be losses to the groundwater along the Faro Creek Channel. Flows at the FCO weir may also be underestimated, as the plate thickness (1/2 inch) is thicker than recommended, the angle (120 degrees) is generally higher than recommended, and the nape was clinging to the downside of the weir (the computations assume atmospheric pressure under the nape) (Shen, 1981). These factors can lead to a depressed water level surface across the weir lip and underestimation of flow.

Based on the performance of wells in Well Cluster 1, particularly the shallow bedrock and poor performance of CH15-106-MW007 compared to CH15-106-MW002, and the point discharge nature of the source of Faro Creek (Faro Creek Spring), uniform groundwater flow coming down the western portion of the valley is unlikely.

The poor performance of wells in Well Cluster 2 and steep hydraulic gradients between the FCD and groundwater here suggest that there is very little groundwater flow occurring from or under the FCD in this area. The Seep Tributary entering the Faro Creek Channel below the main source spring is clearly emanating from under the roadway along the FCD between well clusters 2 and 3.

## Water Quality

Groundwater quality was not uniform between the three well clusters (Table 10). The following notable observations were made:

- Total dissolved solids increased an order of magnitude in the downstream direction between each cluster.

- Phosphorous was one order of magnitude higher at CH15-106-MW006 than at the other wells.
- Sulphate increased in the downstream direction between each cluster.
- Dissolved metals cobalt, ferrous iron, and manganese were two orders of magnitude higher at CH15-106-MW006 than at the other wells.
- Dissolved zinc was an order of magnitude higher at CH15-106-MW006 than at CH15-106-MW002, and even higher at CH15-106-MW008, where it exceeded the 0.03 milligram per litre (mg/L) screening level with a value of 0.085 mg/L. The road embankment in this area of the FCD (i.e., Well Cluster 2) is suspected to have been constructed from potentially acid generating material.
- Fluoride exceeded the screening level of 0.12 mg/L at CH15-106-MW008, with a value of 0.123 mg/L.

## Conclusions

Aquifer properties within the Faro Creek valley varied considerably across the valley. At Well Clusters 1 and 3, the alluvial aquifer has hydraulic conductivity values ranging from 3 to 10 m/d, with potential preferential flow zones with much higher permeability at Cluster 3 (Table 11). The hydraulic conductivity of the upper bedrock was 0.1 m/d. At Well Cluster 2, hydraulic conductivities were not quantified but are assumed to be very low as the wells here were not able to sustain continuous pumping even at very low rates.

Stream discharge measurements were inconclusive with respect to identifying whether the reach between FCD-1 and FCD-2 is a gaining or losing reach. Seeps (about 2 L/s) entering the eastern side of the FCD totaled about 0.5 percent of the discharge in the FCD (about 380 to 395 L/s), whereas the error associated with the stream discharge measurements is on the order of 20 to 40 L/s.

Groundwater flow directions were observed to generally follow the pattern of surface topography, with flow toward the original Faro Creek (Figure 3). A spring in the center of the valley provided most of the water flowing at FCO. Seeps were observed coming from the roadway on the eastern side of the valley, and were estimated to be about 20 percent of the flow at FCO. A ditch intercepts groundwater along the western side of the valley, with about 10 percent of the flow at FCO. While it is clear that all of these sources are from groundwater, it is not possible to determine if the groundwater originated from upstream groundwater flowing under the FCD or the West Valley Interceptor Ditch, or from stream leakage through the streambed. The presence of the very high hydraulic conductivity zone at Well Cluster 3 suggests that a pathway may exist from upgradient groundwater underneath the FCD, and this may be a significant source of groundwater to discharging springs in the Faro Creek valley.

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Tables

**Table 1. Depth to Water Measurements and Groundwater Elevations**  
*Faro Mine Remediation Project*

Location	Top of Casing (m)	Location	Measuring Point Elevation (m)	Location	Measuring Point Elevation (m)			
CH15-106-MW001	1324.266	CH15-106-MW002	1322.16	CH15-106-MW003	1298.438			
Date/Time	Depth to Water (m)	Groundwater Elevation (m)	Date/Time	Depth to Water (m)	Groundwater Elevation (m)	Date/Time	Depth to Water (m)	Groundwater Elevation (m)
6/1/2016 10:28	2.94	1321.326	6/1/2016 10:31	4.505	1317.655	6/2/2016 9:06	12.677	1285.761
6/2/2016 13:30	2.988	1321.278	6/2/2016 13:24	4.475	1317.685	6/3/2016 10:08	12.725	1285.713
6/2/2016 14:46	2.988	1321.278	6/4/2016 9:26	4.36	1317.8	6/7/2016 11:52	12.605	1285.833
6/2/2016 15:16	2.987	1321.279	6/6/2016 8:38	4.364	1317.796	5/31/2016 14:24	12.702	1285.736
6/2/2016 15:33	2.987	1321.279	6/7/2016 9:00	4.485	1317.675	5/31/2016 14:39	12.686	1285.752
6/4/2016 9:27	3.038	1321.228	5/31/2016 12:59	4.614	1317.546			
5/31/2016 13:33	2.934	1321.332	6/2/2016 13:56	4.361	1317.799			
6/6/2016 9:08	3.045	1321.221	6/2/2016 14:09	4.883	1317.277			
6/6/2016 9:30	3.045	1321.221	6/2/2016 14:53	5.355	1316.805			
6/6/2016 9:51	3.045	1321.221	6/2/2016 15:29	5.902	1316.258			
6/6/2016 10:27	3.046	1321.22	6/6/2016 8:59	4.33	1317.83			
6/6/2016 11:16	3.049	1321.217	6/6/2016 9:16	5.5	1316.66			
6/6/2016 11:55	3.05	1321.216	6/6/2016 9:34	5.538	1316.622			
6/6/2016 12:40	3.052	1321.214	6/6/2016 9:46	5.553	1316.607			
6/6/2016 13:43	3.053	1321.213	6/6/2016 10:23	5.572	1316.588			
6/6/2016 14:42	3.053	1321.213	6/6/2016 11:09	5.601	1316.559			
6/6/2016 15:39	3.05	1321.216	6/6/2016 11:51	5.613	1316.547			
6/6/2016 16:34	3.05	1321.216	6/6/2016 12:37	5.63	1316.53			
6/6/2016 16:55	3.05	1321.216	6/6/2016 13:39	5.647	1316.513			
			6/6/2016 14:38	5.65	1316.51			
			6/6/2016 15:36	5.66	1316.5			
			6/6/2016 16:31	5.662	1316.498			
			6/6/2016 16:51	5.67	1316.49			

**Table 1. Depth to Water Measurements and Groundwater Elevations**  
*Faro Mine Remediation Project*

Measuring Point			Measuring Point			Measuring Point		
Location	Elevation (m)		Location	Elevation (m)		Location	Elevation (m)	
CH15-106-MW004	1298.347		CH15-106-MW005	1311.853		CH15-106-MW006	1311.634	
Date/Time	Depth to Water (m)	Groundwater Elevation (m)	Date/Time	Depth to Water (m)	Groundwater Elevation (m)	Date/Time	Depth to Water (m)	Groundwater Elevation (m)
6/1/2016 8:35	12.08	1286.267	6/1/2016 9:22	1.899	1309.954	6/2/2016 10:11	1.275	1310.359
6/2/2016 9:40	12.194	1286.153	6/1/2016 11:21	1.896	1309.957	6/4/2016 8:30	1.3	1310.334
6/3/2016 9:38	12.27	1286.077	6/1/2016 12:19	1.896	1309.957	6/5/2016 8:40	1.297	1310.337
6/7/2016 11:55	13.358	1284.989	6/5/2016 9:06	1.903	1309.95	6/6/2016 8:20	1.31	1310.324
6/3/2016 9:38	12.27	1286.077	6/7/2016 9:40	1.9	1309.953	6/7/2016 9:38	1.209	1310.425
6/3/2016 10:07	12.1	1286.247	6/2/2016 10:30	1.898	1309.955	5/31/2016 14:12	1.266	1310.368
6/3/2016 10:34	13.465	1284.882	6/5/2016 9:32	1.9	1309.953	6/1/2016 10:56	1.255	1310.379
			6/5/2016 10:12	1.905	1309.948	6/1/2016 11:18	1.825	1309.809
			6/5/2016 10:54	1.905	1309.948	6/1/2016 11:36	1.908	1309.726
			6/5/2016 12:03	1.905	1309.948	6/1/2016 11:48	2.035	1309.599
			6/5/2016 12:52	1.91	1309.943	6/1/2016 12:15	2.446	1309.188
			6/5/2016 14:40	1.91	1309.943	6/1/2016 12:38	2.566	1309.068
			6/5/2016 15:15	1.912	1309.941	6/2/2016 10:15	1.275	1310.359
			6/5/2016 16:04	1.914	1309.939	6/2/2016 10:25	2.405	1309.229
			6/5/2016 16:54	1.913	1309.94	6/2/2016 12:38	1.317	1310.317
						6/5/2016 9:18	1.294	1310.34
						6/5/2016 9:26	2.395	1309.239
						6/5/2016 10:03	2.75	1308.884
						6/5/2016 10:48	2.87	1308.764
						6/5/2016 11:28	2.92	1308.714
						6/5/2016 11:58	2.948	1308.686
						6/5/2016 12:47	2.99	1308.644
						6/5/2016 13:26	3.015	1308.619
						6/5/2016 14:07	3.049	1308.585
						6/5/2016 15:09	3.075	1308.559
						6/5/2016 16:01	3.092	1308.542
						6/5/2016 16:48	3.114	1308.52
						6/5/2016 17:19	3.12	1308.514
						6/1/2016 9:13	1.26	1310.374

**Table 1. Depth to Water Measurements and Groundwater Elevations**

*Faro Mine Remediation Project*

Measuring Point			Measuring Point			Measuring Point		
Location	Elevation (m)		Location	Elevation (m)		Location	Elevation (m)	
CH15-106-MW007	1314.978		CH15-106-MW008	1294.065		CH15-106-MW010	1312.829	
Date/Time	Depth to Water (m)	Groundwater Elevation (m)	Date/Time	Depth to Water (m)	Groundwater Elevation (m)	Date/Time	Depth to Water (m)	Groundwater Elevation (m)
6/1/2016 10:42	3.985	1310.993	6/1/2016 8:35	4.882	1289.183	6/1/2016 11:19	1.645	1311.184
6/2/2016 14:10	4.105	1310.873	6/1/2016 14:29	12.649	1281.416	6/1/2016 12:17	1.702	1311.127
6/2/2016 14:37	4.095	1310.883	6/1/2016 14:36	12.131	1281.934	6/7/2016 13:15	1.365	1311.464
6/2/2016 14:44	4.09	1310.888	6/2/2016 9:09	4.815	1289.25	5/31/2016 16:21	1.645	1311.184
6/2/2016 15:13	4.08	1310.898	6/2/2016 16:47	4.815	1289.25	6/2/2016 10:30	1.655	1311.174
6/2/2016 15:31	4.075	1310.903	6/3/2016 10:08	4.808	1289.257			
6/2/2016 15:51	4.075	1310.903	6/7/2016 10:24	4.789	1289.276			
6/2/2016 16:30	4.069	1310.909	6/7/2016 12:22	5.516	1288.549			
6/4/2016 9:28	4.06	1310.918	5/31/2016 16:43	4.92	1289.145			
6/6/2016 8:33	4.052	1310.926	6/1/2016 13:28	4.713	1289.352			
6/6/2016 8:37	4.042	1310.936	6/1/2016 13:33	4.733	1289.332			
6/7/2016 9:19	4.081	1310.897	6/1/2016 13:46	6.61	1287.455			
5/31/2016 12:49	4.03	1310.948	6/3/2016 10:51	4.758	1289.307			
6/1/2016 9:55	3.98	1310.998	6/7/2016 10:32	4.688	1289.377			
6/6/2016 9:09	4.049	1310.929	6/7/2016 10:36	4.855	1289.21			
6/6/2016 9:31	4.05	1310.928	6/7/2016 10:40	5.19	1288.875			
6/6/2016 9:51	4.05	1310.928	6/7/2016 10:43	5.375	1288.69			
6/6/2016 10:29	4.055	1310.923	6/7/2016 10:46	5.615	1288.45			
6/6/2016 11:17	4.055	1310.923	6/7/2016 10:49	5.805	1288.26			
6/6/2016 11:56	4.055	1310.923	6/7/2016 10:51	5.935	1288.13			
6/6/2016 12:42	4.054	1310.924	6/7/2016 10:54	6.025	1288.04			
6/6/2016 13:45	4.056	1310.922	6/7/2016 10:57	6.084	1287.981			
6/6/2016 14:43	4.06	1310.918	6/7/2016 11:00	6.164	1287.901			
6/6/2016 15:41	4.06	1310.918	6/7/2016 11:03	6.244	1287.821			
6/6/2016 16:35	4.062	1310.916						
6/6/2016 16:58	4.065	1310.913						

Note:

m = metre

**Table 2. Aquifer Test Pumping Rates**

*Faro Mine Remediation Project*

Date	Time to Fill 1 Litre (s)					Pumping Rate (L/s)	Average per Step or Test (L/s)
	#1	#2	#3	#4	Average		
<b>CH15-106-MW006 Step Test</b>							
6/1/16 11:12	9.8	9.7			9.7	0.10	0.10
6/1/16 11:24	9.8	9.9			9.8	0.10	
6/1/16 11:34	10.0	9.9			9.9	0.10	
6/1/16 11:39	8.3	8.3	8.1		8.2	0.12	0.12
6/1/16 11:48	8.2	8.1			8.2	0.12	
6/1/16 11:50	6.4	6.4	6.5		6.4	0.16	0.16
6/1/16 12:08	6.4	6.4	6.3		6.3	0.16	
6/1/16 12:11	4.8	4.9			4.8	0.21	0.21
6/1/16 12:15	4.8	4.8	4.8		4.8	0.21	
<b>CH15-106-MW008 Step Test</b>							
6/1/16 13:44	27.0				27.0	0.04	0.03
6/1/16 13:52	47.0				47.0	0.02	
6/1/16 14:07	91.0				91.0	0.01	
6/1/16 14:11	13.7				13.7	0.07	
6/1/16 14:15	25.0				25.0	0.04	
6/1/16 14:19	70.0				70.0	0.01	
<b>CH15-106-MW006 Constant Rate #1 (pump fails)</b>							
6/2/16 10:25	3.4	3.3	3.5		3.4	0.29	0.28
6/2/16 10:40	3.8	3.8	3.7		3.7	0.27	
<b>CH15-106-MW002 Step Test</b>							
6/2/16 14:05	21.3	19.9	20.4		20.5	0.05	0.05
6/2/16 14:13	20.1	20.1			20.1	0.05	
6/2/16 14:29	20.5	20.3	20.4		20.4	0.05	
6/2/16 14:34	10.3	10.3	10.2		10.3	0.10	0.10
6/2/16 14:40	10.4	10.2	10.1		10.2	0.10	
6/2/16 15:11	7.8	7.8	7.8		7.8	0.13	0.13
6/2/16 15:22	7.8	7.7	7.7		7.7	0.13	
6/2/16 15:28	6.0	6.0	6.0		6.0	0.17	0.17
6/2/16 15:41	6.0	5.9	5.9		5.9	0.17	
<b>CH15-106-MW004 Step Test</b>							
6/3/16 10:19	16.9				16.9	0.06	0.06
<b>CH15-106-MW006 Constant Rate #2</b>							
6/4/16 9:23	3.9	3.8	3.8		3.8	0.26	0.25
6/4/16 9:37	4.2	4.1	4.1		4.1	0.24	
6/4/16 10:05	3.9	3.9	4.0		3.9	0.25	
6/4/16 10:48	4.1	4.1	4.1	4.1	4.1	0.24	
6/4/16 11:28	4.0	4.1	4.1		4.1	0.25	
6/4/16 11:58	4.1	4.1	4.0		4.1	0.25	
6/4/16 12:52	4.0	4.0	4.1		4.0	0.25	
6/4/16 13:26	4.1	3.9	4.0		4.0	0.25	
6/4/16 14:07	4.0	4.0	3.9		4.0	0.25	
6/4/16 15:09	4.1	4.1	4.0		4.1	0.25	
6/4/16 16:01	4.0	4.1	4.0		4.0	0.25	
6/4/16 16:48	3.9	4.0	4.0		4.0	0.25	
6/4/16 17:19	4.1	3.9	4.0		4.0	0.25	

**Table 2. Aquifer Test Pumping Rates**

*Faro Mine Remediation Project*

Date	Time to Fill 1 Litre (s)					Pumping Rate (L/s)	Average per Step or Test (L/s)
	#1	#2	#3	#4	Average		
<b>CH15-106-MW002 Constant Rate Test</b>							
6/6/2016 9:03	7.9	7.9	7.9		7.9	0.13	0.13
6/6/2016 9:19	7.8	7.8	7.7		7.8	0.13	
6/6/2016 9:34	7.7	7.8	7.8		7.8	0.13	
6/6/2016 9:46	7.7	7.8	7.6		7.7	0.13	
6/6/2016 10:23	7.7	7.7	7.6		7.7	0.13	
6/6/2016 11:09	7.7	7.8	7.8		7.8	0.13	
6/6/2016 11:51	7.7	7.9	7.9		7.8	0.13	
6/6/2016 12:37	7.7	7.7	7.8		7.7	0.13	
6/6/2016 13:39	7.8	7.8	7.9		7.8	0.13	
6/6/2016 14:38	7.8	7.8	7.8		7.8	0.13	
6/6/2016 15:36	7.8	7.7	7.9		7.8	0.13	
6/6/2016 16:31	7.8	7.8	7.7		7.8	0.13	
6/6/2016 16:51	7.9	7.8	7.8		7.8	0.13	
<b>CH15-106-MW008 Groundwater Sampling</b>							
6/7/2016 10:36	71.0				71.0	0.01	0.01
6/7/2016 10:43	98.0				98.0	0.01	
6/7/2016 10:46	65.0				65.0	0.02	
6/7/2016 10:49	82.0				82.0	0.01	
6/7/2016 10:51	100.0				100.0	0.01	
6/7/2016 10:54	126.0				126.0	0.01	
6/7/2016 10:57	160.0				160.0	0.01	
6/7/2016 11:00	87.0				87.0	0.01	
6/7/2016 11:03	128.0				128.0	0.01	

Note:

L/s = litre per second

**Table 3. Aquifer Test Pumping Rates**

Faro Mine Remediation Project

Well ID	Total Depth (mbgs)	Screen Interval (mbgs)	Depth to Bedrock (mbgs)	Lithology at Screened Interval	Role	Test	Pumping Rates (L/s)	Pumping Duration (minutes)	Drawdown (m)	Specific Capacity (L/s per m)
<b>Well Cluster 1</b>										
CH15-106-MW007	5.49	2.44 to 5.49	4.00	Alluvium (Gravel with Sand)	Observation Well	Insufficient capacity for testing				
CH15-106-MW001	10.52	7.47 to 10.52	3.05	Bedrock	Observation well					
CH15-106-MW002	9.14	6.1 to 9.14	15.10	Alluvium (Sand and Gravel)	Pumping well	Step 1	0.05	30	0.37	0.13
						Step 2	0.10	30	0.86	0.12
						Step 3	0.13	22	1.13	0.12
						Step 4	0.17	21	1.44	0.12
						Constant-rate Test	0.13	480	1.35	0.10
<b>Well Cluster 2</b>										
<b>Screened Formation</b>										
CH15-106-MW008	10.36	7.32 to 10.36	> 10.5	Alluvium (Sand with Gravel)	Pumping well, Observation Well	Insufficient capacity for testing				
CH15-106-MW004	14.94	8.84 to 14.94	> 14.9	Sandy Silt	Pumping well, Observation Well	Insufficient capacity for testing				
CH15-106-MW003	13.72	10.67 to 13.72	> 29.1	Alluvium (Sand with Gravel and Silt)	Observation Well	Insufficient depth of water for pumping				
<b>Well Cluster 3</b>										
<b>Screened Formation</b>										
CH15-106-MW006	5.97	2.93 to 5.97	> 6.25	Alluvium (Gravel with Sand)	Pumping Well	Step 1	0.1	30	0.62	0.16
						Step 2	0.12	12	0.74	0.16
						Step 3	0.16	21	0.95	0.17
						Step 4	0.21	28	1.26	0.17
						Constant-rate Test	0.25	482	1.84	0.14
CH15-106-MW005	6.10	3.05 to 6.1	> 6.5	Alluvium (Gravel with Sand)	Observation well	Constant-rate Test				
CH15-106-MW010	6.10	3.05 to 6.1	> 6.10	Alluvium (Gravel with Sand)	Observation well	Constant-rate Test				

Notes:

Coordinates and Elevations are from a field survey by Challenger Geomatics Ltd., performed on March 23, 2016.

CSRS = Canadian Spatial Reference System

CVGD28 = Canadian Vertical Geodetic Datum of 1928

ID = identification

L/s = litre per second

m = metre

mbgs = metres below ground surface

masl = metre above sea level

mbTOC = metre below top of casing

NAD = North American Datum

UTM = Universal Transverse Mercator

**Table 4. FCD-1 Stream Discharge Data**

*Faro Mine Remediation Project*

Station	Position (m)	Depth (ft)	Depth (m)	Velocity (m/s)	Area (m <sup>2</sup> )	Discharge (m <sup>3</sup> /s)	Discharge (L/s)	Notes
<b>Series 1</b>								
0	1	0	0.00	0	0.006	0.00	0.03	edge
1	1.2	0.4	0.12	0.01	0.024	0.000	0.24	
2	1.4	0.25	0.08	0.08	0.015	0.001	1.22	
3	1.6	0.4	0.12	0.35	0.024	0.009	8.53	
4	1.8	0.45	0.14	0.26	0.027	0.007	7.13	
5	2	0.35	0.11	0.34	0.021	0.007	7.25	
6	2.2	0.4	0.12	0.36	0.024	0.009	8.78	
7	2.4	0.35	0.11	0.59	0.021	0.013	12.59	
8	2.6	0.55	0.17	0.14	0.034	0.005	4.69	
9	2.8	0.6	0.18	0.61	0.037	0.022	22.31	
10	3	0.6	0.18	0.81	0.037	0.030	29.63	
11	3.2	0.65	0.20	0.66	0.040	0.026	26.15	
12	3.4	0.8	0.24	0.76	0.049	0.037	37.06	
13	3.6	0.9	0.27	0.95	0.055	0.052	52.12	
14	3.8	0.75	0.23	0.92	0.046	0.042	42.06	
15	4	0.8	0.24	1.17	0.049	0.057	57.06	
16	4.2	0.6	0.18	0.94	0.037	0.034	34.38	
17	4.4	0.9	0.27	0.56	0.055	0.031	30.72	
18	4.6	0.4	0.12	0.46	0.021	0.010	9.81	
19	4.75	0	0.00	0	0.005	0.000	0.00	edge
<b>Totals</b>					<b>0.626</b>	<b>0.392</b>	<b>391.77</b>	
<b>Series 2</b>								
0	1	0	0.00	0	0.00	0.00	-0.01	edge
1	1.1	0.25	0.08	-0.01	0.011	0.00	-0.11	
2	1.3	0.35	0.11	0.01	0.021	0.00	0.21	
3	1.5	0.3	0.09	0.15	0.018	0.00	2.74	
4	1.7	0.4	0.12	0.37	0.024	0.01	9.02	
5	1.9	0.3	0.09	0.38	0.018	0.01	6.95	
6	2.1	0.4	0.12	0.22	0.024	0.01	5.36	
7	2.3	0.3	0.09	0.52	0.018	0.01	9.51	
8	2.5	0.6	0.18	0.11	0.037	0.00	4.02	
9	2.7	0.5	0.15	0.47	0.030	0.01	14.32	
10	2.9	0.55	0.17	0.59	0.034	0.02	19.78	
11	3.1	0.65	0.20	0.75	0.040	0.03	29.72	
12	3.3	0.6	0.18	0.78	0.037	0.03	28.53	
13	3.5	0.8	0.24	0.87	0.049	0.04	42.43	
14	3.7	0.9	0.27	0.79	0.055	0.04	43.34	
15	3.9	0.7	0.21	1.18	0.043	0.05	50.35	
16	4.1	0.75	0.23	1.16	0.046	0.05	53.03	
17	4.3	0.8	0.24	0.76	0.049	0.04	37.06	
18	4.5	0.4	0.12	0.48	0.024	0.01	11.70	
19	4.7	0.5	0.15	0.56	0.019	0.01	10.67	
20	4.75	0	0.00	0	0.00	0.00	0.00	edge
<b>Totals</b>					<b>0.60</b>	<b>0.38</b>	<b>378.6</b>	

**Table 4. FCD-1 Stream Discharge Data**

*Faro Mine Remediation Project*

Station	Position (m)	Depth (ft)	Depth (m)	Velocity (m/s)	Area (m <sup>2</sup> )	Discharge (m <sup>3</sup> /s)	Discharge (L/s)	Notes
<b>Duplicate of Series 1</b>								
0	1	0	0	0	0.01	0.00	-0.03	edge
1	1.2	0.35	0.11	-0.01	0.021	0.00	-0.21	
2	1.4	0.25	0.08	0.1	0.015	0.00	1.52	
3	1.6	0.4	0.12	0.29	0.024	0.01	7.07	
4	1.8	0.45	0.14	0.33	0.027	0.01	9.05	
5	2	0.35	0.11	0.32	0.021	0.01	6.83	
6	2.2	0.4	0.12	0.37	0.024	0.01	9.02	
7	2.4	0.3	0.09	0.42	0.018	0.01	7.68	
8	2.6	0.6	0.18	0.17	0.037	0.01	6.22	
9	2.8	0.55	0.17	0.57	0.034	0.02	19.11	
10	3	0.6	0.18	0.84	0.037	0.03	30.72	
11	3.2	0.65	0.20	0.73	0.040	0.03	28.92	
12	3.4	0.7	0.21	0.76	0.043	0.03	32.43	
13	3.6	0.85	0.26	0.78	0.052	0.04	40.41	
14	3.8	0.75	0.23	1.01	0.046	0.05	46.17	
15	4	0.75	0.23	1.16	0.046	0.05	53.03	
16	4.2	0.6	0.18	0.84	0.037	0.03	30.72	
17	4.4	0.85	0.26	0.52	0.052	0.03	26.94	
18	4.6	0.4	0.12	0.49	0.021	0.01	10.45	
19	4.75	0	0	0	0.005	0.00	0.00	edge
<b>Totals</b>					<b>0.60</b>	<b>0.37</b>	<b>366.1</b>	

Notes:

FCD - Faro Creek Diversion

ft = feet

L/s = litre per second

m = metre

m/s = cubic metre per second

m<sup>2</sup> = square metre

m<sup>3</sup>/s = cubic metre per second

**Table 5. FCD-2 Stream Discharge Data**

*Faro Mine Remediation Project*

Station	Position (m)	Depth (ft)	Depth (m)	Velocity (m/s)	Area (m <sup>2</sup> )	Discharge (m <sup>3</sup> /s)	Discharge (L/s)	Notes
<b>Series 1</b>								
0	1.2	0	0	0	0.01	0.001	0.53	edge
1	1.55	0.4	0.12	0.1	0.037	0.004	3.66	
2	1.8	0.6	0.18	0.22	0.046	0.010	10.06	
3	2.05	0.85	0.26	0.37	0.065	0.024	23.96	
4	2.3	0.9	0.27	0.21	0.069	0.014	14.40	
5	2.55	0.85	0.26	0.23	0.065	0.015	14.90	
6	2.8	0.6	0.18	0.47	0.046	0.021	21.49	
7	3.05	0.75	0.23	0.46	0.057	0.026	26.29	
8	3.3	0.65	0.20	0.38	0.050	0.019	18.82	
9	3.55	0.75	0.23	0.4	0.057	0.023	22.86	
10	3.8	0.9	0.27	0.38	0.069	0.026	26.06	
11	4.05	0.9	0.27	0.43	0.069	0.029	29.49	
12	4.3	0.9	0.27	0.35	0.069	0.024	24.00	
13	4.55	0.95	0.29	0.36	0.072	0.026	26.06	
14	4.8	1	0.30	0.39	0.076	0.030	29.72	
15	5.05	0.95	0.29	0.43	0.072	0.031	31.13	
16	5.3	0.9	0.27	0.35	0.069	0.024	24.00	
17	5.55	0.8	0.24	0.32	0.061	0.020	19.51	
18	5.8	0.7	0.21	0.27	0.053	0.014	14.40	
19	6.05	0.6	0.18	0.12	0.046	0.005	5.49	
20	6.3	0.2	0.06	0	0.011	0.000	0.00	
21	6.4	0	0	0	0.00	0.000	0.00	edge
<b>Totals</b>					<b>1.17</b>	<b>0.387</b>	<b>386.8</b>	
<b>Series 2</b>								
0	1.2	0	0	0	0.004	0.000	-0.06	edge
1	1.4	0.25	0.08	-0.03	0.017	-0.001	-0.51	
2	1.65	0.45	0.14	0.25	0.034	0.009	8.57	
3	1.9	0.7	0.21	0.15	0.053	0.008	8.00	
4	2.15	0.95	0.29	0.29	0.072	0.021	20.99	
5	2.4	0.95	0.29	0.18	0.072	0.013	13.03	
6	2.65	0.8	0.24	0.3	0.061	0.018	18.29	
7	2.9	0.7	0.21	0.42	0.053	0.022	22.40	
8	3.15	0.85	0.26	0.46	0.065	0.030	29.79	
9	3.4	0.7	0.21	0.46	0.053	0.025	24.54	
10	3.65	0.8	0.24	0.37	0.061	0.023	22.55	
11	3.9	0.85	0.26	0.45	0.065	0.029	29.15	
12	4.15	0.9	0.27	0.37	0.069	0.025	25.37	
13	4.4	0.95	0.29	0.36	0.072	0.026	26.06	
14	4.65	1	0.30	0.41	0.076	0.031	31.24	
15	4.9	1.05	0.32	0.42	0.080	0.034	33.60	
16	5.15	0.95	0.29	0.44	0.072	0.032	31.85	
17	5.4	0.9	0.27	0.32	0.069	0.022	21.94	
18	5.65	0.7	0.21	0.39	0.053	0.021	20.80	
19	5.9	0.65	0.20	0.19	0.050	0.009	9.41	
20	6.15	0.4	0.12	0.07	0.030	0.002	2.13	
21	6.4	0	0	0	0.01	0.000	0.27	edge
<b>Totals</b>					<b>1.18</b>	<b>0.40</b>	<b>399.2</b>	

Notes:

FCD - Faro Creek Diversion

ft = feet

L/s = litre per second

m = metre

m/s = cubic metre per second

m<sup>2</sup> = square metre

m<sup>3</sup>/s = cubic metre per second

**Table 6. FCD-2A Stream Discharge Data**

*Faro Mine Remediation Project*

Station	Position (m)	Depth (ft)	Depth (m)	Velocity (m/s)	Area (m <sup>2</sup> )	Discharge (m <sup>3</sup> /s)	Discharge (L/s)	Notes
<b>Series 1</b>								
0	3.5	0	0	0	0.00	0.000	-0.03	edge
1	3.6	0.4	0.12	-0.02	0.015	0.000	-0.30	
2	3.75	0.4	0.12	0.01	0.018	0.000	0.18	
3	3.9	0.6	0.18	-0.01	0.027	0.000	-0.27	
4	4.05	0.55	0.17	0.08	0.025	0.002	2.01	
5	4.2	0.75	0.23	0.32	0.034	0.011	10.97	
6	4.35	0.95	0.29	0.3	0.043	0.013	13.03	
7	4.5	1.25	0.38	0.51	0.057	0.029	29.15	
8	4.65	1.3	0.40	0.66	0.059	0.039	39.23	
9	4.8	1.3	0.40	0.68	0.059	0.040	40.41	
10	4.95	1.7	0.52	0.51	0.078	0.040	39.64	
11	5.1	1.6	0.49	0.59	0.073	0.043	43.16	
12	5.25	1.5	0.46	0.62	0.069	0.043	42.52	
13	5.4	1.6	0.49	0.52	0.073	0.038	38.04	
14	5.55	1.1	0.34	0.61	0.050	0.031	30.68	
15	5.7	1	0.30	0.5	0.046	0.023	22.86	
16	5.85	1.1	0.34	0.43	0.050	0.022	21.62	
17	6	0.7	0.21	0.5	0.032	0.016	16.00	
18	6.15	0.5	0.15	0.3	0.023	0.007	6.86	
19	6.3	0.4	0.12	0	0.018	0.000	0.00	
20	6.45	0.65	0.20	-0.01	0.030	0.000	-0.30	
21	6.6	0	0	0	0.01	0.000	0.00	edge
<b>Totals</b>					<b>0.88</b>	<b>0.395</b>	<b>395.4</b>	
<b>Series 2</b>								
0	3.5	0	0	0	0.005	0.000	0.00	edge
1	3.65	0.4	0.12	0	0.018	0.000	0.00	
2	3.8	0.35	0.11	0.02	0.016	0.000	0.32	
3	3.95	0.65	0.20	0.03	0.030	0.001	0.89	
4	4.1	0.6	0.18	0.17	0.027	0.005	4.66	
5	4.25	0.7	0.21	0.36	0.032	0.012	11.52	
6	4.4	0.9	0.27	0.47	0.041	0.019	19.34	
7	4.55	1.25	0.38	0.53	0.057	0.030	30.29	
8	4.7	1.3	0.40	0.6	0.059	0.036	35.66	
9	4.85	1.3	0.40	0.75	0.059	0.045	44.57	
10	5	1.7	0.52	0.43	0.078	0.033	33.42	
11	5.15	1.55	0.47	0.62	0.071	0.044	43.93	
12	5.3	1.5	0.46	0.65	0.069	0.045	44.57	
13	5.45	1.65	0.50	0.55	0.075	0.041	41.49	
14	5.6	1.1	0.34	0.6	0.050	0.030	30.17	
15	5.75	1.1	0.34	0.48	0.050	0.024	24.14	
16	5.9	1.4	0.43	0.12	0.064	0.008	7.68	
17	6.05	0.65	0.20	0.5	0.030	0.015	14.86	
18	6.2	0.4	0.12	0.2	0.018	0.004	3.66	
19	6.35	0.4	0.12	-0.01	0.018	0.000	-0.18	
20	6.5	0.65	0.20	0.05	0.025	0.001	1.24	
21	6.6	0	0	0	0.00	0.000	0.12	edge
<b>Totals</b>					<b>0.89</b>	<b>0.39</b>	<b>392.2</b>	

Notes:

FCD - Faro Creek Diversion

ft = feet

L/s = litre per second

m = metre

m/s = cubic metre per second

m<sup>2</sup> = square metre

m<sup>3</sup>/s = cubic metre per second

**Table 7. Seep and Point Source Discharge Data**

*Faro Mine Remediation Project*

East Bank Seeps	Measurement	Volume (mL)	Time (s)	Discharge (mL/s)	Average Discharge (L/s)	Notes
1	1	250	4.30	58	0.06	
	2	250	4.30	58		
	3	250	4.00	63		
2	1	750	2.20	341	0.30	
	2	400	1.94	206		
	3	700	1.96	357		
	4	750	2.47	304		
3	1	750	6.53	115	0.12	
	2	800	6.72	119		
4	1	420	2.40	175	0.19	
	2	500	2.10	238		
	3	450	2.50	180		
	4	450	2.50	180		
5	1	270	3.10	87	0.07	
	2	280	4.10	68		
	3	300	4.60	65		
6	1	350	7.60	46	0.05	
	2	400	7.80	51		
	3	500	10.20	49		
	4	400	7.40	54		
7	1	300	9.40	32	0.03	
	2	280	10.90	26		
	3	270	10.70	25		
	4	220	8.80	25		
8	1	280	3.50	80	0.08	
	2	320	4.10	78		
	3	350	5.00	70		
9	1	530	4.94	107	0.16	
	2	680	4.12	165		
	3	690	3.97	174		
	4	740	3.81	194		
10	1	640	3.72	172	0.16	
	2	700	4.32	162		
	3	630	4.25	148		
	4	700	4.00	175		
11	1	420	3.60	117	0.12	
	2	390	3.30	118		
	3	450	3.90	115		
	4	500	4.20	119		
12	1	280	8.30	34	0.04	
	2	250	5.80	43		
	3	320	7.90	41		
				<b>Total</b>	<b>1.4</b>	

Notes:

L/s = litre per second

mL = millilitre

mL/s = millilitre per second

s = second

**Table 8. Upper FCD Discharge Data**

*Faro Mine Remediation Project*

Station	Position (m)	Depth (ft)	Depth (m)	Velocity (m/s)	Area (m <sup>2</sup> )	Discharge (m <sup>3</sup> /s)	Discharge (L/s)	Notes
<b>West Valley Interceptor Ditch near CH15-106-MW010</b>								
0	0.75	0	0	0	0.004	0.000	0.13	edge
1	1	0.2	0.06	0.07	0.014	0.001	0.96	
2	1.2	0.2	0.06	0.16	0.009	0.001	1.46	
3	1.3	0.25	0.08	0.4	0.008	0.003	3.05	
4	1.4	0.3	0.09	0.48	0.009	0.004	4.39	
5	1.5	0.25	0.08	0.33	0.008	0.003	2.51	
6	1.6	0.2	0.06	0.15	0.008	0.001	1.14	
7	1.75	0	0.00	0	0.00	0.000	0.17	edge
<b>Totals:</b>					<b>0.061</b>	<b>0.014</b>	<b>13.8</b>	
<b>West Valley Interceptor Ditch, Upstream of Tributary</b>								
0	1	0	0	0	0.002	0.000	0.05	edge
1	1.1	0.22	0.07	0.06	0.007	0.000	0.40	
2	1.2	0.28	0.09	0.05	0.009	0.000	0.43	
3	1.3	0.3	0.09	0.03	0.009	0.000	0.27	
4	1.4	0.3	0.09	0	0.009	0.000	0.00	
5	1.5	0.3	0.09	-0.01	0.009	0.000	-0.09	
6	1.6	0	0	0	0.00	0.000	-0.01	edge
<b>Totals:</b>					<b>0.05</b>	<b>0.00</b>	<b>1.1</b>	
<b>West Valley Interceptor Ditch, Downstream of Tributary</b>								
0	0.75	0	0.00	0	0.002	0.000	0.02	edge
1	0.85	0.2	0.06	0.02	0.006	0.000	0.12	
2	0.95	0.23	0.07	0.75	0.007	0.005	5.26	
3	1.05	0.25	0.08	0.23	0.008	0.002	1.75	
4	1.15	0.25	0.08	0.25	0.008	0.002	1.90	
5	1.25	0.28	0.09	0.22	0.009	0.002	1.88	
6	1.35	0.25	0.08	0.1	0.008	0.001	0.76	
7	1.45	0.23	0.07	0.18	0.009	0.002	1.58	
8	1.6	0	0.00	0	0.00	0.000	0.24	edge
<b>Totals:</b>					<b>0.06</b>	<b>0.01</b>	<b>13.5</b>	

**Table 8. Upper FCD Discharge Data**

*Faro Mine Remediation Project*

**West Valley Interceptor Ditch, Near Well Cluster 1**

Trial	Width (m)	Depth (m)	Distance (m)	Time (s)	Velocity (m/s)	Discharge (m <sup>3</sup> /s)	Discharge (L/s)
1	0.2	0.02	2	6.22	0.32	0.001	1.29
2	0.2	0.02	2	7.37	0.27	0.001	1.09
3	0.2	0.02	2	6.81	0.29	0.001	1.17
4	0.2	0.02	2	6.37	0.31	0.001	1.26
<b>Averages:</b>				<b>6.69</b>	<b>0.30</b>	<b>0.001</b>	<b>1.20</b>

**Faro Creek Main Source**

Trial	Time (s)	Volume (L)	Discharge (L/s)
1	1.37	8	5.8
2	1.47	9	6.1
3	1.81	10	5.5
4	1.28	9	7.0
<b>Averages:</b>		1.48	9

**Western Ditch**

Trial	Time (s)	Volume (L)	Discharge (L/s)
1	6.7	3	0.45
2	3.88	2	0.52
3	4.37	2.8	0.64
4	4.44	2.5	0.56
5	4.7	2.6	0.55
<b>Averages:</b>		4.82	2.58

**FCO**

Width of Water (cm)	Depth of Water at Notch (cm)	Depth of Water at Notch (ft)	Discharge Coefficient	Head Correction Factor	Discharge (cfs)	Discharge (L/s)
29.5	9.0	0.30	0.585	0.003	0.233	6.6

Notes:

cm = centimetre

FCD - Faro Creek Diversion

ft = feet

L = litre

L/s = litre per second

m = metre

m/s = cubic metre per second

m<sup>2</sup> = square metre

m<sup>3</sup>/s = cubic metre per second

s = second

**Table 9. Field Parameters**

*Faro Mine Remediation Project*

	Location ID	CH15-106-MW002	CH15-106-MW006	CH15-106MW008	FCD-1	FCD-1	FCD-2	FCD-2A	West Valley Interceptor Ditch
	General Location	Cluster 1	Cluster 3	Cluster 2	FCD-1	FCD-1	FCD-2	FCD-2A	Cluster 1
	Date	2-Jun-16	2-Jun-16	7-Jun-16	6/4/16 13:26	6/4/16 12:51	6/4/16 11:19	6/4/16 12:09	6/2/16 15:49
Field Parameter	Unit								
Conductivity	mS/cm	0.181	0.139	0.247	0.024	0.024	0.024	0.024	0.128
Dissolved Oxygen	mg/L	9.44	6.01	6.03	10.91	10.9	11.2	10.98	7.89
Oxidation Reduction Potential	mV	173.6	130.6	95.7	110.6	140	88.5	102.8	138.7
pH	pH UNITS	7.19	6.5	7.1	7.11	7.11	7.21	7.16	7.89
Temperature	deg c	3.65	2.96	3.6	4.83	4.77	4.49	4.95	12.79
Turbidity	NTU	18.2	130	18.8	-0.2	-0.2	-0.3	-0.3	3.1

Notes:

deg c = degrees Celsius

FCD = Faro Creek Diversion

ID = identification

mS/cm = milliSiemen per centimetre

mg/L = milligram per litre

mV = millivolt

NTU = nephelometric turbidity unit

Table 10. Analytical Results - General Chemistry, Anions, Nutrients and Dissolved Metals

Faro Mine Remediation Project

		Location ID	CH15-106-MW002	CH15-106-MW006	CH15-106-MW008
		General Location	Cluster 1	Cluster 3	Cluster 2
		Date	2-Jun-16	2-Jun-16	7-Jun-16
Analyses ID	Units	Screening Level			
<b>General Chemistry</b>					
pH, Field	pH UNITS	6.5 - 9.0	7.19	6.5	7.1
Temperature, Field	deg c	-	3.65	2.96	3.6
Hardness (as CaCO3)	mg/L	-	97.4	62	116
Total Suspended Solids	mg/L	-	125	129	9.6
Total Dissolved Solids	mg/L	-	33.6	160	411
<b>Anions and Nutrients</b>					
Acidity, Hot Peroxide	mg/L	-	25	25	25
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	94.1	50.1	74.5
Alkalinity, Carbonate (as CaCO3)	mg/L	-	1	1	1
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	1	1	1
Alkalinity, Total (as CaCO3)	mg/L	-	94.1	50.1	79.8
Ammonia	mg/L	Variable <sup>a</sup>	0.005	0.0196	0.005
Chloride (Cl)	mg/L	120	0.5	0.5	0.5
Fluoride	mg/L	0.12	0.067	0.091	0.123
Nitrate (as N)	mg/L	13	0.207	0.112	0.113
Nitrite (as N)	mg/L	0.06	0.001	0.001	0.001
Phosphorus	mg/L	-	0.026	0.157	0.02
Sulfate	mg/L	100	4.07	20.8	43.4
Carbon, Dissolved Organic (DOC)	mg/L	-	2.76	1.28	0.87
Free Cyanide		0.005			
<b>Dissolved Metals</b>					
Aluminum	mg/L	0.005 to 0.1 <sup>b</sup>	0.001	0.001	0.001
Antimony (Sb)	mg/L	1.6	0.0001	0.0001	0.00014
Arsenic (As)	mg/L	0.005	0.00017	0.00024	0.00016
Barium (Ba)	mg/L	2.3	0.171	0.0717	0.049
Beryllium (Be)	mg/L	0.0053	0.0001	0.0001	0.0001
Boron (B)	mg/L	1.5	0.01	0.01	0.01
Cadmium (Cd)	mg/L	Variable <sup>c</sup>	4.83E-05	0.000106	0.000214
Calcium	mg/L	-	34.4	18.9	38.5
Chromium (Cr)	mg/L	0.0089	0.00046	0.00019	0.00038
Cobalt (Co)	mg/L	-	0.0001	0.00066	0.00016
Copper (Cu)	mg/L	0.002 to 0.004 <sup>d</sup>	0.0014	0.00041	0.00074
Ferrous Iron	mg/L	-	0.02	0.165	0.023
Iron	mg/L	0.3	0.03	0.176	0.03
Lead (Pb)	mg/L	0.001 <sup>e</sup>	0.000438	0.000352	0.00031
Lithium	mg/L	-	0.0049	0.0047	0.0037
Magnesium	mg/L	-	2.77	3.61	4.94
Manganese	mg/L	-	0.00211	0.11	0.0592
Mercury	mg/L	0.000026	5.00E-06	5.00E-06	5.00E-06
Molybdenum (Mo)	mg/L	0.073	0.000194	0.00023	0.000162
Nickel	mg/L	0.025 <sup>f</sup>	0.0008	0.0017	0.00637
Phosphorus	mg/L	0.004 to 0.10 <sup>g</sup>	0.3	0.3	0.3
Potassium	mg/L	-	1	0.69	0.869
Selenium	mg/L	0.001	9.10E-05	8.70E-05	5.20E-05

**Table 10. Analytical Results - General Chemistry, Anions, Nutrients and Dissolved Metals**

*Faro Mine Remediation Project*

Location ID			CH15-106-MW002	CH15-106-MW006	CH15-106-MW008
General Location			Cluster 1	Cluster 3	Cluster 2
Date			2-Jun-16	2-Jun-16	7-Jun-16
Analyses ID	Units	Screening Level			
Silica	mg/L	-	17.9	18.6	17.8
Silicon	mg/L	-	8.35	8.69	8.34
Silver	mg/L	0.0001	1.00E-05	1.00E-05	1.00E-05
Sodium	mg/L	-	1.83	2.88	2.34
Strontium	mg/L	-	0.118	0.0895	0.113
Sulfur	mg/L	-	1.46	6.87	15.2
Thallium	mg/L	0.0008	1.00E-05	1.00E-05	1.00E-05
Titanium	mg/L	0.1	0.0003	0.0003	0.0003
Uranium	mg/L	0.015	0.000152	0.000133	5.00E-05
Vanadium	mg/L	-	0.0005	0.0005	0.0005
Zinc	mg/L	0.03	0.001	0.014	0.085

ALS Laboratory Report ID: L1778682-1

**Notes:**

Concentration exceeds Screening Level

pH reported is the field parameter value.

< = less than

> = greater than

µg/L = micrograms per litre

CCME = Canadian Council of the Ministers of the Environment

CWQG = Canadian Environmental Quality Guidelines

deg C = degrees Celsius

FIGQG = Federal Interim Groundwater Quality Guidelines

ID = identification

J = Analyte was present but the reported value may not be accurate or precise.

mg/L = milligram per litre

NTU = nephelometric turbidity unit

R = Result has been rejected for use.

U = Analyte was analyzed for but not detected at the specified detection limit.

UJ = Analyte was not detected above the detection limit; however, the reported detection limit is approximate and may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

<sup>a</sup> CCME guideline is pH and temperature dependent; p guidelines used here assume 5°C typical laboratory storage temperature.

<sup>b</sup> CCME guideline is pH dependent; 0.005 mg/L if pH < 6.5; 0.1 mg/L if pH ≥ 6.5.

<sup>c</sup> CCME guideline is hardness dependent; If hardness is > 0 to < 17 mg/L, the CWQG is 0.04 µg/L; at hardness > 280 mg/L, the CWQG is 0.37 µg/L; at hardness ≥ 17 to ≤ 280 mg/L cadmium concentration = 100.83[log10(hardness)]-2.46/1000 mg/L.

<sup>d</sup> CCME guideline is hardness dependent; If hardness is 0 to < 82 mg/L, the CWQG is 2 µg/L; at hardness >180 mg/L, the CWQG is 4 µg/L; at hardness ≥82 to ≤180 mg/L the CWQG= e0.8545[ln(hardness)]-1.465 \* 0.2 /1000 mg/L.

<sup>e</sup> CCME guideline is hardness dependent; 0 to ≤ 60 mg/L, the CWQG is 1 µg/L; at hardness >180 mg/L, the CWQG is 7 µg/L; at hardness >60 to ≤ 180 mg/L the CWQG = e1.273[ln(hardness)]-4.705 /1000 mg/L.

<sup>f</sup> CCME guideline is hardness dependent; At hardness is 0 to ≤ 60 mg/L, the CWQG is 25 µg/L; at hardness >180 mg/L, the CWQG is 150 µg/L; at hardness > 60 to ≤ 180 mg/L the CWQG is = e0.76[ln(hardness)]+1.06 /1000 mg/L.

<sup>g</sup> CCME trigger range for oligotrophic phosphorous.

**Table 11. Aquifer Test Summary**

*Faro Mine Remediation Project*

Location	Well	MLU Model Layer	Thickness (m)	Represented Zone	Lithology	Hydraulic Conductivity (m/d)	Storativity
Well Cluster 1	CH15-106-MW002	1	1.5	Saturated Interval above screen	Well-graded Sand with Silt	10	0.01
		2	1.4	Upper portion of screened interval	Silty Gravel With Sand	5	0.01
		3	1.65	Lower portion of screened interval	Well-graded Sand with Bedrock Fragments	0.1	1.00E-06
		4	1	1 m zone below screen interval	Well-graded Gravel (bedrock)	0.1	1.00E-06
Well Cluster 3	CH15-106-MW006	1	1.6	Saturated Interval above screen	Silty Sand	1	0.1
		2	3.05	Screened Interval	Well-graded Gravel with Sand / Sand with Gravel	3	0.1
		3	1	1 m zone below screen interval	Well-graded Gravel with Sand	300	1.00E-06
	CH15-106-MW005	1	1.6	Saturated Interval above screen	Silty Sand	1	0.1
		2	3.05	Screened Interval	Well-graded Gravel with Sand / Sand with Gravel	3	0.01
		3	1	1 m zone below screen interval	Well-graded Gravel with Sand	300	1.00E-06
	CH15-106-MW010	1	1.6	Saturated Interval above screen	Silty Sand	1	0.1
		2	3.05	Screened Interval	Well-graded Gravel with Sand / Sand with Gravel	5	0.0015
		3	1	1 m zone below screen interval	Well-graded Gravel with Sand	5	1.00E-06

Notes:

1. For Well Cluster 1, the model lithology represents conditions at CH15-106-MW002 only.

m = metre

m/d = metre per day

**Table 12. Upper FCD Discharge Data**

*Faro Mine Remediation Project*

<b>Station</b>	<b>Series 1 Discharge (L/s)</b>	<b>Series 2 Discharge (L/s)</b>	<b>Series 1 Duplicate Discharge (L/s)</b>	<b>Average (L/s)</b>	<b>Range (L/s)</b>	<b>Uncertainty in a Measurement (L/s)</b>	<b>Uncertainty in the Mean (L/s)</b>	<b>Average Depth (ft)</b>	<b>Standard Error</b>	<b>Standard Error (L/s)</b>	<b>Total Error</b>	<b>Discharge (L/s)</b>
FCD-1	392	379	366	379	25.8	12.9	7.4	0.55	9.2%	34.9	42.4	379 +/- 42.4
FCD-2A	395	392	--	394	3.2	1.6	1.1	0.97	5.2%	20.6	21.8	394 +/- 21.8
FCD-2	387	399	--	393	12.3	6.2	4.4	0.77	6.6%	25.9	30.3	393 +/- 30.3

Notes:

1. Uncertainty in a measurement computed as the range divided by 2.
2. Uncertainty in the mean computed as the uncertainty in a measurement divided by the square root of the number of samples
3. The standard error (%) is computed as: the square root of  $1+(10/2*\text{depth})^2$ , with depth in feet, from Sauer and Meyer, 1992.
4. Total error is computed as the uncertainty in the mean plus the standard error.

FCD = Faro Creed Diversion

ft = feet

L/s = litre per second

Figures



- Legend**
- Monitoring Well (2-inch)
  - Pumping Well (4-inch)
  - ▲ Stage Gauge

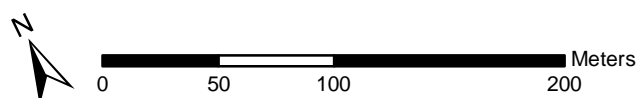
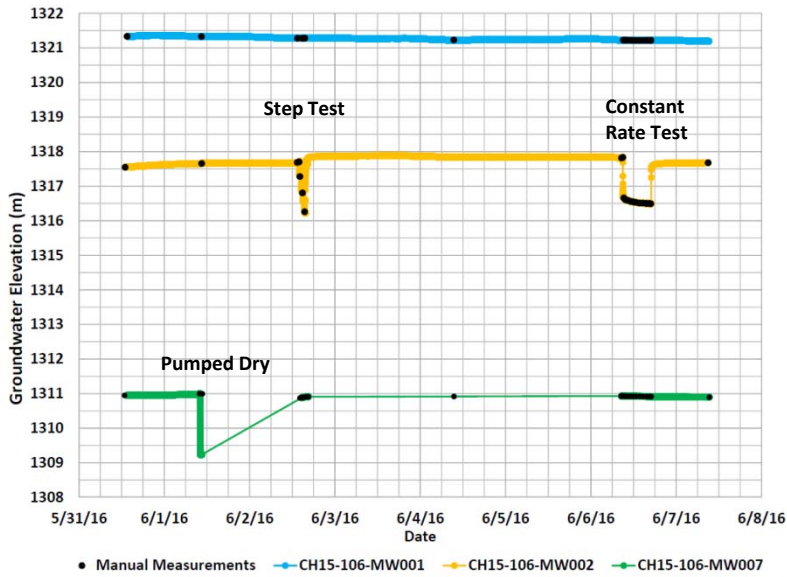
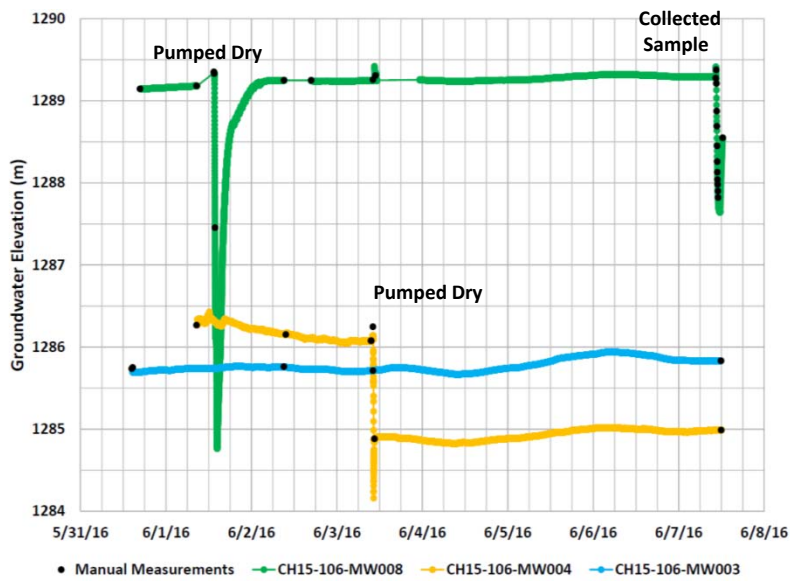


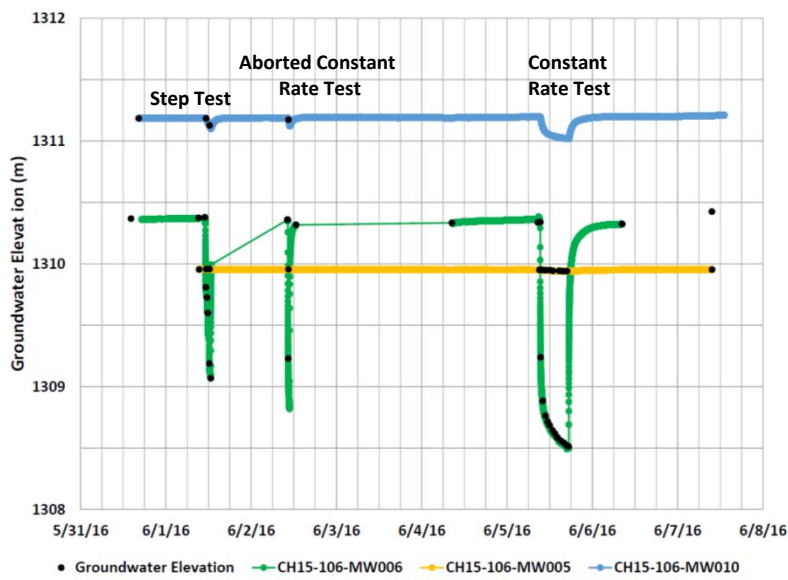
FIGURE 1  
**Faro Creek Diversion Area**  
 Faro Mine Remediation Project



Well Cluster 1



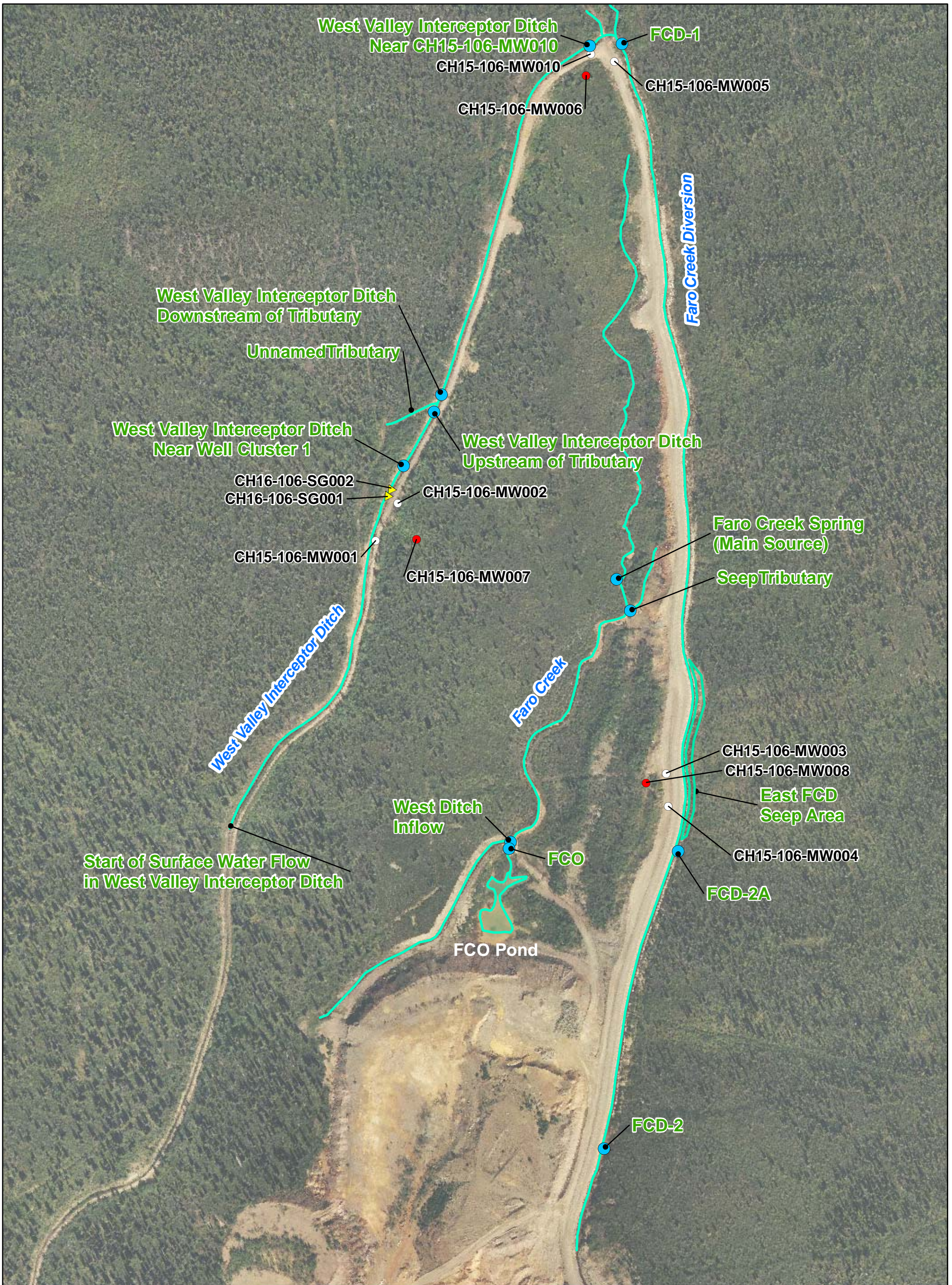
Well Cluster 2



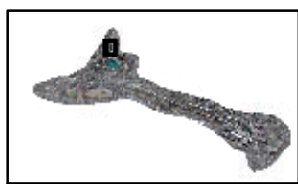
Well Cluster 3

FIGURE 2  
Groundwater Elevations  
At Well Clusters

Faro Mine Remediation Project



- Legend**
- Wells and Piezometers**
- Monitoring Well (2-inch)
  - Pumping Well (4-inch)
  - ▲ Streambed Piezometer
  - Surface Water Discharge Locations
  - Surface Water Features



Vicinity Map



0 50 100 200 Meters

FIGURE 3  
**Surface Water Discharge Locations**  
 Faro Mine Remediation Project

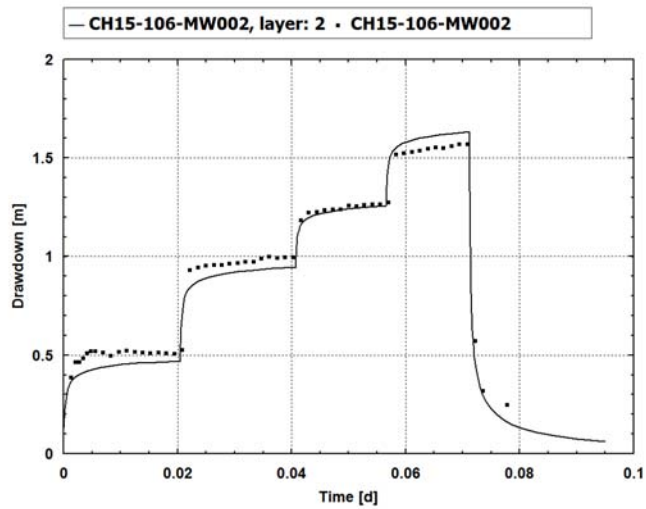


**Legend**

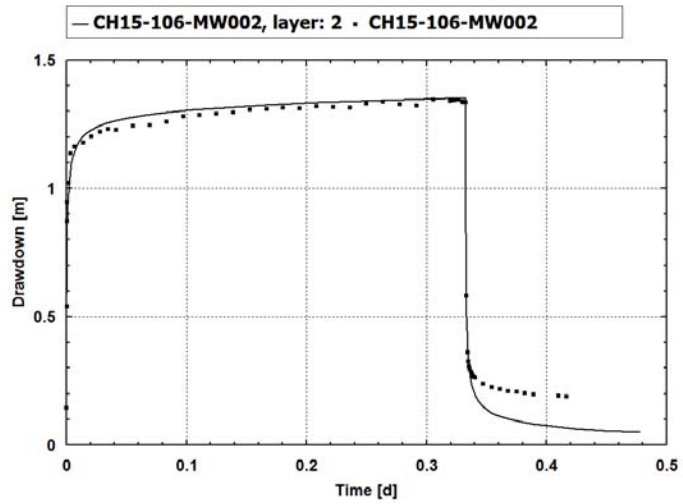
- Groundwater and Surface Water Elevations (m)**
- Monitoring Well (2-inch)
  - Pumping Well (4-inch)
  - ▲ Stage Gauge
  - Groundwater Elevation (m)
  - Surface Water Features



FIGURE 4  
**Groundwater Elevation  
 Contours, June 1, 2016**  
 Faro Mine Remediation Project



Step Test

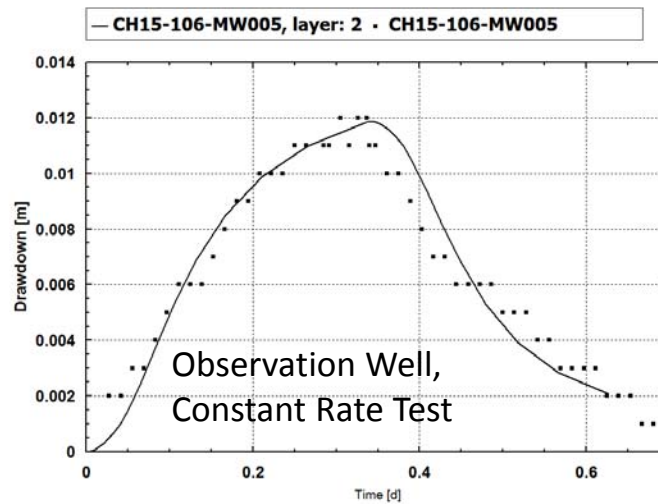
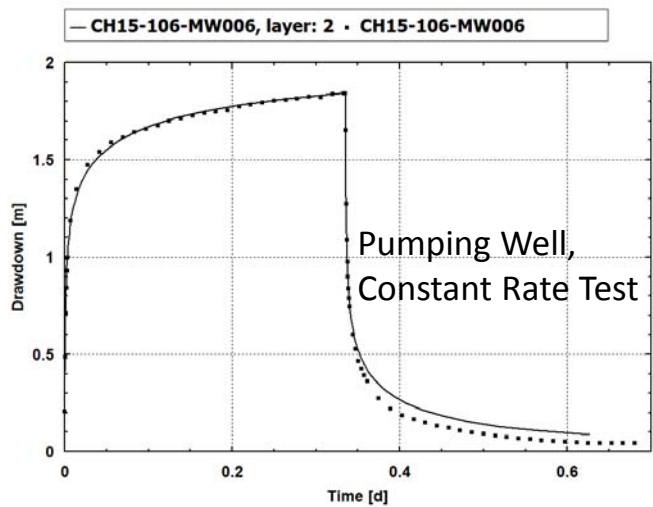
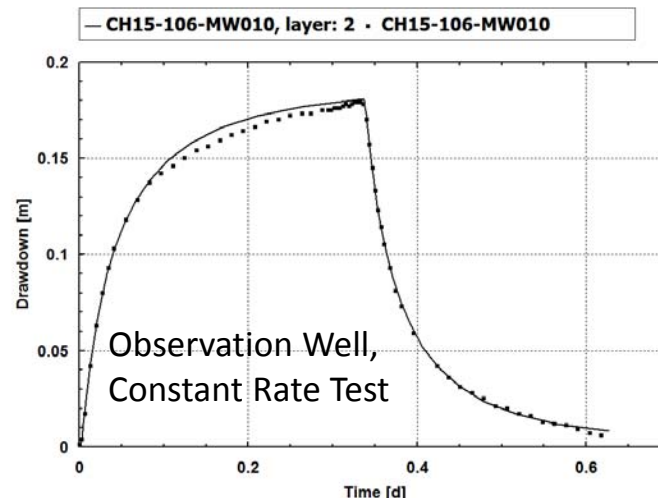
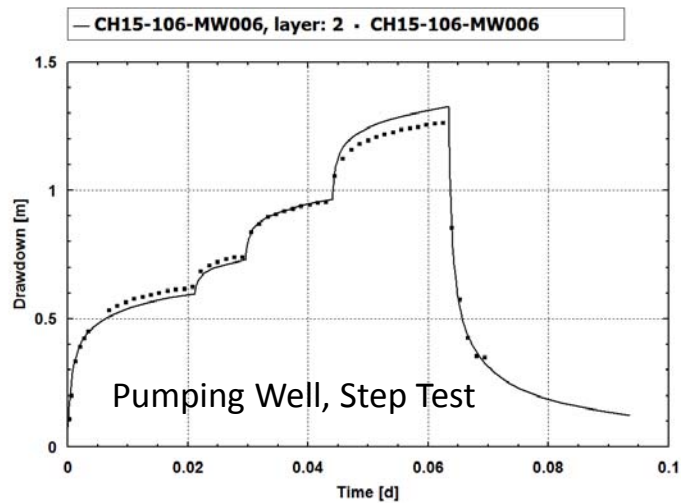


Constant Rate Test

Notes:

1. Scale of Y axis is variable.
2. Continuous lines are simulated (model) results and point values are observed (field) data.

**FIGURE 5**  
**SIMULATED AND OBSERVED DRAWDOWN**  
**FCD, WELL CLUSTER 1**  
 Faro Mine Remediation Project



Notes:

1. Scale of Y axis is variable.
2. Continuous lines are simulated (model) results and point values are observed (field) data.

**FIGURE 6**  
**SIMULATED AND OBSERVED DRAWDOWN**  
**FCD, WELL CLUSTER 3**  
 Faro Mine Remediation Project

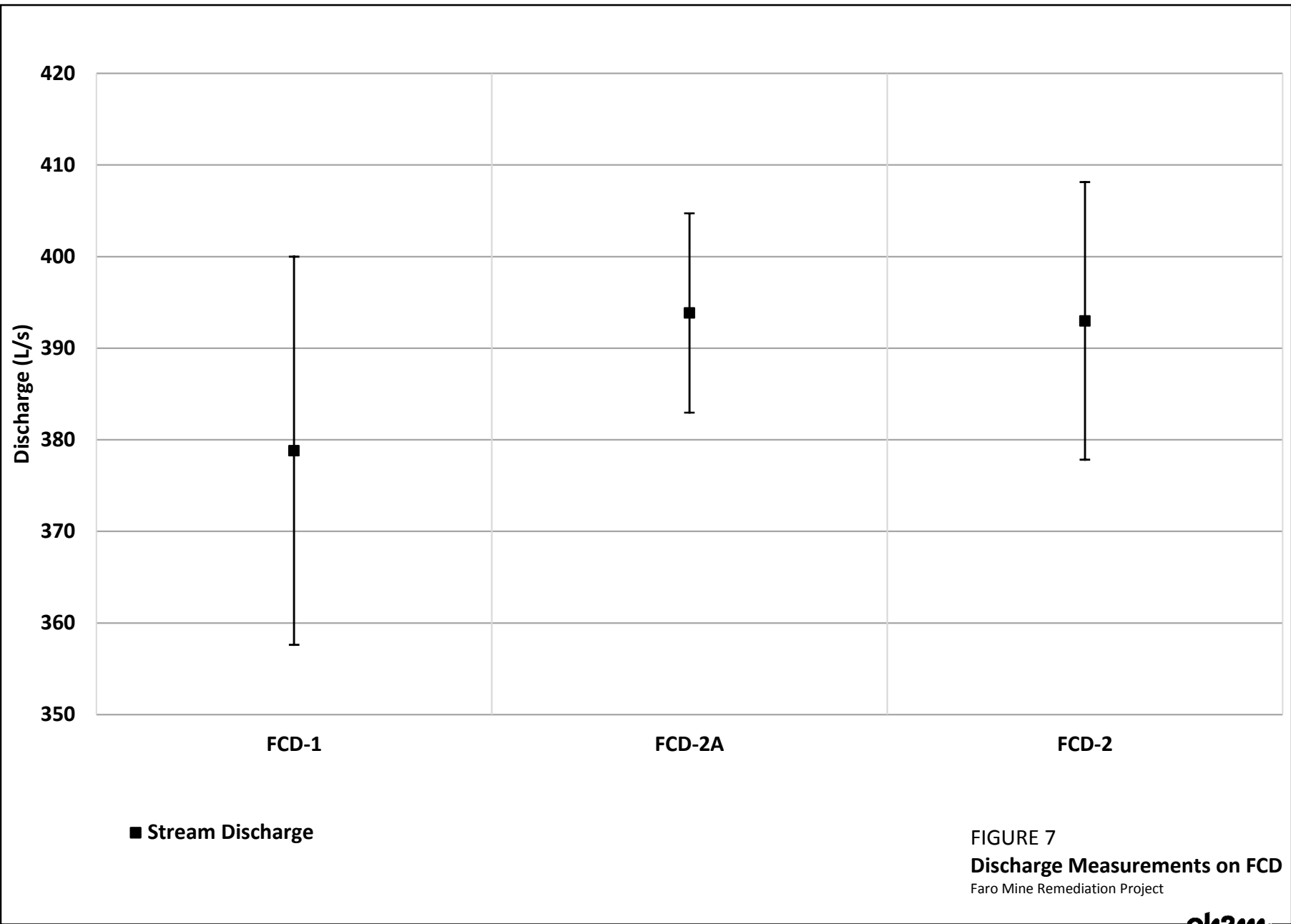


FIGURE 7  
Discharge Measurements on FCD  
Faro Mine Remediation Project

Attachment 1  
Water Quality Analytical  
Laboratory Reports



CH2M HILL, INC  
ATTN: Mark Cichy  
2525 Airpark Drive  
Redding CA 96001

Date Received: 03-JUN-16  
Report Date: 20-JUN-16 11:49 (MT)  
Version: FINAL

Client Phone: 530-229-3203

## Certificate of Analysis

Lab Work Order #: L1778682  
Project P.O. #: 673709.20.01.01.01.05 PO=10201-7-100939  
Job Reference: FARO VALLEY AQUIFER TESTING 2016 TAR20  
C of C Numbers: ALS06031602  
Legal Site Desc:

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Amber Springer, B.Sc  
Account Manager

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# ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1778682-1 CH15-106-MW002_GW0616							
Sampled By: CLIENT on 02-JUN-16 @ 16:00							
Matrix: Water							
<b>Alkalinity Species by Titration</b>							
<b>Alkalinity Species by Titration</b>							
Alkalinity, Bicarbonate (as CaCO3)	94.1		1.0	mg/L		15-JUN-16	R3480552
Alkalinity, Carbonate (as CaCO3)	<1.0		1.0	mg/L		15-JUN-16	R3480552
Alkalinity, Hydroxide (as CaCO3)	<1.0		1.0	mg/L		15-JUN-16	R3480552
Alkalinity, Total (as CaCO3)	94.1		1.0	mg/L		15-JUN-16	R3480552
<b>Anions by Ion Chromatography</b>							
<b>Chloride in Water by IC</b>							
Chloride (Cl)	<0.50		0.50	mg/L		06-JUN-16	R3476325
<b>Fluoride in Water by IC</b>							
Fluoride (F)	0.067		0.020	mg/L		06-JUN-16	R3476325
<b>Nitrate in Water by IC (Low Level)</b>							
Nitrate (as N)	0.207		0.0050	mg/L		06-JUN-16	R3476325
<b>Nitrite in Water by IC (Low Level)</b>							
Nitrite (as N)	<0.0010		0.0010	mg/L		06-JUN-16	R3476325
<b>Sulfate in Water by IC</b>							
Sulfate (SO4)	4.07		0.30	mg/L		06-JUN-16	R3476325
<b>Faro Mine Project Dissolved Metals</b>							
<b>Diss. Mercury in Water by CVAAS or CVAFS</b>							
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L	08-JUN-16	08-JUN-16	R3475133
Dissolved Mercury Filtration Location	FIELD					08-JUN-16	R3474606
<b>Dissolved Metals in Water by CRC ICPMS</b>							
Dissolved Metals Filtration Location	FIELD					07-JUN-16	R3474544
Aluminum (Al)-Dissolved	0.0078		0.0010	mg/L	07-JUN-16	14-JUN-16	R3475246
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L	07-JUN-16	14-JUN-16	R3475246
Arsenic (As)-Dissolved	0.00017		0.00010	mg/L	07-JUN-16	15-JUN-16	R3475246
Barium (Ba)-Dissolved	0.171		0.000050	mg/L	07-JUN-16	14-JUN-16	R3475246
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	07-JUN-16	14-JUN-16	R3475246
Boron (B)-Dissolved	<0.010		0.010	mg/L	07-JUN-16	14-JUN-16	R3475246
Cadmium (Cd)-Dissolved	0.0000483		0.0000050	mg/L	07-JUN-16	14-JUN-16	R3475246
Chromium (Cr)-Dissolved	0.00046		0.00010	mg/L	07-JUN-16	14-JUN-16	R3475246
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	07-JUN-16	14-JUN-16	R3475246
Copper (Cu)-Dissolved	0.00140		0.00020	mg/L	07-JUN-16	14-JUN-16	R3475246
Lead (Pb)-Dissolved	0.000438		0.000050	mg/L	07-JUN-16	14-JUN-16	R3475246
Lithium (Li)-Dissolved	0.0049		0.0010	mg/L	07-JUN-16	15-JUN-16	R3475246
Manganese (Mn)-Dissolved	0.00211		0.00010	mg/L	07-JUN-16	14-JUN-16	R3475246
Molybdenum (Mo)-Dissolved	0.000194		0.000050	mg/L	07-JUN-16	14-JUN-16	R3475246
Nickel (Ni)-Dissolved	0.00080		0.00050	mg/L	07-JUN-16	14-JUN-16	R3475246
Potassium (K)-Dissolved	1.00		0.050	mg/L	07-JUN-16	15-JUN-16	R3475246
Selenium (Se)-Dissolved	0.000091		0.000050	mg/L	07-JUN-16	14-JUN-16	R3475246
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L	07-JUN-16	14-JUN-16	R3475246
Sodium (Na)-Dissolved	1.83		0.050	mg/L	07-JUN-16	14-JUN-16	R3475246
Strontium (Sr)-Dissolved	0.118		0.00020	mg/L	07-JUN-16	14-JUN-16	R3475246
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L	07-JUN-16	14-JUN-16	R3475246
Titanium (Ti)-Dissolved	0.00030		0.00030	mg/L	07-JUN-16	14-JUN-16	R3475246
Uranium (U)-Dissolved	0.000152		0.000010	mg/L	07-JUN-16	14-JUN-16	R3475246
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L	07-JUN-16	14-JUN-16	R3475246
Zinc (Zn)-Dissolved	0.0075		0.0010	mg/L	07-JUN-16	14-JUN-16	R3475246
<b>Dissolved Metals in Water by ICPOES</b>							
Dissolved Metals Filtration Location	FIELD					07-JUN-16	R3474544
Calcium (Ca)-Dissolved	34.4		0.050	mg/L	07-JUN-16	07-JUN-16	R3474977
Iron (Fe)-Dissolved	<0.030		0.030	mg/L	07-JUN-16	07-JUN-16	R3474977
Magnesium (Mg)-Dissolved	2.77		0.10	mg/L	07-JUN-16	07-JUN-16	R3474977

\* Refer to Referenced Information for Qualifiers (if any) and Methodology.

# ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1778682-1 CH15-106-MW002_GW0616 Sampled By: CLIENT on 02-JUN-16 @ 16:00 Matrix: Water							
<b>Dissolved Metals in Water by ICPOES</b>							
Phosphorus (P)-Dissolved	<0.30		0.30	mg/L	07-JUN-16	07-JUN-16	R3474977
Silicon (Si)-Dissolved	8.35		0.050	mg/L	07-JUN-16	07-JUN-16	R3474977
<b>Dissolved Silicon (reported as Silica)</b>							
Silicon (as SiO2)-Dissolved	17.9		0.20	mg/L		08-JUN-16	
<b>Dissolved Sulfur in Water by ICPOES</b>							
Dissolved Metals Filtration Location	FIELD					07-JUN-16	R3474544
Sulfur (S)-Dissolved	1.46		0.50	mg/L	07-JUN-16	07-JUN-16	R3474977
<b>Hardness</b>							
Hardness (as CaCO3)	97.4		0.50	mg/L		15-JUN-16	
<b>Miscellaneous Parameters</b>							
Acidity-Hot Peroxide Treated (as CaCO3)	<25		25	mg/L		12-JUN-16	R3479237
Ammonia, Total (as N)	<0.0050		0.0050	mg/L		18-JUN-16	R3483165
Dissolved Organic Carbon	2.76		0.50	mg/L		15-JUN-16	R3480789
Total Dissolved Solids	125		13	mg/L		09-JUN-16	R3477373
Phosphorus (P)-Total	0.026	DLM	0.020	mg/L		14-JUN-16	R3479367
Total Suspended Solids	33.6		1.0	mg/L		07-JUN-16	R3475693
<b>Diss. Ferrous Iron in Water by Colour</b>							
Ferrous Iron, Dissolved	<0.020		0.020	mg/L	09-JUN-16	09-JUN-16	R3475524
Dissolved Fe2 Filtration Location	FIELD					09-JUN-16	R3475517
L1778682-2 CH15-106-MW006_GW0616 Sampled By: CLIENT on 02-JUN-16 @ 12:30 Matrix: Water							
<b>Alkalinity Species by Titration</b>							
<b>Alkalinity Species by Titration</b>							
Alkalinity, Bicarbonate (as CaCO3)	50.1		1.0	mg/L		15-JUN-16	R3480552
Alkalinity, Carbonate (as CaCO3)	<1.0		1.0	mg/L		15-JUN-16	R3480552
Alkalinity, Hydroxide (as CaCO3)	<1.0		1.0	mg/L		15-JUN-16	R3480552
Alkalinity, Total (as CaCO3)	50.1		1.0	mg/L		15-JUN-16	R3480552
<b>Anions by Ion Chromatography</b>							
<b>Chloride in Water by IC</b>							
Chloride (Cl)	<0.50		0.50	mg/L		06-JUN-16	R3476325
<b>Fluoride in Water by IC</b>							
Fluoride (F)	0.091		0.020	mg/L		06-JUN-16	R3476325
<b>Nitrate in Water by IC (Low Level)</b>							
Nitrate (as N)	0.112		0.0050	mg/L		06-JUN-16	R3476325
<b>Nitrite in Water by IC (Low Level)</b>							
Nitrite (as N)	<0.0010		0.0010	mg/L		06-JUN-16	R3476325
<b>Sulfate in Water by IC</b>							
Sulfate (SO4)	20.8		0.30	mg/L		06-JUN-16	R3476325
<b>Faro Mine Project Dissolved Metals</b>							
<b>Diss. Mercury in Water by CVAAS or CVAFS</b>							
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L	08-JUN-16	08-JUN-16	R3475133
Dissolved Mercury Filtration Location	FIELD					08-JUN-16	R3474606
<b>Dissolved Metals in Water by CRC ICPMS</b>							
Dissolved Metals Filtration Location	FIELD					07-JUN-16	R3474544
Aluminum (Al)-Dissolved	0.0055		0.0010	mg/L	07-JUN-16	14-JUN-16	R3475246
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L	07-JUN-16	14-JUN-16	R3475246
Arsenic (As)-Dissolved	0.00024		0.00010	mg/L	07-JUN-16	15-JUN-16	R3475246
Barium (Ba)-Dissolved	0.0717		0.000050	mg/L	07-JUN-16	14-JUN-16	R3475246
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	07-JUN-16	14-JUN-16	R3475246
Boron (B)-Dissolved	<0.010		0.010	mg/L	07-JUN-16	14-JUN-16	R3475246

\* Refer to Referenced Information for Qualifiers (if any) and Methodology.

# ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1778682-2 CH15-106-MW006_GW0616 Sampled By: CLIENT on 02-JUN-16 @ 12:30 Matrix: Water							
<b>Dissolved Metals in Water by CRC ICPMS</b>							
Cadmium (Cd)-Dissolved	0.000106		0.0000050	mg/L	07-JUN-16	14-JUN-16	R3475246
Chromium (Cr)-Dissolved	0.00019		0.00010	mg/L	07-JUN-16	14-JUN-16	R3475246
Cobalt (Co)-Dissolved	0.00066		0.00010	mg/L	07-JUN-16	14-JUN-16	R3475246
Copper (Cu)-Dissolved	0.00041		0.00020	mg/L	07-JUN-16	14-JUN-16	R3475246
Lead (Pb)-Dissolved	0.000352		0.000050	mg/L	07-JUN-16	14-JUN-16	R3475246
Lithium (Li)-Dissolved	0.0047		0.0010	mg/L	07-JUN-16	15-JUN-16	R3475246
Manganese (Mn)-Dissolved	0.110		0.00010	mg/L	07-JUN-16	14-JUN-16	R3475246
Molybdenum (Mo)-Dissolved	0.000230		0.000050	mg/L	07-JUN-16	14-JUN-16	R3475246
Nickel (Ni)-Dissolved	0.00170		0.00050	mg/L	07-JUN-16	14-JUN-16	R3475246
Potassium (K)-Dissolved	0.690		0.050	mg/L	07-JUN-16	15-JUN-16	R3475246
Selenium (Se)-Dissolved	0.000087		0.000050	mg/L	07-JUN-16	14-JUN-16	R3475246
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L	07-JUN-16	14-JUN-16	R3475246
Sodium (Na)-Dissolved	2.88		0.050	mg/L	07-JUN-16	14-JUN-16	R3475246
Strontium (Sr)-Dissolved	0.0895		0.00020	mg/L	07-JUN-16	14-JUN-16	R3475246
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L	07-JUN-16	14-JUN-16	R3475246
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L	07-JUN-16	14-JUN-16	R3475246
Uranium (U)-Dissolved	0.000133		0.000010	mg/L	07-JUN-16	14-JUN-16	R3475246
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L	07-JUN-16	14-JUN-16	R3475246
Zinc (Zn)-Dissolved	0.0140		0.0010	mg/L	07-JUN-16	14-JUN-16	R3475246
<b>Dissolved Metals in Water by ICPOES</b>							
Dissolved Metals Filtration Location	FIELD					07-JUN-16	R3474544
Calcium (Ca)-Dissolved	18.9		0.050	mg/L	07-JUN-16	07-JUN-16	R3474977
Iron (Fe)-Dissolved	0.176		0.030	mg/L	07-JUN-16	07-JUN-16	R3474977
Magnesium (Mg)-Dissolved	3.61		0.10	mg/L	07-JUN-16	07-JUN-16	R3474977
Phosphorus (P)-Dissolved	<0.30		0.30	mg/L	07-JUN-16	07-JUN-16	R3474977
Silicon (Si)-Dissolved	8.69		0.050	mg/L	07-JUN-16	07-JUN-16	R3474977
<b>Dissolved Silicon (reported as Silica)</b>							
Silicon (as SiO2)-Dissolved	18.6		0.20	mg/L		08-JUN-16	
<b>Dissolved Sulfur in Water by ICPOES</b>							
Dissolved Metals Filtration Location	FIELD					07-JUN-16	R3474544
Sulfur (S)-Dissolved	6.87		0.50	mg/L	07-JUN-16	07-JUN-16	R3474977
<b>Hardness</b>							
Hardness (as CaCO3)	62.0		0.50	mg/L		15-JUN-16	
<b>Miscellaneous Parameters</b>							
Acidity-Hot Peroxide Treated (as CaCO3)	<25		25	mg/L		12-JUN-16	R3479237
Ammonia, Total (as N)	0.0196		0.0050	mg/L		18-JUN-16	R3483165
Dissolved Organic Carbon	1.28		0.50	mg/L		15-JUN-16	R3480789
Total Dissolved Solids	129		13	mg/L		09-JUN-16	R3477373
Phosphorus (P)-Total	0.157		0.020	mg/L		14-JUN-16	R3479367
Total Suspended Solids	160		3.0	mg/L		07-JUN-16	R3475693
<b>Diss. Ferrous Iron in Water by Colour</b>							
Ferrous Iron, Dissolved	0.165		0.020	mg/L	09-JUN-16	09-JUN-16	R3475524
Dissolved Fe2 Filtration Location	FIELD					09-JUN-16	R3475517

\* Refer to Referenced Information for Qualifiers (if any) and Methodology.

## Reference Information

## Sample Parameter Qualifier Key:

Qualifier	Description
B	Method Blank exceeds ALS DQO. All associated sample results are at least 5 times greater than blank levels and are considered reliable.
DLA	Detection Limit adjusted for required dilution
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

## Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-H2O2-MAN-VA	Water	Acidity by Hot Peroxide Titration	APHA - ACIDITY (2310)
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". The procedure involves preliminary sample treatment by the hot peroxide procedure, and Acidity is subsequently determined by potentiometric titration to a specified endpoint (i.e. pH = 8.3).			
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.			
CL-IC-N-WR	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
F-IC-N-WR	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
FE2-D-COL-VA	Water	Diss. Ferrous Iron in Water by Colour	APHA 3500-Fe B/James Ball et al (1999)
This analysis is carried out using procedures adapted from APHA 3500-Fe B and "A New Method for the Direct Determination of Dissolved Iron Concentration in Acid Mine Waters" published by James W. Ball et al (1999). The procedure involves preliminary sample filtration, and ferrous iron is determined using the "FerroZine" colourimetric method.			
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO <sub>3</sub> equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			
HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)
Water samples are filtered (0.45 µm), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.			
MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 µm), preserved with nitric acid, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
MET-DIS-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
NH3-F-VA	Water	Ammonia in Water by Fluorescence	APHA 4500 NH3-NITROGEN (AMMONIA)
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.			
NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.			
NO2-L-IC-N-WR	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-L-IC-N-WR	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

# Reference Information

**Test Method References:**

ALS Test Code	Matrix	Test Description	Method Reference**
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-PRES-COL-VA	Water	Total P in Water by Colour	APHA 4500-P Phosphorus
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
S-DIS-ICP-VA	Water	Dissolved Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.			
SIO2-D-CALC-VA	Water	Dissolved Silicon (reported as Silica)	CALCULATION
Dissolved Silicon (as SiO2) is a calculated parameter. Dissolved Silicon (as SiO2 mg/L) = 2.139 x Dissolved Silicon (mg/L).			
SO4-IC-N-WR	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.			
TSS-LOW-WR	Water	Total Suspended Solids by Grav. (1 mg/L)	APHA 2540 D
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids are determined by filtering a sample through a glass fibre filter and drying the filter at 104 degrees celsius.			

\*\* ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WR	ALS ENVIRONMENTAL - WHITEHORSE, YUKON, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

**Chain of Custody Numbers:**

ALS06031602

**GLOSSARY OF REPORT TERMS**

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

- mg/kg - milligrams per kilogram based on dry weight of sample
- mg/kg wwt - milligrams per kilogram based on wet weight of sample
- mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
- mg/L - unit of concentration based on volume, parts per million.
- < - Less than.
- D.L. - The reporting limit.
- N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



### Quality Control Report

Workorder: L1778682

Report Date: 20-JUN-16

Page 1 of 10

Client: CH2M HILL, INC  
2525 Airpark Drive  
Redding CA 96001

Contact: Mark Cichy

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>ACY-H2O2-MAN-VA</b>		<b>Water</b>						
<b>Batch</b>	<b>R3479237</b>							
<b>WG2326067-2</b>	<b>CRM</b>	<b>VA-ACY-M-CONTROL</b>						
Acidity-Hot Peroxide Treated (as CaCO3)			98.6		%		85-115	12-JUN-16
<b>WG2326067-3</b>	<b>DUP</b>	<b>L1778682-2</b>						
Acidity-Hot Peroxide Treated (as CaCO3)		<25	<25	RPD-NA	mg/L	N/A	20	12-JUN-16
<b>WG2326067-1</b>	<b>MB</b>							
Acidity-Hot Peroxide Treated (as CaCO3)			<25		mg/L		25	12-JUN-16
<b>ALK-TITR-VA</b>		<b>Water</b>						
<b>Batch</b>	<b>R3480552</b>							
<b>WG2327329-3</b>	<b>CRM</b>	<b>VA-ALK-TITR-CONTROL</b>						
Alkalinity, Total (as CaCO3)			97.7		%		85-115	15-JUN-16
<b>WG2327329-5</b>	<b>DUP</b>	<b>L1778685-1</b>						
Alkalinity, Total (as CaCO3)		579	573		mg/L	1.0	20	15-JUN-16
<b>WG2327329-1</b>	<b>MB</b>							
Alkalinity, Total (as CaCO3)			1.7	B	mg/L		1	15-JUN-16
<b>CARBONS-DOC-VA</b>		<b>Water</b>						
<b>Batch</b>	<b>R3480789</b>							
<b>WG2328094-1</b>	<b>DUP</b>	<b>L1778028-2</b>						
Dissolved Organic Carbon		5.68	5.59		mg/L	1.5	20	15-JUN-16
<b>WG2328094-4</b>	<b>LCS</b>							
Dissolved Organic Carbon			101.5		%		80-120	15-JUN-16
<b>WG2328094-3</b>	<b>MB</b>							
Dissolved Organic Carbon			<0.50		mg/L		0.5	15-JUN-16
<b>WG2328094-2</b>	<b>MS</b>	<b>L1778682-1</b>						
Dissolved Organic Carbon			108.9		%		70-130	15-JUN-16
<b>CL-IC-N-WR</b>		<b>Water</b>						
<b>Batch</b>	<b>R3476325</b>							
<b>WG2322172-3</b>	<b>DUP</b>	<b>L1778682-2</b>						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	06-JUN-16
<b>WG2322172-2</b>	<b>LCS</b>							
Chloride (Cl)			101.8		%		90-110	06-JUN-16
<b>WG2322172-1</b>	<b>MB</b>							
Chloride (Cl)			<0.50		mg/L		0.5	06-JUN-16
<b>WG2322172-4</b>	<b>MS</b>	<b>L1778682-1</b>						
Chloride (Cl)			99.9		%		75-125	06-JUN-16
<b>F-IC-N-WR</b>		<b>Water</b>						



### Quality Control Report

Workorder: L1778682

Report Date: 20-JUN-16

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Client: CH2M HILL, INC  
2525 Airpark Drive  
Redding CA 96001

Contact: Mark Cichy

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>F-IC-N-WR</b>		<b>Water</b>						
<b>Batch</b>	<b>R3476325</b>							
<b>WG2322172-3</b>	<b>DUP</b>	<b>L1778682-2</b>						
Fluoride (F)		0.091	0.092		mg/L	0.7	20	06-JUN-16
<b>WG2322172-2</b>	<b>LCS</b>							
Fluoride (F)			105.9		%		90-110	06-JUN-16
<b>WG2322172-1</b>	<b>MB</b>							
Fluoride (F)			<0.020		mg/L		0.02	06-JUN-16
<b>WG2322172-4</b>	<b>MS</b>	<b>L1778682-1</b>						
Fluoride (F)			105.3		%		75-125	06-JUN-16
<b>FE2-D-COL-VA</b>		<b>Water</b>						
<b>Batch</b>	<b>R3475524</b>							
<b>WG2324115-3</b>	<b>DUP</b>	<b>L1778701-5</b>						
Ferrous Iron, Dissolved		0.061	0.088	J	mg/L	0.027	0.04	09-JUN-16
<b>WG2324115-2</b>	<b>LCS</b>							
Ferrous Iron, Dissolved			106.5		%		80-120	09-JUN-16
<b>WG2324115-1</b>	<b>MB</b>							
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	09-JUN-16
<b>HG-D-CVAA-VA</b>		<b>Water</b>						
<b>Batch</b>	<b>R3475133</b>							
<b>WG2323133-3</b>	<b>DUP</b>	<b>L1778701-5</b>						
Mercury (Hg)-Dissolved		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	08-JUN-16
<b>WG2323133-2</b>	<b>LCS</b>							
Mercury (Hg)-Dissolved			93.7		%		80-120	08-JUN-16
<b>WG2323133-1</b>	<b>MB</b>							
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	08-JUN-16
<b>WG2323133-4</b>	<b>MS</b>	<b>L1778682-2</b>						
Mercury (Hg)-Dissolved			92.6		%		70-130	08-JUN-16
<b>MET-D-CCMS-VA</b>		<b>Water</b>						
<b>Batch</b>	<b>R3475246</b>							
<b>WG2323053-3</b>	<b>DUP</b>	<b>L1778701-1</b>						
Aluminum (Al)-Dissolved		0.0036	0.0030	J	mg/L	0.0007	0.004	15-JUN-16
Antimony (Sb)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	15-JUN-16
Arsenic (As)-Dissolved		0.00044	0.00047		mg/L	7.2	20	15-JUN-16
Barium (Ba)-Dissolved		0.0210	0.0209		mg/L	0.6	20	15-JUN-16
Beryllium (Be)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	15-JUN-16
Boron (B)-Dissolved		<0.020	<0.020	RPD-NA	mg/L	N/A	20	15-JUN-16
Cadmium (Cd)-Dissolved		0.000325	0.000321		mg/L	1.2	20	15-JUN-16



### Quality Control Report

Workorder: L1778682

Report Date: 20-JUN-16

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Client: CH2M HILL, INC  
2525 Airpark Drive  
Redding CA 96001

Contact: Mark Cichy

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>MET-D-CCMS-VA</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3475246</b>							
<b>WG2323053-3</b>	<b>DUP</b>	<b>L1778701-1</b>						
Chromium (Cr)-Dissolved		0.00116	0.00107		mg/L	7.6	20	15-JUN-16
Cobalt (Co)-Dissolved		0.00466	0.00456		mg/L	2.1	20	15-JUN-16
Copper (Cu)-Dissolved		0.00105	0.00104		mg/L	0.3	20	15-JUN-16
Lead (Pb)-Dissolved		0.00161	0.00154		mg/L	4.3	20	15-JUN-16
Lithium (Li)-Dissolved		0.0373	0.0351		mg/L	6.1	20	15-JUN-16
Manganese (Mn)-Dissolved		2.44	2.42		mg/L	1.1	20	15-JUN-16
Molybdenum (Mo)-Dissolved		0.00143	0.00137		mg/L	4.6	20	15-JUN-16
Nickel (Ni)-Dissolved		0.0713	0.0704		mg/L	1.2	20	15-JUN-16
Potassium (K)-Dissolved		6.81	6.70		mg/L	1.6	20	15-JUN-16
Selenium (Se)-Dissolved		0.00010	<0.00010	RPD-NA	mg/L	N/A	20	15-JUN-16
Silver (Ag)-Dissolved		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	15-JUN-16
Sodium (Na)-Dissolved		10.0	9.91		mg/L	1.2	20	15-JUN-16
Strontium (Sr)-Dissolved		1.05	1.02		mg/L	3.1	20	15-JUN-16
Thallium (Tl)-Dissolved		0.000021	<0.000020	RPD-NA	mg/L	N/A	20	15-JUN-16
Titanium (Ti)-Dissolved		<0.00060	<0.00060	RPD-NA	mg/L	N/A	20	15-JUN-16
Uranium (U)-Dissolved		0.0476	0.0456		mg/L	4.4	20	15-JUN-16
Vanadium (V)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	15-JUN-16
Zinc (Zn)-Dissolved		0.684	0.683		mg/L	0.2	20	15-JUN-16
<b>WG2323053-2</b>	<b>LCS</b>							
Aluminum (Al)-Dissolved			104.3		%		80-120	08-JUN-16
Antimony (Sb)-Dissolved			95.8		%		80-120	08-JUN-16
Arsenic (As)-Dissolved			99.1		%		80-120	08-JUN-16
Barium (Ba)-Dissolved			99.8		%		80-120	08-JUN-16
Beryllium (Be)-Dissolved			97.2		%		80-120	08-JUN-16
Boron (B)-Dissolved			91.7		%		80-120	08-JUN-16
Cadmium (Cd)-Dissolved			98.4		%		80-120	08-JUN-16
Chromium (Cr)-Dissolved			99.3		%		80-120	08-JUN-16
Cobalt (Co)-Dissolved			99.2		%		80-120	08-JUN-16
Copper (Cu)-Dissolved			96.1		%		80-120	08-JUN-16
Lead (Pb)-Dissolved			98.2		%		80-120	08-JUN-16
Lithium (Li)-Dissolved			98.3		%		80-120	08-JUN-16
Manganese (Mn)-Dissolved			99.9		%		80-120	08-JUN-16
Molybdenum (Mo)-Dissolved			102.7		%		80-120	08-JUN-16



Environmental

### Quality Control Report

Workorder: L1778682

Report Date: 20-JUN-16

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Client: CH2M HILL, INC  
2525 Airpark Drive  
Redding CA 96001

Contact: Mark Cichy

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>MET-D-CCMS-VA</b>		<b>Water</b>						
<b>Batch</b>	<b>R3475246</b>							
<b>WG2323053-2 LCS</b>								
Nickel (Ni)-Dissolved			99.8		%		80-120	08-JUN-16
Potassium (K)-Dissolved			100.6		%		80-120	08-JUN-16
Selenium (Se)-Dissolved			97.0		%		80-120	08-JUN-16
Silver (Ag)-Dissolved			96.9		%		80-120	08-JUN-16
Sodium (Na)-Dissolved			97.9		%		80-120	08-JUN-16
Strontium (Sr)-Dissolved			96.9		%		80-120	08-JUN-16
Thallium (Tl)-Dissolved			98.8		%		80-120	08-JUN-16
Titanium (Ti)-Dissolved			92.8		%		80-120	08-JUN-16
Uranium (U)-Dissolved			97.3		%		80-120	08-JUN-16
Vanadium (V)-Dissolved			101.3		%		80-120	08-JUN-16
Zinc (Zn)-Dissolved			95.9		%		80-120	08-JUN-16
<b>WG2323053-1 MB</b>								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	08-JUN-16
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	08-JUN-16
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	08-JUN-16
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	08-JUN-16
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	08-JUN-16
Boron (B)-Dissolved			<0.010		mg/L		0.01	08-JUN-16
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	08-JUN-16
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	08-JUN-16
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	08-JUN-16
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	08-JUN-16
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	08-JUN-16
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	08-JUN-16
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	08-JUN-16
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	08-JUN-16
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	08-JUN-16
Potassium (K)-Dissolved			<0.050		mg/L		0.05	08-JUN-16
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	08-JUN-16
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	08-JUN-16
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	08-JUN-16
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	08-JUN-16
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	08-JUN-16
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	08-JUN-16



### Quality Control Report

Workorder: L1778682

Report Date: 20-JUN-16

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Client: CH2M HILL, INC  
2525 Airpark Drive  
Redding CA 96001

Contact: Mark Cichy

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>MET-D-CCMS-VA</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3475246</b>							
<b>WG2323053-1</b>	<b>MB</b>							
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	08-JUN-16
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	08-JUN-16
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	08-JUN-16
<b>WG2323053-4</b>	<b>MS</b>	<b>L1778701-6</b>						
Aluminum (Al)-Dissolved			96.0		%		70-130	14-JUN-16
Antimony (Sb)-Dissolved			91.8		%		70-130	14-JUN-16
Arsenic (As)-Dissolved			93.7		%		70-130	14-JUN-16
Barium (Ba)-Dissolved			97.8		%		70-130	14-JUN-16
Beryllium (Be)-Dissolved			96.2		%		70-130	14-JUN-16
Boron (B)-Dissolved			89.5		%		70-130	14-JUN-16
Cadmium (Cd)-Dissolved			101.3		%		70-130	14-JUN-16
Chromium (Cr)-Dissolved			99.0		%		70-130	14-JUN-16
Cobalt (Co)-Dissolved			99.3		%		70-130	14-JUN-16
Copper (Cu)-Dissolved			99.7		%		70-130	14-JUN-16
Lead (Pb)-Dissolved			98.3		%		70-130	14-JUN-16
Lithium (Li)-Dissolved			103.5		%		70-130	14-JUN-16
Manganese (Mn)-Dissolved			98.8		%		70-130	14-JUN-16
Molybdenum (Mo)-Dissolved			94.0		%		70-130	14-JUN-16
Nickel (Ni)-Dissolved			98.7		%		70-130	14-JUN-16
Potassium (K)-Dissolved			95.5		%		70-130	14-JUN-16
Selenium (Se)-Dissolved			85.0		%		70-130	14-JUN-16
Silver (Ag)-Dissolved			100.4		%		70-130	14-JUN-16
Sodium (Na)-Dissolved			96.4		%		70-130	14-JUN-16
Strontium (Sr)-Dissolved			98.8		%		70-130	14-JUN-16
Thallium (Tl)-Dissolved			95.1		%		70-130	14-JUN-16
Titanium (Ti)-Dissolved			91.5		%		70-130	14-JUN-16
Uranium (U)-Dissolved			95.9		%		70-130	14-JUN-16
Vanadium (V)-Dissolved			96.0		%		70-130	14-JUN-16
Zinc (Zn)-Dissolved			99.7		%		70-130	14-JUN-16
<b>MET-DIS-ICP-VA</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3474977</b>							
<b>WG2323053-3</b>	<b>DUP</b>	<b>L1778701-1</b>						
Calcium (Ca)-Dissolved		400	404		mg/L	0.9	20	07-JUN-16
Iron (Fe)-Dissolved		2.94	2.94		mg/L	0.0	20	07-JUN-16



**Environmental**

## Quality Control Report

Workorder: L1778682

Report Date: 20-JUN-16

Page 6 of 10

Client: CH2M HILL, INC  
2525 Airpark Drive  
Redding CA 96001

Contact: Mark Cichy

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>MET-DIS-ICP-VA</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3474977</b>							
<b>WG2323053-3</b>	<b>DUP</b>	<b>L1778701-1</b>						
Magnesium (Mg)-Dissolved		337	338		mg/L	0.4	20	07-JUN-16
Phosphorus (P)-Dissolved		<0.30	<0.30	RPD-NA	mg/L	N/A	20	07-JUN-16
Silicon (Si)-Dissolved		4.72	4.74		mg/L	0.5	20	07-JUN-16
<b>WG2323053-2</b>	<b>LCS</b>							
Calcium (Ca)-Dissolved			102.5		%		80-120	07-JUN-16
Iron (Fe)-Dissolved			97.0		%		80-120	07-JUN-16
Magnesium (Mg)-Dissolved			98.2		%		80-120	07-JUN-16
Phosphorus (P)-Dissolved			99.99		%		80-120	07-JUN-16
Silicon (Si)-Dissolved			109.2		%		80-120	07-JUN-16
<b>WG2323053-1</b>	<b>MB</b>							
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	07-JUN-16
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	07-JUN-16
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	07-JUN-16
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	07-JUN-16
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	07-JUN-16
<b>WG2323053-4</b>	<b>MS</b>	<b>L1778701-6</b>						
Calcium (Ca)-Dissolved			102.4		%		70-130	08-JUN-16
Iron (Fe)-Dissolved			96.2		%		70-130	08-JUN-16
Magnesium (Mg)-Dissolved			97.8		%		70-130	08-JUN-16
Phosphorus (P)-Dissolved			98.7		%		70-130	08-JUN-16
Silicon (Si)-Dissolved			101.1		%		70-130	08-JUN-16
<b>NH3-F-VA</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3483165</b>							
<b>WG2329903-3</b>	<b>DUP</b>	<b>L1778685-1</b>						
Ammonia, Total (as N)		0.0266	0.0267		mg/L	0.3	20	18-JUN-16
<b>WG2329903-2</b>	<b>LCS</b>							
Ammonia, Total (as N)			98.1		%		85-115	18-JUN-16
<b>WG2329903-1</b>	<b>MB</b>							
Ammonia, Total (as N)			<0.0050		mg/L		0.005	18-JUN-16
<b>WG2329903-4</b>	<b>MS</b>	<b>L1778685-1</b>						
Ammonia, Total (as N)			97.9		%		75-125	18-JUN-16
<b>NO2-L-IC-N-WR</b>								
	<b>Water</b>							



**Environmental**

## Quality Control Report

Workorder: L1778682

Report Date: 20-JUN-16

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Client: CH2M HILL, INC  
2525 Airpark Drive  
Redding CA 96001

Contact: Mark Cichy

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>NO2-L-IC-N-WR</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3476325</b>							
<b>WG2322172-3</b>	<b>DUP</b>	<b>L1778682-2</b>						
Nitrite (as N)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	06-JUN-16
<b>WG2322172-2</b>	<b>LCS</b>							
Nitrite (as N)			101.7		%		90-110	06-JUN-16
<b>WG2322172-1</b>	<b>MB</b>							
Nitrite (as N)			<0.0010		mg/L		0.001	06-JUN-16
<b>WG2322172-4</b>	<b>MS</b>	<b>L1778682-1</b>						
Nitrite (as N)			100.2		%		75-125	06-JUN-16
<b>NO3-L-IC-N-WR</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3476325</b>							
<b>WG2322172-3</b>	<b>DUP</b>	<b>L1778682-2</b>						
Nitrate (as N)		0.112	0.112		mg/L	0.7	20	06-JUN-16
<b>WG2322172-2</b>	<b>LCS</b>							
Nitrate (as N)			101.7		%		90-110	06-JUN-16
<b>WG2322172-1</b>	<b>MB</b>							
Nitrate (as N)			<0.0050		mg/L		0.005	06-JUN-16
<b>WG2322172-4</b>	<b>MS</b>	<b>L1778682-1</b>						
Nitrate (as N)			99.3		%		75-125	06-JUN-16
<b>P-T-PRES-COL-VA</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3479367</b>							
<b>WG2326882-2</b>	<b>CRM</b>	<b>VA-ERA-PO4</b>						
Phosphorus (P)-Total			100.5		%		80-120	14-JUN-16
<b>WG2326882-3</b>	<b>DUP</b>	<b>L1778682-1</b>						
Phosphorus (P)-Total		0.026	0.026		mg/L	0.7	20	14-JUN-16
<b>WG2326882-1</b>	<b>MB</b>							
Phosphorus (P)-Total			<0.0020		mg/L		0.002	14-JUN-16
<b>WG2326882-4</b>	<b>MS</b>	<b>L1778682-2</b>						
Phosphorus (P)-Total			103.6		%		70-130	14-JUN-16
<b>S-DIS-ICP-VA</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3474977</b>							
<b>WG2323053-3</b>	<b>DUP</b>	<b>L1778701-1</b>						
Sulfur (S)-Dissolved		533	539		mg/L	1.1	20	07-JUN-16
<b>WG2323053-2</b>	<b>LCS</b>							
Sulfur (S)-Dissolved			97.0		%		80-120	07-JUN-16
<b>WG2323053-1</b>	<b>MB</b>							
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	07-JUN-16
<b>WG2323053-4</b>	<b>MS</b>	<b>L1778701-6</b>						



Environmental

### Quality Control Report

Workorder: L1778682

Report Date: 20-JUN-16

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Client: CH2M HILL, INC  
2525 Airpark Drive  
Redding CA 96001

Contact: Mark Cichy

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>S-DIS-ICP-VA</b>	<b>Water</b>							
<b>Batch</b> R3474977								
<b>WG2323053-4 MS</b>		<b>L1778701-6</b>						
Sulfur (S)-Dissolved			99.8		%		70-130	08-JUN-16
<b>SO4-IC-N-WR</b>	<b>Water</b>							
<b>Batch</b> R3476325								
<b>WG2322172-3 DUP</b>		<b>L1778682-2</b>						
Sulfate (SO4)		20.8	21.0		mg/L	1.2	20	06-JUN-16
<b>WG2322172-2 LCS</b>								
Sulfate (SO4)			102.2		%		90-110	06-JUN-16
<b>WG2322172-1 MB</b>								
Sulfate (SO4)			<0.30		mg/L		0.3	06-JUN-16
<b>WG2322172-4 MS</b>		<b>L1778682-1</b>						
Sulfate (SO4)			99.6		%		75-125	06-JUN-16
<b>TDS-VA</b>	<b>Water</b>							
<b>Batch</b> R3477373								
<b>WG2324792-3 DUP</b>		<b>L1778682-1</b>						
Total Dissolved Solids		125	123		mg/L	1.6	20	09-JUN-16
<b>WG2324792-2 LCS</b>								
Total Dissolved Solids			99.4		%		85-115	09-JUN-16
<b>WG2324792-1 MB</b>								
Total Dissolved Solids			<10		mg/L		10	09-JUN-16
<b>TSS-LOW-WR</b>	<b>Water</b>							
<b>Batch</b> R3475693								
<b>WG2322579-3 DUP</b>		<b>L1778028-2</b>						
Total Suspended Solids		182	190		mg/L	4.7	20	07-JUN-16
<b>WG2322579-2 LCS</b>								
Total Suspended Solids			97.8		%		85-115	07-JUN-16
<b>WG2322579-1 MB</b>								
Total Suspended Solids			<1.0		mg/L		1	07-JUN-16

# Quality Control Report

Workorder: L1778682

Report Date: 20-JUN-16

Client: CH2M HILL, INC  
2525 Airpark Drive  
Redding CA 96001  
Contact: Mark Cichy

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## Legend:

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Limit ALS Control Limit (Data Quality Objectives)  
DUP Duplicate  
RPD Relative Percent Difference  
N/A Not Available  
LCS Laboratory Control Sample  
SRM Standard Reference Material  
MS Matrix Spike  
MSD Matrix Spike Duplicate  
ADE Average Desorption Efficiency  
MB Method Blank  
IRM Internal Reference Material  
CRM Certified Reference Material  
CCV Continuing Calibration Verification  
CVS Calibration Verification Standard  
LCSD Laboratory Control Sample Duplicate

## Sample Parameter Qualifier Definitions:

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Qualifier	Description
B	Method Blank exceeds ALS DQO. All associated sample results are at least 5 times greater than blank levels and are considered reliable.
DLA	Detection Limit adjusted for required dilution
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

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# Quality Control Report

Workorder: L1778682

Report Date: 20-JUN-16

Client: CH2M HILL, INC  
2525 Airpark Drive  
Redding CA 96001

Page 10 of 10

Contact: Mark Cichy

## Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
<b>Anions and Nutrients</b>							
Nitrate in Water by IC (Low Level)							
	1	02-JUN-16 16:00	06-JUN-16 15:50	3	4	days	EHT
	2	02-JUN-16 12:30	06-JUN-16 15:50	3	4	days	EHT
Nitrite in Water by IC (Low Level)							
	1	02-JUN-16 16:00	06-JUN-16 15:50	3	4	days	EHT
	2	02-JUN-16 12:30	06-JUN-16 15:50	3	4	days	EHT

## Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.  
EHTR: Exceeded ALS recommended hold time prior to sample receipt.  
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.  
EHT: Exceeded ALS recommended hold time prior to analysis.  
Rec. HT: ALS recommended hold time (see units).

Notes\*:  
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.  
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1778682 were received on 03-JUN-16 21:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

<b>Project Name</b> Faro <b>Location</b> Faro Mine Complex - Faro YK <b>Project Number</b> 673709.20.01.01.01.05 <b>Project Manager</b> BT Thomas <b>Sample Manager</b> Jay Bilyk  <b>Task Order</b> TAR 20 <b>Project</b> FARO VALLEY AQUIFER TESTING 2016 <b>Turnaround Time</b> 10 Days <b>Shipping Date:</b> 6/3/2016 <b>COC Number:</b> ALS06031602				<b>Container:</b> 40ml vial 125ml Poly HCl, 4°C	125ml glass H2SO4, pH<2, 4°C	500ml Poly 4°C	500ml Poly 4°C	500ml Poly 4°C	125ml glass H2SO4, pH<2, 4°C	125ml Glass H2SO4, pH<2, 4°C	125ml Poly HNO3, 4°C	500ml Poly 4°C	500ml Poly 4°C					
				<b>Preservatives:</b>														
				<b>Filtered:</b>	Field	Field	NA	NA	NA	NA	Field	Field	NA	NA				
				<b>Holding Time:</b>	28	180	28	14	14	7	28	28	180	14	3			
				(E245.7-Diss) Field Filtered Dissolved Hg	(Ferrozine Method) Field Filtered Ferrous Iron	(JEM/SM4500NH3) Ammonia	(SM2320B) Alkalinity	(SM2540C) TDS	(SM2540D) TSS	(SM4500P) Total Phosphorous	(SM5310) Field Filtered DOC	(SW6010B/SW6020A) Field Filtered Metals Analyte List Table	SM2310_HP Acidity - Run Hot H2O2	SM4110B CL F NO2 NO3 and SO4				
	<b>DATE</b>	<b>TIME</b>	<b>Matrix</b>															
CH15-106-MW002_GW0616	6/2/2016	16:00	Water	X	X	X	X	X	X	X	X	X	X	X	X			
CH15-106-MW006_GW0616	6/2/2016	12:30	Water	X	X	X	X	X	X	X	X	X	X	X	X			
<b>TOTAL NUMBER OF CONTAINERS</b>														<b>16</b>				



L1778682-COFC

**Short Holding Time**

*Rush Processing*

*Shelby June 7 2:20 13/12/8*

<b>Signatures</b> Approved by _____ Sampled by <u>Blair</u> Relinquished by _____ Received by <u>S. Z. Jun -16 9pm</u> Relinquished by <u>Y.D.</u> Received by _____		<b>Date/Time</b> June 3/16		<b>Shipping Details</b> Method of Shipment: FedEx On Ice: <u>yes</u> / no Airbill No: Lab Name: ALS Vancouver Lab Phone: (604) 253-4188		<b>ATTN:</b> Sample Custody and Amber Springer		<b>Special Instructions:</b> Report Copy to Mark Cichy (530) 229-3203	
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CH2M HILL, INC  
ATTN: Mark Cichy  
2525 Airpark Drive  
Redding CA 96001

Date Received: 08-JUN-16  
Report Date: 22-JUN-16 17:53 (MT)  
Version: FINAL

Client Phone: 530-229-3203

## Certificate of Analysis

Lab Work Order #: L1780437  
Project P.O. #: 674521.20.01.01.02.03 PO=10201-7-100939  
Job Reference: WRD MONITORING 2016 TAR20  
C of C Numbers: ALS06081601  
Legal Site Desc:

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Amber Springer, B.Sc  
Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700  
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1780437-1 CH14-104-MW008_GW0616							
Sampled By: CLIENT on 06-JUN-16 @ 09:00							
Matrix: Water							
<b>Alkalinity Species by Titration</b>							
<b>Alkalinity Species by Titration</b>							
Alkalinity, Bicarbonate (as CaCO3)	1560		1.0	mg/L		18-JUN-16	R3483538
Alkalinity, Carbonate (as CaCO3)	<1.0		1.0	mg/L		18-JUN-16	R3483538
Alkalinity, Hydroxide (as CaCO3)	<1.0		1.0	mg/L		18-JUN-16	R3483538
Alkalinity, Total (as CaCO3)	1560		1.0	mg/L		18-JUN-16	R3483538
<b>Anions by Ion Chromatography</b>							
<b>Chloride in Water by IC</b>							
Chloride (Cl)	<10	DLDS	10	mg/L		09-JUN-16	R3476754
<b>Fluoride in Water by IC</b>							
Fluoride (F)	0.60		0.40	mg/L		09-JUN-16	R3476754
<b>Nitrate in Water by IC (Low Level)</b>							
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		09-JUN-16	R3476754
<b>Nitrite in Water by IC (Low Level)</b>							
Nitrite (as N)	<0.020	DLDS	0.020	mg/L		09-JUN-16	R3476754
<b>Sulfate in Water by IC</b>							
Sulfate (SO4)	13500		6.0	mg/L		09-JUN-16	R3476754
<b>Faro Mine Project Dissolved Metals</b>							
<b>Diss. Mercury in Water by CVAAS or CVAFS</b>							
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L	10-JUN-16	10-JUN-16	R3476698
Dissolved Mercury Filtration Location	FIELD					10-JUN-16	R3476192
<b>Dissolved Metals in Water by CRC ICPMS</b>							
Dissolved Metals Filtration Location	FIELD					10-JUN-16	R3476138
Aluminum (Al)-Dissolved	0.025		0.020	mg/L	10-JUN-16	20-JUN-16	R3484154
Antimony (Sb)-Dissolved	<0.0020	DLA	0.0020	mg/L	10-JUN-16	20-JUN-16	R3484154
Arsenic (As)-Dissolved	<0.0020	DLA	0.0020	mg/L	10-JUN-16	20-JUN-16	R3484154
Barium (Ba)-Dissolved	0.0425		0.0010	mg/L	10-JUN-16	20-JUN-16	R3484154
Beryllium (Be)-Dissolved	<0.0020	DLA	0.0020	mg/L	10-JUN-16	20-JUN-16	R3484154
Boron (B)-Dissolved	<0.20	DLA	0.20	mg/L	10-JUN-16	20-JUN-16	R3484154
Cadmium (Cd)-Dissolved	0.00258		0.00010	mg/L	10-JUN-16	20-JUN-16	R3484154
Chromium (Cr)-Dissolved	<0.0020	DLA	0.0020	mg/L	10-JUN-16	20-JUN-16	R3484154
Cobalt (Co)-Dissolved	0.0294		0.0020	mg/L	10-JUN-16	20-JUN-16	R3484154
Copper (Cu)-Dissolved	0.0194		0.0040	mg/L	10-JUN-16	20-JUN-16	R3484154
Lead (Pb)-Dissolved	0.0233		0.0010	mg/L	10-JUN-16	20-JUN-16	R3484154
Lithium (Li)-Dissolved	0.082		0.020	mg/L	10-JUN-16	20-JUN-16	R3484154
Manganese (Mn)-Dissolved	26.7		0.0020	mg/L	10-JUN-16	20-JUN-16	R3484154
Molybdenum (Mo)-Dissolved	0.0022		0.0010	mg/L	10-JUN-16	20-JUN-16	R3484154
Nickel (Ni)-Dissolved	0.354		0.010	mg/L	10-JUN-16	20-JUN-16	R3484154
Potassium (K)-Dissolved	28.6		1.0	mg/L	10-JUN-16	20-JUN-16	R3484154
Selenium (Se)-Dissolved	<0.0010	DLA	0.0010	mg/L	10-JUN-16	20-JUN-16	R3484154
Silver (Ag)-Dissolved	<0.00020	DLA	0.00020	mg/L	10-JUN-16	20-JUN-16	R3484154
Sodium (Na)-Dissolved	57.6		1.0	mg/L	10-JUN-16	20-JUN-16	R3484154
Strontium (Sr)-Dissolved	12.5		0.0040	mg/L	10-JUN-16	20-JUN-16	R3484154
Thallium (Tl)-Dissolved	<0.00020	DLA	0.00020	mg/L	10-JUN-16	20-JUN-16	R3484154
Titanium (Ti)-Dissolved	<0.0060	DLA	0.0060	mg/L	10-JUN-16	20-JUN-16	R3484154
Uranium (U)-Dissolved	0.113		0.00020	mg/L	10-JUN-16	20-JUN-16	R3484154
Vanadium (V)-Dissolved	<0.010	DLA	0.010	mg/L	10-JUN-16	20-JUN-16	R3484154
Zinc (Zn)-Dissolved	3.08		0.020	mg/L	10-JUN-16	20-JUN-16	R3484154
<b>Dissolved Metals in Water by ICPOES</b>							
Dissolved Metals Filtration Location	FIELD					10-JUN-16	R3476138
Calcium (Ca)-Dissolved	467		0.25	mg/L	10-JUN-16	13-JUN-16	R3479958
Iron (Fe)-Dissolved	<0.15	DLHC	0.15	mg/L	10-JUN-16	13-JUN-16	R3479958
Magnesium (Mg)-Dissolved	3500		0.50	mg/L	10-JUN-16	13-JUN-16	R3479958

\* Refer to Referenced Information for Qualifiers (if any) and Methodology.

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1780437-1 CH14-104-MW008_GW0616 Sampled By: CLIENT on 06-JUN-16 @ 09:00 Matrix: Water							
<b>Dissolved Metals in Water by ICPOES</b>							
Phosphorus (P)-Dissolved	<1.5	DLHC	1.5	mg/L	10-JUN-16	13-JUN-16	R3479958
Silicon (Si)-Dissolved	8.18		0.25	mg/L	10-JUN-16	13-JUN-16	R3479958
<b>Dissolved Silicon (reported as Silica)</b>							
Silicon (as SiO <sub>2</sub> )-Dissolved	17.5		0.53	mg/L		15-JUN-16	
<b>Dissolved Sulfur in Water by ICPOES</b>							
Dissolved Metals Filtration Location	FIELD					10-JUN-16	R3476138
Sulfur (S)-Dissolved	4740		2.5	mg/L	10-JUN-16	13-JUN-16	R3479958
<b>Hardness</b>							
Hardness (as CaCO <sub>3</sub> )	15600		2.2	mg/L		20-JUN-16	
<b>Miscellaneous Parameters</b>							
Acidity-Hot Peroxide Treated (as CaCO <sub>3</sub> )	<25		25	mg/L		16-JUN-16	R3483420
Total Dissolved Solids	19900		20	mg/L		13-JUN-16	R3479723
Total Suspended Solids	69.2		2.0	mg/L		10-JUN-16	R3478661
<b>Diss. Ferrous Iron in Water by Colour</b>							
Ferrous Iron, Dissolved	<0.020		0.020	mg/L	11-JUN-16	11-JUN-16	R3477067
Dissolved Fe <sub>2</sub> Filtration Location	FIELD					11-JUN-16	R3477061
L1780437-2 CH15-106-MW008_GW0616 Sampled By: CLIENT on 07-JUN-16 @ 11:10 Matrix: Water							
<b>Alkalinity Species by Titration</b>							
<b>Alkalinity Species by Titration</b>							
Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	79.8		1.0	mg/L		18-JUN-16	R3483538
Alkalinity, Carbonate (as CaCO <sub>3</sub> )	<1.0		1.0	mg/L		18-JUN-16	R3483538
Alkalinity, Hydroxide (as CaCO <sub>3</sub> )	<1.0		1.0	mg/L		18-JUN-16	R3483538
Alkalinity, Total (as CaCO <sub>3</sub> )	79.8		1.0	mg/L		18-JUN-16	R3483538
<b>Anions by Ion Chromatography</b>							
<b>Chloride in Water by IC</b>							
Chloride (Cl)	<0.50		0.50	mg/L		09-JUN-16	R3476754
<b>Fluoride in Water by IC</b>							
Fluoride (F)	0.123		0.020	mg/L		09-JUN-16	R3476754
<b>Nitrate in Water by IC (Low Level)</b>							
Nitrate (as N)	0.113		0.0050	mg/L		09-JUN-16	R3476754
<b>Nitrite in Water by IC (Low Level)</b>							
Nitrite (as N)	<0.0010		0.0010	mg/L		09-JUN-16	R3476754
<b>Sulfate in Water by IC</b>							
Sulfate (SO <sub>4</sub> )	43.4		0.30	mg/L		09-JUN-16	R3476754
<b>Faro Mine Project Dissolved Metals</b>							
<b>Diss. Mercury in Water by CVAAS or CVAFS</b>							
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L	10-JUN-16	10-JUN-16	R3476698
Dissolved Mercury Filtration Location	FIELD					10-JUN-16	R3476192
<b>Dissolved Metals in Water by CRC ICPMS</b>							
Dissolved Metals Filtration Location	FIELD					10-JUN-16	R3476138
Aluminum (Al)-Dissolved	0.0044		0.0010	mg/L	10-JUN-16	17-JUN-16	R3484136
Antimony (Sb)-Dissolved	0.00016		0.00010	mg/L	10-JUN-16	17-JUN-16	R3484136
Arsenic (As)-Dissolved	0.00018		0.00010	mg/L	10-JUN-16	17-JUN-16	R3484136
Barium (Ba)-Dissolved	0.0490		0.000050	mg/L	10-JUN-16	17-JUN-16	R3484136
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	10-JUN-16	17-JUN-16	R3484136
Boron (B)-Dissolved	<0.010		0.010	mg/L	10-JUN-16	17-JUN-16	R3484136
Cadmium (Cd)-Dissolved	0.000214		0.0000050	mg/L	10-JUN-16	17-JUN-16	R3484136
Chromium (Cr)-Dissolved	0.00038		0.00010	mg/L	10-JUN-16	17-JUN-16	R3484136
Cobalt (Co)-Dissolved	0.00016		0.00010	mg/L	10-JUN-16	17-JUN-16	R3484136

\* Refer to Referenced Information for Qualifiers (if any) and Methodology.

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1780437-2 CH15-106-MW008_GW0616							
Sampled By: CLIENT on 07-JUN-16 @ 11:10							
Matrix: Water							
<b>Dissolved Metals in Water by CRC ICPMS</b>							
Copper (Cu)-Dissolved	0.00074		0.00020	mg/L	10-JUN-16	17-JUN-16	R3484136
Lead (Pb)-Dissolved	0.000310		0.000050	mg/L	10-JUN-16	17-JUN-16	R3484136
Lithium (Li)-Dissolved	0.0037		0.0010	mg/L	10-JUN-16	20-JUN-16	R3484154
Manganese (Mn)-Dissolved	0.0592		0.00010	mg/L	10-JUN-16	17-JUN-16	R3484136
Molybdenum (Mo)-Dissolved	0.000162		0.000050	mg/L	10-JUN-16	17-JUN-16	R3484136
Nickel (Ni)-Dissolved	0.00637		0.00050	mg/L	10-JUN-16	17-JUN-16	R3484136
Potassium (K)-Dissolved	0.861		0.050	mg/L	10-JUN-16	17-JUN-16	R3484136
Selenium (Se)-Dissolved	0.000052		0.000050	mg/L	10-JUN-16	17-JUN-16	R3484136
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L	10-JUN-16	17-JUN-16	R3484136
Sodium (Na)-Dissolved	2.34		0.050	mg/L	10-JUN-16	17-JUN-16	R3484136
Strontium (Sr)-Dissolved	0.113		0.00020	mg/L	10-JUN-16	17-JUN-16	R3484136
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L	10-JUN-16	17-JUN-16	R3484136
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L	10-JUN-16	17-JUN-16	R3484136
Uranium (U)-Dissolved	0.000047		0.000010	mg/L	10-JUN-16	17-JUN-16	R3484136
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L	10-JUN-16	17-JUN-16	R3484136
Zinc (Zn)-Dissolved	0.0817		0.0010	mg/L	10-JUN-16	17-JUN-16	R3484136
<b>Dissolved Metals in Water by ICPOES</b>							
Dissolved Metals Filtration Location	FIELD					10-JUN-16	R3476138
Calcium (Ca)-Dissolved	38.5		0.050	mg/L	10-JUN-16	13-JUN-16	R3479958
Iron (Fe)-Dissolved	<0.030		0.030	mg/L	10-JUN-16	13-JUN-16	R3479958
Magnesium (Mg)-Dissolved	4.94		0.10	mg/L	10-JUN-16	13-JUN-16	R3479958
Phosphorus (P)-Dissolved	<0.30		0.30	mg/L	10-JUN-16	13-JUN-16	R3479958
Silicon (Si)-Dissolved	8.34		0.050	mg/L	10-JUN-16	13-JUN-16	R3479958
<b>Dissolved Silicon (reported as Silica)</b>							
Silicon (as SiO2)-Dissolved	17.8		0.20	mg/L		15-JUN-16	
<b>Dissolved Sulfur in Water by ICPOES</b>							
Dissolved Metals Filtration Location	FIELD					10-JUN-16	R3476138
Sulfur (S)-Dissolved	15.2		0.50	mg/L	10-JUN-16	13-JUN-16	R3479958
<b>Hardness</b>							
Hardness (as CaCO3)	116		0.50	mg/L		20-JUN-16	
<b>Miscellaneous Parameters</b>							
Acidity-Hot Peroxide Treated (as CaCO3)	<25		25	mg/L		16-JUN-16	R3483420
Ammonia, Total (as N)	<0.0050		0.0050	mg/L		21-JUN-16	R3486785
Dissolved Organic Carbon	0.87		0.50	mg/L		15-JUN-16	R3480789
Total Dissolved Solids	411		20	mg/L		13-JUN-16	R3479723
Phosphorus (P)-Total	<0.020	DLM	0.020	mg/L		14-JUN-16	R3479367
Total Suspended Solids	5.0		1.0	mg/L		10-JUN-16	R3478661
<b>Diss. Ferrous Iron in Water by Colour</b>							
Ferrous Iron, Dissolved	<0.020		0.020	mg/L	11-JUN-16	11-JUN-16	R3477067
Dissolved Fe2 Filtration Location	FIELD					11-JUN-16	R3477061
L1780437-3 CH15-106-MW908_GW0616							
Sampled By: CLIENT on 07-JUN-16 @ 11:10							
Matrix: Water							
<b>Alkalinity Species by Titration</b>							
<b>Alkalinity Species by Titration</b>							
Alkalinity, Bicarbonate (as CaCO3)	74.5		1.0	mg/L		18-JUN-16	R3483538
Alkalinity, Carbonate (as CaCO3)	<1.0		1.0	mg/L		18-JUN-16	R3483538
Alkalinity, Hydroxide (as CaCO3)	<1.0		1.0	mg/L		18-JUN-16	R3483538
Alkalinity, Total (as CaCO3)	74.5		1.0	mg/L		18-JUN-16	R3483538
<b>Anions by Ion Chromatography</b>							
<b>Chloride in Water by IC</b>							

\* Refer to Referenced Information for Qualifiers (if any) and Methodology.

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1780437-3 CH15-106-MW908_GW0616							
Sampled By: CLIENT on 07-JUN-16 @ 11:10							
Matrix: Water							
<b>Chloride in Water by IC</b>							
Chloride (Cl)	<0.50		0.50	mg/L		09-JUN-16	R3476754
<b>Fluoride in Water by IC</b>							
Fluoride (F)	0.125		0.020	mg/L		09-JUN-16	R3476754
<b>Nitrate in Water by IC (Low Level)</b>							
Nitrate (as N)	0.113		0.0050	mg/L		09-JUN-16	R3476754
<b>Nitrite in Water by IC (Low Level)</b>							
Nitrite (as N)	<0.0010		0.0010	mg/L		09-JUN-16	R3476754
<b>Sulfate in Water by IC</b>							
Sulfate (SO4)	43.4		0.30	mg/L		09-JUN-16	R3476754
<b>Faro Mine Project Dissolved Metals</b>							
<b>Diss. Mercury in Water by CVAAS or CVAFS</b>							
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L	10-JUN-16	10-JUN-16	R3476698
Dissolved Mercury Filtration Location	FIELD					10-JUN-16	R3476192
<b>Dissolved Metals in Water by CRC ICPMS</b>							
Dissolved Metals Filtration Location	FIELD					10-JUN-16	R3476138
Aluminum (Al)-Dissolved	0.0037		0.0010	mg/L	10-JUN-16	17-JUN-16	R3484136
Antimony (Sb)-Dissolved	0.00014		0.00010	mg/L	10-JUN-16	17-JUN-16	R3484136
Arsenic (As)-Dissolved	0.00016		0.00010	mg/L	10-JUN-16	17-JUN-16	R3484136
Barium (Ba)-Dissolved	0.0488		0.000050	mg/L	10-JUN-16	17-JUN-16	R3484136
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	10-JUN-16	17-JUN-16	R3484136
Boron (B)-Dissolved	<0.010		0.010	mg/L	10-JUN-16	17-JUN-16	R3484136
Cadmium (Cd)-Dissolved	0.000216		0.0000050	mg/L	10-JUN-16	17-JUN-16	R3484136
Chromium (Cr)-Dissolved	0.00036		0.00010	mg/L	10-JUN-16	17-JUN-16	R3484136
Cobalt (Co)-Dissolved	0.00016		0.00010	mg/L	10-JUN-16	17-JUN-16	R3484136
Copper (Cu)-Dissolved	0.00074		0.00020	mg/L	10-JUN-16	17-JUN-16	R3484136
Lead (Pb)-Dissolved	0.000250		0.000050	mg/L	10-JUN-16	17-JUN-16	R3484136
Lithium (Li)-Dissolved	0.0037		0.0010	mg/L	10-JUN-16	20-JUN-16	R3484154
Manganese (Mn)-Dissolved	0.0567		0.00010	mg/L	10-JUN-16	17-JUN-16	R3484136
Molybdenum (Mo)-Dissolved	0.000139		0.000050	mg/L	10-JUN-16	17-JUN-16	R3484136
Nickel (Ni)-Dissolved	0.00620		0.00050	mg/L	10-JUN-16	17-JUN-16	R3484136
Potassium (K)-Dissolved	0.869		0.050	mg/L	10-JUN-16	17-JUN-16	R3484136
Selenium (Se)-Dissolved	0.000051		0.000050	mg/L	10-JUN-16	17-JUN-16	R3484136
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L	10-JUN-16	17-JUN-16	R3484136
Sodium (Na)-Dissolved	2.30		0.050	mg/L	10-JUN-16	17-JUN-16	R3484136
Strontium (Sr)-Dissolved	0.114		0.00020	mg/L	10-JUN-16	17-JUN-16	R3484136
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L	10-JUN-16	17-JUN-16	R3484136
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L	10-JUN-16	17-JUN-16	R3484136
Uranium (U)-Dissolved	0.000050		0.000010	mg/L	10-JUN-16	17-JUN-16	R3484136
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L	10-JUN-16	17-JUN-16	R3484136
Zinc (Zn)-Dissolved	0.0850		0.0010	mg/L	10-JUN-16	17-JUN-16	R3484136
<b>Dissolved Metals in Water by ICPOES</b>							
Dissolved Metals Filtration Location	FIELD					10-JUN-16	R3476138
Calcium (Ca)-Dissolved	38.5		0.050	mg/L	10-JUN-16	13-JUN-16	R3479958
Iron (Fe)-Dissolved	<0.030		0.030	mg/L	10-JUN-16	13-JUN-16	R3479958
Magnesium (Mg)-Dissolved	4.92		0.10	mg/L	10-JUN-16	13-JUN-16	R3479958
Phosphorus (P)-Dissolved	<0.30		0.30	mg/L	10-JUN-16	13-JUN-16	R3479958
Silicon (Si)-Dissolved	8.29		0.050	mg/L	10-JUN-16	13-JUN-16	R3479958
<b>Dissolved Silicon (reported as Silica)</b>							
Silicon (as SiO2)-Dissolved	17.7		0.20	mg/L		15-JUN-16	
<b>Dissolved Sulfur in Water by ICPOES</b>							
Dissolved Metals Filtration Location	FIELD					10-JUN-16	R3476138
Sulfur (S)-Dissolved	15.2		0.50	mg/L	10-JUN-16	13-JUN-16	R3479958

\* Refer to Referenced Information for Qualifiers (if any) and Methodology.

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1780437-3 CH15-106-MW908_GW0616 Sampled By: CLIENT on 07-JUN-16 @ 11:10 Matrix: Water							
<b>Hardness</b>							
Hardness (as CaCO3)	116		0.50	mg/L		20-JUN-16	
<b>Miscellaneous Parameters</b>							
Acidity-Hot Peroxide Treated (as CaCO3)	<25		25	mg/L		16-JUN-16	R3483420
Ammonia, Total (as N)	<0.0050		0.0050	mg/L		21-JUN-16	R3486785
Dissolved Organic Carbon	1.10		0.50	mg/L		15-JUN-16	R3480789
Total Dissolved Solids	182		20	mg/L		13-JUN-16	R3479723
Phosphorus (P)-Total	<0.020	DLM	0.020	mg/L		14-JUN-16	R3479367
Total Suspended Solids	9.6		2.0	mg/L		10-JUN-16	R3478661
<b>Diss. Ferrous Iron in Water by Colour</b>							
Ferrous Iron, Dissolved	0.023		0.020	mg/L	11-JUN-16	11-JUN-16	R3477067
Dissolved Fe2 Filtration Location	FIELD					11-JUN-16	R3477061
L1780437-4 E_104_16_001 Sampled By: CLIENT on 07-JUN-16 @ 14:30 Matrix: Water							
<b>Alkalinity Species by Titration</b>							
<b>Alkalinity Species by Titration</b>							
Alkalinity, Bicarbonate (as CaCO3)	<1.0		1.0	mg/L		18-JUN-16	R3483538
Alkalinity, Carbonate (as CaCO3)	<1.0		1.0	mg/L		18-JUN-16	R3483538
Alkalinity, Hydroxide (as CaCO3)	<1.0		1.0	mg/L		18-JUN-16	R3483538
Alkalinity, Total (as CaCO3)	<1.0		1.0	mg/L		18-JUN-16	R3483538
<b>Anions by Ion Chromatography</b>							
<b>Chloride in Water by IC</b>							
Chloride (Cl)	<0.50		0.50	mg/L		09-JUN-16	R3476754
<b>Fluoride in Water by IC</b>							
Fluoride (F)	<0.020		0.020	mg/L		09-JUN-16	R3476754
<b>Nitrate in Water by IC (Low Level)</b>							
Nitrate (as N)	<0.0050		0.0050	mg/L		09-JUN-16	R3476754
<b>Nitrite in Water by IC (Low Level)</b>							
Nitrite (as N)	<0.0010		0.0010	mg/L		09-JUN-16	R3476754
<b>Sulfate in Water by IC</b>							
Sulfate (SO4)	<0.30		0.30	mg/L		09-JUN-16	R3476754
<b>Faro Mine Project Dissolved Metals</b>							
<b>Diss. Mercury in Water by CVAAS or CVAFS</b>							
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L	10-JUN-16	10-JUN-16	R3476698
Dissolved Mercury Filtration Location	FIELD					10-JUN-16	R3476192
<b>Dissolved Metals in Water by CRC ICPMS</b>							
Dissolved Metals Filtration Location	FIELD					10-JUN-16	R3476138
Aluminum (Al)-Dissolved	0.0042	RRV	0.0010	mg/L	10-JUN-16	20-JUN-16	R3484154
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L	10-JUN-16	17-JUN-16	R3484136
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L	10-JUN-16	17-JUN-16	R3484136
Barium (Ba)-Dissolved	0.000185	RRV	0.000050	mg/L	10-JUN-16	20-JUN-16	R3484154
Beryllium (Be)-Dissolved	<0.00010		0.00010	mg/L	10-JUN-16	17-JUN-16	R3484136
Boron (B)-Dissolved	<0.010		0.010	mg/L	10-JUN-16	17-JUN-16	R3484136
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L	10-JUN-16	17-JUN-16	R3484136
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L	10-JUN-16	17-JUN-16	R3484136
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	10-JUN-16	17-JUN-16	R3484136
Copper (Cu)-Dissolved	<0.00020		0.00020	mg/L	10-JUN-16	17-JUN-16	R3484136
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	10-JUN-16	20-JUN-16	R3484154
Lithium (Li)-Dissolved	<0.0010		0.0010	mg/L	10-JUN-16	17-JUN-16	R3484136
Manganese (Mn)-Dissolved	0.00018	RRV	0.00010	mg/L	10-JUN-16	20-JUN-16	R3484154
Molybdenum (Mo)-Dissolved	<0.000050		0.000050	mg/L	10-JUN-16	17-JUN-16	R3484136

\* Refer to Referenced Information for Qualifiers (if any) and Methodology.

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1780437-4 E_104_16_001							
Sampled By: CLIENT on 07-JUN-16 @ 14:30							
Matrix: Water							
<b>Dissolved Metals in Water by CRC ICPMS</b>							
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L	10-JUN-16	17-JUN-16	R3484136
Potassium (K)-Dissolved	<0.050		0.050	mg/L	10-JUN-16	20-JUN-16	R3484154
Selenium (Se)-Dissolved	<0.000050		0.000050	mg/L	10-JUN-16	17-JUN-16	R3484136
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L	10-JUN-16	17-JUN-16	R3484136
Sodium (Na)-Dissolved	<0.050		0.050	mg/L	10-JUN-16	17-JUN-16	R3484136
Strontium (Sr)-Dissolved	<0.00020		0.00020	mg/L	10-JUN-16	17-JUN-16	R3484136
Thallium (Tl)-Dissolved	<0.000010		0.000010	mg/L	10-JUN-16	17-JUN-16	R3484136
Titanium (Ti)-Dissolved	<0.00030		0.00030	mg/L	10-JUN-16	17-JUN-16	R3484136
Uranium (U)-Dissolved	<0.000010		0.000010	mg/L	10-JUN-16	17-JUN-16	R3484136
Vanadium (V)-Dissolved	<0.00050		0.00050	mg/L	10-JUN-16	17-JUN-16	R3484136
Zinc (Zn)-Dissolved	0.0027	RRV	0.0010	mg/L	10-JUN-16	20-JUN-16	R3484154
<b>Dissolved Metals in Water by ICPOES</b>							
Dissolved Metals Filtration Location	FIELD					10-JUN-16	R3476138
Calcium (Ca)-Dissolved	<0.050		0.050	mg/L	10-JUN-16	13-JUN-16	R3479958
Iron (Fe)-Dissolved	<0.030		0.030	mg/L	10-JUN-16	13-JUN-16	R3479958
Magnesium (Mg)-Dissolved	<0.10		0.10	mg/L	10-JUN-16	13-JUN-16	R3479958
Phosphorus (P)-Dissolved	<0.30		0.30	mg/L	10-JUN-16	13-JUN-16	R3479958
Silicon (Si)-Dissolved	<0.050		0.050	mg/L	10-JUN-16	13-JUN-16	R3479958
<b>Dissolved Silicon (reported as Silica)</b>							
Silicon (as SiO2)-Dissolved	<0.20		0.20	mg/L		15-JUN-16	
<b>Dissolved Sulfur in Water by ICPOES</b>							
Dissolved Metals Filtration Location	FIELD					10-JUN-16	R3476138
Sulfur (S)-Dissolved	<0.50		0.50	mg/L	10-JUN-16	13-JUN-16	R3479958
<b>Hardness</b>							
Hardness (as CaCO3)	<0.50		0.50	mg/L		20-JUN-16	
<b>Miscellaneous Parameters</b>							
Acidity-Hot Peroxide Treated (as CaCO3)	<25		25	mg/L		16-JUN-16	R3483420
Ammonia, Total (as N)	<0.0050		0.0050	mg/L		21-JUN-16	R3486785
Dissolved Organic Carbon	<0.50		0.50	mg/L		15-JUN-16	R3480789
Total Dissolved Solids	<10		10	mg/L		13-JUN-16	R3479723
Phosphorus (P)-Total	<0.020	DLM	0.020	mg/L		14-JUN-16	R3479367
Total Suspended Solids	<1.0		1.0	mg/L		10-JUN-16	R3478661
<b>Diss. Ferrous Iron in Water by Colour</b>							
Ferrous Iron, Dissolved	<0.020		0.020	mg/L	11-JUN-16	11-JUN-16	R3477067
Dissolved Fe2 Filtration Location	FIELD					11-JUN-16	R3477061

\* Refer to Referenced Information for Qualifiers (if any) and Methodology.

## Reference Information

## Sample Parameter Qualifier Key:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
RRV	Reported Result Verified By Repeat Analysis

## Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-H2O2-MAN-VA	Water	Acidity by Hot Peroxide Titration	APHA - ACIDITY (2310)
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". The procedure involves preliminary sample treatment by the hot peroxide procedure, and Acidity is subsequently determined by potentiometric titration to a specified endpoint (i.e. pH = 8.3).			
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310B TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.			
CL-IC-N-WR	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
F-IC-N-WR	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
FE2-D-COL-VA	Water	Diss. Ferrous Iron in Water by Colour	APHA 3500-Fe B/James Ball et al (1999)
This analysis is carried out using procedures adapted from APHA 3500-Fe B and "A New Method for the Direct Determination of Dissolved Iron Concentration in Acid Mine Waters" published by James W. Ball et al (1999). The procedure involves preliminary sample filtration, and ferrous iron is determined using the "FerroZine" colourimetric method.			
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			
HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)
Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.			
MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
MET-DIS-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
NH3-F-VA	Water	Ammonia in Water by Fluorescence	APHA 4500 NH3-NITROGEN (AMMONIA)
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Weston et al.			
NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Weston et al.			
NO2-L-IC-N-WR	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			

## Reference Information

### Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
NO3-L-IC-N-WR	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-PRES-COL-VA	Water	Total P in Water by Colour	APHA 4500-P Phosphorus
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
S-DIS-ICP-VA	Water	Dissolved Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.			
SIO2-D-CALC-VA	Water	Dissolved Silicon (reported as Silica)	CALCULATION
Dissolved Silicon (as SiO <sub>2</sub> ) is a calculated parameter. Dissolved Silicon (as SiO <sub>2</sub> mg/L) = 2.139 x Dissolved Silicon (mg/L).			
SO4-IC-N-WR	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.			
TSS-LOW-WR	Water	Total Suspended Solids by Grav. (1 mg/L)	APHA 2540 D
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids are determined by filtering a sample through a glass fibre filter and drying the filter at 104 degrees celsius.			

\*\* ALS test methods may incorporate modifications from specified reference methods to improve performance.

*The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:*

Laboratory Definition Code	Laboratory Location
WR	ALS ENVIRONMENTAL - WHITEHORSE, YUKON, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

### Chain of Custody Numbers:

ALS06081601

### GLOSSARY OF REPORT TERMS

*Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.*

*mg/kg - milligrams per kilogram based on dry weight of sample*  
*mg/kg wwt - milligrams per kilogram based on wet weight of sample*  
*mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight*  
*mg/L - unit of concentration based on volume, parts per million.*  
 < - Less than.

*D.L. - The reporting limit.*

*N/A - Result not available. Refer to qualifier code and definition for explanation.*

*Test results reported relate only to the samples as received by the laboratory.*

*UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.*

*Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.*



Environmental

### Quality Control Report

Workorder: L1780437

Report Date: 22-JUN-16

Page 1 of 9

Client: CH2M HILL, INC  
2525 Airpark Drive  
Redding CA 96001

Contact: Mark Cichy

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>ACY-H2O2-MAN-VA</b>		<b>Water</b>						
<b>Batch</b>	<b>R3483420</b>							
<b>WG2329274-2</b>	<b>CRM</b>	<b>VA-ACY-M-CONTROL</b>						
Acidity-Hot Peroxide Treated (as CaCO3)			99.0		%		85-115	16-JUN-16
<b>WG2329274-3</b>	<b>DUP</b>	<b>L1780437-2</b>						
Acidity-Hot Peroxide Treated (as CaCO3)		<25	<25	RPD-NA	mg/L	N/A	20	16-JUN-16
<b>WG2329274-1</b>	<b>MB</b>							
Acidity-Hot Peroxide Treated (as CaCO3)			<25		mg/L		25	16-JUN-16
<b>ALK-TITR-VA</b>		<b>Water</b>						
<b>Batch</b>	<b>R3483538</b>							
<b>WG2329227-3</b>	<b>CRM</b>	<b>VA-ALK-TITR-CONTROL</b>						
Alkalinity, Total (as CaCO3)			97.4		%		85-115	18-JUN-16
<b>WG2329227-5</b>	<b>DUP</b>	<b>L1780437-4</b>						
Alkalinity, Total (as CaCO3)		<1.0	<1.0	RPD-NA	mg/L	N/A	20	18-JUN-16
<b>WG2329227-1</b>	<b>MB</b>							
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	18-JUN-16
<b>CARBONS-DOC-VA</b>		<b>Water</b>						
<b>Batch</b>	<b>R3480789</b>							
<b>WG2328094-1</b>	<b>DUP</b>	<b>L1778028-2</b>						
Dissolved Organic Carbon		5.68	5.59		mg/L	1.5	20	15-JUN-16
<b>WG2328094-4</b>	<b>LCS</b>							
Dissolved Organic Carbon			101.5		%		80-120	15-JUN-16
<b>WG2328094-3</b>	<b>MB</b>							
Dissolved Organic Carbon			<0.50		mg/L		0.5	15-JUN-16
<b>WG2328094-2</b>	<b>MS</b>	<b>L1778682-1</b>						
Dissolved Organic Carbon			108.9		%		70-130	15-JUN-16
<b>CL-IC-N-WR</b>		<b>Water</b>						
<b>Batch</b>	<b>R3476754</b>							
<b>WG2324741-3</b>	<b>DUP</b>	<b>L1780437-4</b>						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	09-JUN-16
<b>WG2324741-2</b>	<b>LCS</b>							
Chloride (Cl)			101.6		%		90-110	09-JUN-16
<b>WG2324741-1</b>	<b>MB</b>							
Chloride (Cl)			<0.50		mg/L		0.5	09-JUN-16
<b>WG2324741-4</b>	<b>MS</b>	<b>L1780437-3</b>						
Chloride (Cl)			90.6		%		75-125	09-JUN-16
<b>F-IC-N-WR</b>		<b>Water</b>						



### Quality Control Report

Workorder: L1780437

Report Date: 22-JUN-16

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Client: CH2M HILL, INC  
2525 Airpark Drive  
Redding CA 96001

Contact: Mark Cichy

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>F-IC-N-WR</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3476754</b>							
<b>WG2324741-3</b>	<b>DUP</b>	<b>L1780437-4</b>						
Fluoride (F)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	09-JUN-16
<b>WG2324741-2</b>	<b>LCS</b>							
Fluoride (F)			107.5		%		90-110	09-JUN-16
<b>WG2324741-1</b>	<b>MB</b>							
Fluoride (F)			<0.020		mg/L		0.02	09-JUN-16
<b>WG2324741-4</b>	<b>MS</b>	<b>L1780437-3</b>						
Fluoride (F)			94.7		%		75-125	09-JUN-16
<b>FE2-D-COL-VA</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3477067</b>							
<b>WG2325764-3</b>	<b>DUP</b>	<b>L1780437-1</b>						
Ferrous Iron, Dissolved		<0.020	<0.020	RPD-NA	mg/L	N/A	20	11-JUN-16
<b>WG2325764-2</b>	<b>LCS</b>							
Ferrous Iron, Dissolved			105.8		%		80-120	11-JUN-16
<b>WG2325764-1</b>	<b>MB</b>							
Ferrous Iron, Dissolved			<0.020		mg/L		0.02	11-JUN-16
<b>WG2325764-4</b>	<b>MS</b>	<b>L1780437-2</b>						
Ferrous Iron, Dissolved			126.1		%		70-130	11-JUN-16
<b>HG-D-CVAA-VA</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3476698</b>							
<b>WG2324956-3</b>	<b>DUP</b>	<b>L1780437-1</b>						
Mercury (Hg)-Dissolved		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	10-JUN-16
<b>WG2324956-2</b>	<b>LCS</b>							
Mercury (Hg)-Dissolved			97.3		%		80-120	10-JUN-16
<b>WG2324956-1</b>	<b>MB</b>							
Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	10-JUN-16
<b>WG2324956-4</b>	<b>MS</b>	<b>L1780437-4</b>						
Mercury (Hg)-Dissolved			98.7		%		70-130	10-JUN-16
<b>MET-D-CCMS-VA</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3484154</b>							
<b>WG2324867-3</b>	<b>DUP</b>	<b>L1780437-1</b>						
Aluminum (Al)-Dissolved		0.025	0.024		mg/L	2.6	20	20-JUN-16
Antimony (Sb)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	20-JUN-16
Arsenic (As)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	20-JUN-16
Barium (Ba)-Dissolved		0.0425	0.0422		mg/L	0.6	20	20-JUN-16
Beryllium (Be)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	20-JUN-16
Boron (B)-Dissolved		<0.20	<0.20	RPD-NA	mg/L	N/A	20	20-JUN-16



Environmental

### Quality Control Report

Workorder: L1780437

Report Date: 22-JUN-16

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Client: CH2M HILL, INC  
2525 Airpark Drive  
Redding CA 96001

Contact: Mark Cichy

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>MET-D-CCMS-VA</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3484154</b>							
<b>WG2324867-3</b>	<b>DUP</b>	<b>L1780437-1</b>						
Cadmium (Cd)-Dissolved		0.00258	0.00233		mg/L	10	20	20-JUN-16
Chromium (Cr)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	20-JUN-16
Cobalt (Co)-Dissolved		0.0294	0.0295		mg/L	0.4	20	20-JUN-16
Copper (Cu)-Dissolved		0.0194	0.0187		mg/L	3.3	20	20-JUN-16
Lead (Pb)-Dissolved		0.0233	0.0232		mg/L	0.5	20	20-JUN-16
Lithium (Li)-Dissolved		0.082	0.077		mg/L	5.5	20	20-JUN-16
Manganese (Mn)-Dissolved		26.7	26.0		mg/L	2.5	20	20-JUN-16
Molybdenum (Mo)-Dissolved		0.0022	0.0019		mg/L	18	20	20-JUN-16
Nickel (Ni)-Dissolved		0.354	0.348		mg/L	1.8	20	20-JUN-16
Potassium (K)-Dissolved		28.6	27.9		mg/L	2.6	20	20-JUN-16
Selenium (Se)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-JUN-16
Silver (Ag)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	20-JUN-16
Sodium (Na)-Dissolved		57.6	55.9		mg/L	2.9	20	20-JUN-16
Strontium (Sr)-Dissolved		12.5	12.3		mg/L	0.9	20	20-JUN-16
Thallium (Tl)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	20-JUN-16
Titanium (Ti)-Dissolved		<0.0060	<0.0060	RPD-NA	mg/L	N/A	20	20-JUN-16
Uranium (U)-Dissolved		0.113	0.111		mg/L	2.3	20	20-JUN-16
Vanadium (V)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	20-JUN-16
Zinc (Zn)-Dissolved		3.08	3.01		mg/L	2.3	20	20-JUN-16
<b>WG2324867-2</b>	<b>LCS</b>							
Aluminum (Al)-Dissolved			110.9		%		80-120	17-JUN-16
Antimony (Sb)-Dissolved			101.0		%		80-120	17-JUN-16
Arsenic (As)-Dissolved			104.5		%		80-120	17-JUN-16
Barium (Ba)-Dissolved			103.5		%		80-120	17-JUN-16
Beryllium (Be)-Dissolved			102.6		%		80-120	17-JUN-16
Boron (B)-Dissolved			95.8		%		80-120	17-JUN-16
Cadmium (Cd)-Dissolved			101.2		%		80-120	17-JUN-16
Chromium (Cr)-Dissolved			99.8		%		80-120	17-JUN-16
Cobalt (Co)-Dissolved			104.3		%		80-120	17-JUN-16
Copper (Cu)-Dissolved			102.0		%		80-120	17-JUN-16
Lead (Pb)-Dissolved			101.2		%		80-120	17-JUN-16
Lithium (Li)-Dissolved			103.0		%		80-120	17-JUN-16
Manganese (Mn)-Dissolved			103.9		%		80-120	17-JUN-16



Environmental

### Quality Control Report

Workorder: L1780437

Report Date: 22-JUN-16

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Client: CH2M HILL, INC  
2525 Airpark Drive  
Redding CA 96001

Contact: Mark Cichy

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>MET-D-CCMS-VA</b>		<b>Water</b>						
<b>Batch</b>	<b>R3484154</b>							
<b>WG2324867-2</b>	<b>LCS</b>							
Molybdenum (Mo)-Dissolved			105.1		%		80-120	17-JUN-16
Nickel (Ni)-Dissolved			102.9		%		80-120	17-JUN-16
Potassium (K)-Dissolved			104.4		%		80-120	17-JUN-16
Selenium (Se)-Dissolved			103.6		%		80-120	17-JUN-16
Silver (Ag)-Dissolved			101.4		%		80-120	17-JUN-16
Sodium (Na)-Dissolved			105.3		%		80-120	17-JUN-16
Strontium (Sr)-Dissolved			98.5		%		80-120	17-JUN-16
Thallium (Tl)-Dissolved			100.8		%		80-120	17-JUN-16
Titanium (Ti)-Dissolved			99.0		%		80-120	17-JUN-16
Uranium (U)-Dissolved			103.3		%		80-120	17-JUN-16
Vanadium (V)-Dissolved			104.3		%		80-120	17-JUN-16
Zinc (Zn)-Dissolved			108.9		%		80-120	17-JUN-16
<b>WG2324867-1</b>	<b>MB</b>							
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	17-JUN-16
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-16
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-16
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-16
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-16
Boron (B)-Dissolved			<0.010		mg/L		0.01	17-JUN-16
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	17-JUN-16
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-16
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-16
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	17-JUN-16
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-16
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	17-JUN-16
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	17-JUN-16
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-16
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	17-JUN-16
Potassium (K)-Dissolved			<0.050		mg/L		0.05	17-JUN-16
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	17-JUN-16
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-16
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	17-JUN-16
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	17-JUN-16
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-16



### Quality Control Report

Workorder: L1780437

Report Date: 22-JUN-16

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Client: CH2M HILL, INC  
2525 Airpark Drive  
Redding CA 96001

Contact: Mark Cichy

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>MET-D-CCMS-VA</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3484154</b>							
<b>WG2324867-1 MB</b>								
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	17-JUN-16
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	17-JUN-16
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	17-JUN-16
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	17-JUN-16
<b>MET-DIS-ICP-VA</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3479958</b>							
<b>WG2324867-3 DUP</b>		<b>L1780437-1</b>						
Calcium (Ca)-Dissolved		467	458		mg/L	2.0	20	13-JUN-16
Iron (Fe)-Dissolved		<0.15	<0.15	RPD-NA	mg/L	N/A	20	13-JUN-16
Magnesium (Mg)-Dissolved		3500	3470		mg/L	1.0	20	13-JUN-16
Phosphorus (P)-Dissolved		<1.5	<1.5	RPD-NA	mg/L	N/A	20	13-JUN-16
Silicon (Si)-Dissolved		8.18	7.95		mg/L	2.8	20	13-JUN-16
<b>WG2324867-2 LCS</b>								
Calcium (Ca)-Dissolved			99.7		%		80-120	13-JUN-16
Iron (Fe)-Dissolved			91.2		%		80-120	13-JUN-16
Magnesium (Mg)-Dissolved			97.1		%		80-120	13-JUN-16
Phosphorus (P)-Dissolved			98.6		%		80-120	13-JUN-16
Silicon (Si)-Dissolved			103.2		%		80-120	13-JUN-16
<b>WG2324867-1 MB</b>								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	13-JUN-16
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	13-JUN-16
Magnesium (Mg)-Dissolved			<0.10		mg/L		0.1	13-JUN-16
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	13-JUN-16
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	13-JUN-16
<b>WG2324867-4 MS</b>		<b>L1780437-4</b>						
Calcium (Ca)-Dissolved			102.5		%		70-130	13-JUN-16
Iron (Fe)-Dissolved			92.3		%		70-130	13-JUN-16
Magnesium (Mg)-Dissolved			98.8		%		70-130	13-JUN-16
Phosphorus (P)-Dissolved			99.7		%		70-130	13-JUN-16
Silicon (Si)-Dissolved			100.2		%		70-130	13-JUN-16
<b>NH3-F-VA</b>								
	<b>Water</b>							



**Environmental**

## Quality Control Report

Workorder: L1780437

Report Date: 22-JUN-16

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Client: CH2M HILL, INC  
2525 Airpark Drive  
Redding CA 96001

Contact: Mark Cichy

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>NH3-F-VA</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3486785</b>							
<b>WG2331986-3</b>	<b>DUP</b>	<b>L1780437-4</b>						
Ammonia, Total (as N)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	21-JUN-16
<b>WG2331986-2</b>	<b>LCS</b>							
Ammonia, Total (as N)			109.3		%		85-115	21-JUN-16
<b>WG2331986-1</b>	<b>MB</b>							
Ammonia, Total (as N)			<0.0050		mg/L		0.005	21-JUN-16
<b>WG2331986-4</b>	<b>MS</b>	<b>L1780437-4</b>						
Ammonia, Total (as N)			101.4		%		75-125	21-JUN-16
<b>NO2-L-IC-N-WR</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3476754</b>							
<b>WG2324741-3</b>	<b>DUP</b>	<b>L1780437-4</b>						
Nitrite (as N)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	09-JUN-16
<b>WG2324741-2</b>	<b>LCS</b>							
Nitrite (as N)			99.7		%		90-110	09-JUN-16
<b>WG2324741-1</b>	<b>MB</b>							
Nitrite (as N)			<0.0010		mg/L		0.001	09-JUN-16
<b>WG2324741-4</b>	<b>MS</b>	<b>L1780437-3</b>						
Nitrite (as N)			89.3		%		75-125	09-JUN-16
<b>NO3-L-IC-N-WR</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3476754</b>							
<b>WG2324741-3</b>	<b>DUP</b>	<b>L1780437-4</b>						
Nitrate (as N)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	09-JUN-16
<b>WG2324741-2</b>	<b>LCS</b>							
Nitrate (as N)			101.9		%		90-110	09-JUN-16
<b>WG2324741-1</b>	<b>MB</b>							
Nitrate (as N)			<0.0050		mg/L		0.005	09-JUN-16
<b>WG2324741-4</b>	<b>MS</b>	<b>L1780437-3</b>						
Nitrate (as N)			90.6		%		75-125	09-JUN-16
<b>P-T-PRES-COL-VA</b>								
	<b>Water</b>							
<b>Batch</b>	<b>R3479367</b>							
<b>WG2326882-2</b>	<b>CRM</b>	<b>VA-ERA-PO4</b>						
Phosphorus (P)-Total			100.5		%		80-120	14-JUN-16
<b>WG2326882-3</b>	<b>DUP</b>	<b>L1778682-1</b>						
Phosphorus (P)-Total		0.026	0.026		mg/L	0.7	20	14-JUN-16
<b>WG2326882-1</b>	<b>MB</b>							
Phosphorus (P)-Total			<0.0020		mg/L		0.002	14-JUN-16
<b>WG2326882-4</b>	<b>MS</b>	<b>L1778682-2</b>						



**Environmental**

## Quality Control Report

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Client: CH2M HILL, INC  
2525 Airpark Drive  
Redding CA 96001

Contact: Mark Cichy

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>P-T-PRES-COL-VA</b> <b>Water</b>								
Batch	R3479367							
WG2326882-4	MS	L1778682-2						
Phosphorus (P)-Total			103.6		%		70-130	14-JUN-16
<b>S-DIS-ICP-VA</b> <b>Water</b>								
Batch	R3479958							
WG2324867-3	DUP	L1780437-1						
Sulfur (S)-Dissolved		4740	4690		mg/L	1.0	20	13-JUN-16
WG2324867-2	LCS							
Sulfur (S)-Dissolved			104.0		%		80-120	13-JUN-16
WG2324867-1	MB							
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	13-JUN-16
WG2324867-4	MS	L1780437-4						
Sulfur (S)-Dissolved			102.3		%		70-130	13-JUN-16
<b>SO4-IC-N-WR</b> <b>Water</b>								
Batch	R3476754							
WG2324741-3	DUP	L1780437-4						
Sulfate (SO4)		<0.30	<0.30	RPD-NA	mg/L	N/A	20	09-JUN-16
WG2324741-2	LCS							
Sulfate (SO4)			102.3		%		90-110	09-JUN-16
WG2324741-1	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	09-JUN-16
WG2324741-4	MS	L1780437-3						
Sulfate (SO4)			88.3		%		75-125	09-JUN-16
<b>TDS-VA</b> <b>Water</b>								
Batch	R3479723							
WG2326795-3	DUP	L1780437-1						
Total Dissolved Solids		19900	20900		mg/L	4.8	20	13-JUN-16
WG2326795-2	LCS							
Total Dissolved Solids			102.1		%		85-115	13-JUN-16
WG2326795-1	MB							
Total Dissolved Solids			<10		mg/L		10	13-JUN-16
<b>TSS-LOW-WR</b> <b>Water</b>								
Batch	R3478661							
WG2325258-3	DUP	L1780437-3						
Total Suspended Solids		9.6	9.2		mg/L	4.3	20	10-JUN-16
WG2325258-2	LCS							
Total Suspended Solids			89.8		%		85-115	10-JUN-16



**Environmental**

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Client: CH2M HILL, INC  
2525 Airpark Drive  
Redding CA 96001

Contact: Mark Cichy

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>TSS-LOW-WR</b>	<b>Water</b>							
<b>Batch</b>	<b>R3478661</b>							
<b>WG2325258-1 MB</b>								
Total Suspended Solids			<1.0		mg/L		1	10-JUN-16

# Quality Control Report

Workorder: L1780437

Report Date: 22-JUN-16

Client: CH2M HILL, INC  
2525 Airpark Drive  
Redding CA 96001

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Contact: Mark Cichy

## Legend:

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Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

## Sample Parameter Qualifier Definitions:

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Qualifier	Description
DLA	Detection Limit adjusted for required dilution
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

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## Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

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The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Project Name Faro Location Faro Mine Complex - Faro YK Project Number 674521.20.01.01.02.03 Project Manager BT Thomas Sample Manager Jay Bilyk  Task Order TAR 20 Project WRD MONITORING 2016 Turnaround Time 10 Days Shipping Date: 6/7/2016 COC Number: ALS06081601	Container:		40ml vial	125ml Poly	125ml glass	500ml Poly	500ml Poly	500ml Poly	125ml glass	125ml Glass	125ml Poly	500ml Poly	500ml Poly	Number of Containers	COMMENTS
	Preservatives:		HCl, 4°C	HCl, 4°C	H2SO4, pH<2, 4°C	4C	4C	4°C	H2SO4, pH<2, 4C	H2SO4, pH<2, 4°C	HNO3, 4°C	4C	4°C		
	Filtered:		Field	Field	NA	NA	NA	NA	Field	Field	NA	NA	NA		
	Holding Time:		28	180	28	14	14	7	28	28	180	14	3		
DATE	TIME	Matrix	(E245-7-Diss) Field Filtered Dissolved Hg	(ferrozine Method) Field Filtered Ferrous Iron	(JEM/SM4500NH3) Ammonia	(SM2320B) Alkalinity	(SM2540C) TDS	(SM2540D) TSS	(SM4500P) Total Phosphorous	(SM5310) Field Filtered DOC	(SW6010B/SW6020A) Field Filtered Metals Analyte List Table 1	SM2310 HP Acidity - Run Hot H2O2	SM4110B CL F NO2 NO3 and SO4		
CH14-104-MW008_GW0616	6/6/2016	9:00	Water	X	X	X	X	X	X	X	X	X	X	65	
CH15-106-MW008_GW0616	6/7/2016	11:10	Water	X	X	X	X	X	X	X	X	X	X	8	
CH15-106-MW908_GW0616	6/7/2016	11:10	Water	X	X	X	X	X	X	X	X	X	X	8	
E_104_16_001	6/7/2016	14:30	Water	X	X	X	X	X	X	X	X	X	X	8	
TOTAL NUMBER OF CONTAINERS													29		

30



L1780437-COFC

Shelby June 9 2:10 10/8/15/15

Approved by Sampled by <u>Shelby</u> Relinquished by <u>Shelby</u> Received by <u>Shelby</u> Relinquished by _____ Received by _____	Signatures Date/Time June 8/16 2:55 pm 0.20C	Shipping Details Method of Shipment: FedEx On Ice: <u>yes</u> / no Airbill No: Lab Name: ALS Vancouver Lab Phone: (604) 253-4188	ATTN: Sample Custody and Amber Springer	Special Instructions: Report Copy to Mark Cichy (530) 229-3203
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Attachment 2  
Data Quality Evaluation Report

# 2016 Faro Creek Diversion Seepage Aquifer Testing, Data Quality Evaluation Report

Water samples were collected and analyzed during the 2016 Faro Creek Diversion Seepage Aquifer Testing in support of the Faro Mine Remediation Project. All analytical data were evaluated as described in the *Quality Assurance Project Plan, Faro Mine Remediation Project (QAPP)* (CH2M, September 2015). This data quality evaluation (DQE) report summarizes the results of the quality assurance and quality control activities prescribed in the QAPP and provides a data usability assessment. The QAPP identifies the method-specific quality control (QC) requirements for each analytical parameter and matrix and defines a plan to test that the correct sampling, analytical, and data reduction procedures are followed by using audits and data validation.

This report is a general data quality assessment designed to summarize data issues.

## Analytical Data

Between June 2 and 7, 2016, three groundwater samples, one groundwater field duplicate (FD) sample, and one equipment blank (EB) were collected. Samples were analyzed by ALS Canada, Ltd. (ALS), in Burnaby, British Columbia. The laboratory placed the samples into two sample delivery groups (SDG). Summaries of the samples collected are presented in Tables 1 and 2. A total of 13 methods were used to analyze the environmental samples. The samples were collected and couriered to ALS in Whitehorse and shipped by overnight carrier to ALS in Burnaby for analysis. Selected samples were analyzed for one or more of the following analytes/methods:

- Mercury, dissolved by Method E1631E
- Ferrous iron by Method Ferrozine
- Ammonia by Method JEM/SM4500N
- Acidity, hot peroxide by Method SM2310\_HP
- Alkalinity, bicarbonate, carbonate, hydroxide, and total by Method SM2320B
- Hardness by Method SM2340B\_CALC
- Total dissolved solids (TDS) by Method SM2540C
- Total suspended solids by Method SM2540D
- Anions (chloride, fluoride, nitrate, nitrite, sulphate) by SM4110B
- Phosphorus by Method SM4500P
- Dissolved organic carbon (DOC) by Method SM5310
- Metals, total and dissolved by Method SW6010B
- Metals, dissolved by Method SW6020A

The SDGs were evaluated by CH2M chemists for data quality. Analytical performance was initially assessed on an SDG basis or an analytical batch basis. The association of laboratory QC samples and environmental samples from the same analytical batch is determined by the laboratory lot control number. Data were assessed using Level II validation as follows:

- Review data set narrative to identify issues that the laboratory reported in the data deliverable.
- Check sample integrity (e.g., sample collection, preservation, and holding times).

- Evaluate basic QC measurements used to assess the accuracy, precision, and representativeness of data, including QC blanks, laboratory control samples, matrix spike samples and field or laboratory duplicate results.
- Review sample results, target compound lists, and detection limits to verify that project analytical requirements are met.
- Initiate corrective actions, as necessary, based on the data review findings.
- Verify that hardcopy results match electronic deliverable results.
- Qualify data by using appropriate qualifier flags, as necessary, to indicate data usability limitations.

Field samples were also reviewed to ascertain field compliance and data quality issues. This included a review of EBs and FDs.

Data flags were assigned in accordance with the QC acceptance limits defined in the QAPP. The data validation flags for the SDG are summarized in each data quality validation report. The flags, and the reason for each flag, are recorded in the electronic validation database. Multiple flags can be applied to specific sample method/matrix/analyte combinations, but there is only one final flag. The final flag is applied on the basis of the flags entered into the database and is the most conservative of the applied validation flags. The final flag also includes matrix and blank sample impacts.

Data flags can be separated into the following two categories to be used in estimating both contractor and analytical completeness:

1. Flags applied because of laboratory deviations from requirements in the QAPP
2. Flags applied because of the nature of the sample matrix or method limitations

The database tracks the type of protocol violation and the contractual and analytical completeness during data validation.

The data flags are defined in the QAPP as follows:

- J = Analyte was present but the reported value may not be accurate or precise.
- UJ = Analyte was not detected above the detection limit objective. However, the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R = Result has been rejected for use.
- U = Analyte was analyzed for but not detected at the specified detection limit.
- None = A database flag with no QC implications. A flag is not applied. This is a placeholder for calculating QC criteria issues that do not require flagging.
- Exclude = A database flag with no QC implications. When multiple data points have been reported, such as dilutions or re-extractions, the data that best match QAPP QC requirements are presented to the data users and the remainders are marked with this flag.
- = = A database flag with no QC implications. A place holder for the DQE reporting purposes noting that the reported result is a detected concentration greater than the RL.

## Findings

The overall summaries of the data validation findings are contained in Tables 1 through 7 and summarized in the method sections that follow.

- **Table 1:** Sample Summary by Chain of Custody – Data Summary. Presents the sample identifiers, sampling dates, and SDG sorted by chain-of-custody (COC) number.
- **Table 2:** Sample Chronology – Data Summary. Presents the sample identifiers, methods, sampling dates, received dates, extraction dates, and analysis dates sorted by SDG number.
- **Table 3:** Overall Flagging Summary. Presents the number of occurrences for each data validation reason by method.
- **Table 4:** Field Duplicate Precision – Qualified Data. Presents the results that are qualified because of FD precision exceedances.
- **Table 5:** Holding Time Exceedances – Qualified Data. Presents the data qualified because of holding time criteria exceedances.
- **Table 6:** Blank Contamination – Qualified Data. Presents the data qualified because of blank contamination.
- **Table 7:** Site Completeness by Analyte – Qualified Data. Presents the percent completeness by method, analyte, and matrix.

## Overall Flagging Summary

The frequency of field and laboratory QC samples and the associated control criteria are specified in the QAPP. The control criteria were used to evaluate laboratory data. In the following method-specific discussions, only the criteria exceedances that affect data qualification are discussed.

### Method SM2540C (Total Dissolved Solids)

#### Field Duplicate

Table 4 lists the specific field sample and the associated FD that exceeded criteria. There was a criteria exceedance in one FD pair. The associated detected concentrations were flagged “J.”

### Method SM2540D (Total Suspended Solids)

#### Field Duplicate

Table 4 lists the specific field samples and their associated FD that exceeded criteria. There was a criteria exceedance in one FD pair. The associated detected concentrations were flagged “J.”

### Method SM4110B (Chloride, Nitrate, Nitrite and Sulphate)

#### Holding Time

Table 5 lists the specific field samples and their associated holding time criteria exceedances. The 3-day nitrate and nitrite holding time for water samples was exceeded by 1 day for two samples. The associated detected concentrations were flagged “J.” The associated non-detected concentrations were flagged “UJ.”

### Method SW6020A (Metals)

#### Equipment Blank

Table 6 lists the specific field samples and their associated EB criteria exceedances. Aluminum was detected in the EB associated with four sample results and zinc was detected in the EB associated with one sample result. The associated detected concentrations were flagged “U” as non-detects.

## Overall Assessment

Completeness is calculated and reported for each method, matrix, and analyte combination as outlined in the QAPP. The number of valid (i.e., not qualified with an “R” flag) results divided by the number of possible individual analyte results, expressed as a percentage, determines the completeness of the data set. A summary of the completeness percentages is provided in Table 7.

The QAPP completeness goal is 90 percent, and the overall data completeness is 100 percent.

Of 200 normal and FD data points, six detected results and two non-detected results (four percent) were qualified as estimated concentrations because of QC exceedances. Blank contamination resulted in five detected results being flagged as non-detects (2.5 percent). Evaluation of 100 percent of the chemical data was performed using QAPP guidelines for this DQE.

## Data Management

Faro Mine Remediation Project (FMRP) sampling activity logs and laboratory analytical data are maintained in a project database or in project files, where appropriate. Data were collected and stored in a manner consistent with the requirements of the QAPP.

All raw data will be maintained on file in the laboratory and will be available upon request. Complete documentation of sample preparation and analysis and associated QC information will be maintained in a manner that allows easy retrieval if that information is needed. The following minimum documentation was kept for this project:

- Original work order, COC forms, and other pertinent documents received with the samples
- Records of communications between the laboratory, field personnel, and the client
- Corrective action reports
- Laboratory data reports
- Laboratory logbooks and all raw sample preparation and analytical data
- Electronic data and all pertinent standard operating procedures

The minimum field records retained for this project included correspondence, COC forms, field notes, field equipment performance records, maintenance logs, field procedures, corrective action reports, field personnel files, and project-related reports.

The receipt of electronic and portable document format (PDF) laboratory data were logged into the sample tracking program to determine completeness and contractor turnaround time compliance. CH2M chemists uploaded this data into the validation program. All data validation was performed by a semi-automated data validation program that uses laboratory PDF report and electronic data simultaneously. All validation flags and discoveries were entered into the validation database and linked directly to each individual data point.

All DQE reports were generated from the validation database. Final validation flags and data points were uploaded to the FMRP EQUIS site.

The data management system is designed to maintain the usability and integrity of the data through a series of procedures and QC checks that began at the field site and carried through to the generation of data for the user. These data include chemical data and field operation information. Both the chemical data and the field operations information were handled in accordance with the guidelines established in the QAPP and the *Faro Mine Data Management Plan* (CH2M, December 2015g).

The laboratory PDF reports are stored in the project files and project local area network hard drive areas in the CH2M office in Redding, California. The original field data forms are stored on the FMRP SharePoint site. Laboratories are required to archive the analytical data as outlined in the QAPP.

## Works Cited

CH2M Canada Limited (CH2M). September 2015. *Quality Assurance Project Plan*. Final. Prepared for Government of Canada as represented by Aboriginal Affairs and Northern Development Canada and the Government of Yukon.

CH2M Canada Limited (CH2M). December 2015g. *Faro Mine Complex Data Management Plan*. Final. Prepared for Government of Canada as represented by Aboriginal Affairs and Northern Development Canada and the Government of Yukon. December 1.

**TABLE 1**  
**Sample Summary by COC - Data Summary**

CoC Number	Sample Date	Matrix	Sample ID / QAQC Type	SDG	Laboratory
ALS06031602	02-Jun-16	WATER	CH15-106-MW002_GW0616 / N	L1778682	ALS
			CH15-106-MW002_GW0616MS / MS	L1778682	ALS
			CH15-106-MW006_GW0616 / N	L1778682	ALS
			CH15-106-MW006_GW0616MS / MS	L1778682	ALS
ALS06081601	07-Jun-16	WATER	CH15-106-MW008_GW0616 / N	L1780437	ALS
			CH15-106-MW008_GW0616MS / MS	L1780437	ALS
			CH15-106-MW908_GW0616 / FD	L1780437	ALS
			CH15-106-MW908_GW0616MS / MS	L1780437	ALS
			E_104_16_001 / EB	L1780437	ALS

**QAQC Type**

N = normal environmental sample  
 FD = field duplicate  
 MS = matrix spike  
 EB = equipment blank

TABLE 2  
Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1778682	CH15-106-MW002_GW0616	E1631E	6/2/2016	6/3/2016	6/8/2016	6/8/2016
		CH15-106-MW002_GW0616	Ferrozine	6/2/2016	6/3/2016	6/9/2016	6/9/2016
		CH15-106-MW002_GW0616	JEM/SM4500N	6/2/2016	6/3/2016		6/18/2016
		CH15-106-MW002_GW0616	SM2310_HP	6/2/2016	6/3/2016		6/12/2016
		CH15-106-MW002_GW0616	SM2320B	6/2/2016	6/3/2016		6/15/2016
		CH15-106-MW002_GW0616	SM2340B_CALC	6/2/2016	6/3/2016		6/15/2016
		CH15-106-MW002_GW0616	SM2540C	6/2/2016	6/3/2016		6/9/2016
		CH15-106-MW002_GW0616	SM2540D	6/2/2016	6/3/2016		6/7/2016
		CH15-106-MW002_GW0616	SM4110B	6/2/2016	6/3/2016		6/6/2016
		CH15-106-MW002_GW0616	SM4500P	6/2/2016	6/3/2016		6/14/2016
		CH15-106-MW002_GW0616	SM5310	6/2/2016	6/3/2016		6/15/2016
		CH15-106-MW002_GW0616	SW6010B	6/2/2016	6/3/2016		6/8/2016
		CH15-106-MW002_GW0616	SW6010B	6/2/2016	6/3/2016	6/7/2016	6/7/2016
		CH15-106-MW002_GW0616	SW6020A	6/2/2016	6/3/2016	6/7/2016	6/14/2016
		CH15-106-MW002_GW0616	SW6020A	6/2/2016	6/3/2016	6/7/2016	6/15/2016
		CH15-106-MW002_GW0616MS	SM4110B	6/2/2016	6/6/2016		6/6/2016
		CH15-106-MW002_GW0616MS	SM5310	6/2/2016	6/15/2016		6/15/2016
		CH15-106-MW006_GW0616	E1631E	6/2/2016	6/3/2016	6/8/2016	6/8/2016
		CH15-106-MW006_GW0616	Ferrozine	6/2/2016	6/3/2016	6/9/2016	6/9/2016
		CH15-106-MW006_GW0616	JEM/SM4500N	6/2/2016	6/3/2016		6/18/2016
	CH15-106-MW006_GW0616	SM2310_HP	6/2/2016	6/3/2016		6/12/2016	
	CH15-106-MW006_GW0616	SM2320B	6/2/2016	6/3/2016		6/15/2016	
	CH15-106-MW006_GW0616	SM2340B_CALC	6/2/2016	6/3/2016		6/15/2016	
	CH15-106-MW006_GW0616	SM2540C	6/2/2016	6/3/2016		6/9/2016	
	CH15-106-MW006_GW0616	SM2540D	6/2/2016	6/3/2016		6/7/2016	
	CH15-106-MW006_GW0616	SM4110B	6/2/2016	6/3/2016		6/6/2016	
	CH15-106-MW006_GW0616	SM4500P	6/2/2016	6/3/2016		6/14/2016	
	CH15-106-MW006_GW0616	SM5310	6/2/2016	6/3/2016		6/15/2016	
	CH15-106-MW006_GW0616	SW6010B	6/2/2016	6/3/2016		6/8/2016	
	CH15-106-MW006_GW0616	SW6010B	6/2/2016	6/3/2016	6/7/2016	6/7/2016	
	CH15-106-MW006_GW0616	SW6020A	6/2/2016	6/3/2016	6/7/2016	6/14/2016	
	CH15-106-MW006_GW0616	SW6020A	6/2/2016	6/3/2016	6/7/2016	6/15/2016	
	CH15-106-MW006_GW0616MS	E1631E	6/2/2016	6/8/2016	6/8/2016	6/8/2016	
	CH15-106-MW006_GW0616MS	SM4500P	6/2/2016	6/14/2016		6/14/2016	
	L1780437		CH15-106-MW008_GW0616	E1631E	6/7/2016	6/8/2016	6/10/2016

TABLE 2  
Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date	
ALS	L1780437	CH15-106-MW008_GW0616	Ferrozine	6/7/2016	6/8/2016	6/11/2016	6/11/2016	
		CH15-106-MW008_GW0616	JEM/SM4500N	6/7/2016	6/8/2016		6/21/2016	
		CH15-106-MW008_GW0616	SM2310_HP	6/7/2016	6/8/2016		6/16/2016	
		CH15-106-MW008_GW0616	SM2320B	6/7/2016	6/8/2016		6/18/2016	
		CH15-106-MW008_GW0616	SM2340B_CALC	6/7/2016	6/8/2016		6/20/2016	
		CH15-106-MW008_GW0616	SM2540C	6/7/2016	6/8/2016		6/13/2016	
		CH15-106-MW008_GW0616	SM2540D	6/7/2016	6/8/2016		6/10/2016	
		CH15-106-MW008_GW0616	SM4110B	6/7/2016	6/8/2016		6/9/2016	
		CH15-106-MW008_GW0616	SM4500P	6/7/2016	6/8/2016		6/14/2016	
		CH15-106-MW008_GW0616	SM5310	6/7/2016	6/8/2016		6/15/2016	
		CH15-106-MW008_GW0616	SW6010B	6/7/2016	6/8/2016		6/15/2016	
		CH15-106-MW008_GW0616	SW6010B	6/7/2016	6/8/2016	6/10/2016	6/13/2016	
		CH15-106-MW008_GW0616	SW6020A	6/7/2016	6/8/2016	6/10/2016	6/17/2016	
		CH15-106-MW008_GW0616	SW6020A	6/7/2016	6/8/2016	6/10/2016	6/20/2016	
		CH15-106-MW008_GW0616MS	Ferrozine	6/7/2016	6/11/2016	6/11/2016	6/11/2016	
		CH15-106-MW908_GW0616	E1631E	6/7/2016	6/8/2016	6/10/2016	6/10/2016	
		CH15-106-MW908_GW0616	Ferrozine	6/7/2016	6/8/2016	6/11/2016	6/11/2016	
		CH15-106-MW908_GW0616	JEM/SM4500N	6/7/2016	6/8/2016		6/21/2016	
		CH15-106-MW908_GW0616	SM2310_HP	6/7/2016	6/8/2016		6/16/2016	
		CH15-106-MW908_GW0616	SM2320B	6/7/2016	6/8/2016		6/18/2016	
		CH15-106-MW908_GW0616	SM2340B_CALC	6/7/2016	6/8/2016		6/20/2016	
		CH15-106-MW908_GW0616	SM2540C	6/7/2016	6/8/2016		6/13/2016	
		CH15-106-MW908_GW0616	SM2540D	6/7/2016	6/8/2016		6/10/2016	
		CH15-106-MW908_GW0616	SM4110B	6/7/2016	6/8/2016		6/9/2016	
		CH15-106-MW908_GW0616	SM4500P	6/7/2016	6/8/2016		6/14/2016	
		CH15-106-MW908_GW0616	SM5310	6/7/2016	6/8/2016		6/15/2016	
		CH15-106-MW908_GW0616	SW6010B	6/7/2016	6/8/2016		6/15/2016	
		CH15-106-MW908_GW0616	SW6010B	6/7/2016	6/8/2016	6/10/2016	6/13/2016	
		CH15-106-MW908_GW0616	SW6020A	6/7/2016	6/8/2016	6/10/2016	6/17/2016	
		CH15-106-MW908_GW0616	SW6020A	6/7/2016	6/8/2016	6/10/2016	6/20/2016	
		CH15-106-MW908_GW0616MS	SM4110B	6/7/2016	6/9/2016		6/9/2016	
		E_104_16_001		E1631E	6/7/2016	6/8/2016	6/10/2016	6/10/2016
		E_104_16_001		Ferrozine	6/7/2016	6/8/2016	6/11/2016	6/11/2016
		E_104_16_001		JEM/SM4500N	6/7/2016	6/8/2016		6/21/2016
		E_104_16_001		SM2310_HP	6/7/2016	6/8/2016		6/16/2016

TABLE 2  
Sample Chronology - Data Summary

Laboratory	SDG	Sample ID	Method	Sample Date	Receive Date	Extract Date	Analysis Date
ALS	L1780437	E_104_16_001	SM2320B	6/7/2016	6/8/2016		6/18/2016
		E_104_16_001	SM2340B_CALC	6/7/2016	6/8/2016		6/20/2016
		E_104_16_001	SM2540C	6/7/2016	6/8/2016		6/13/2016
		E_104_16_001	SM2540D	6/7/2016	6/8/2016		6/10/2016
		E_104_16_001	SM4110B	6/7/2016	6/8/2016		6/9/2016
		E_104_16_001	SM4500P	6/7/2016	6/8/2016		6/14/2016
		E_104_16_001	SM5310	6/7/2016	6/8/2016		6/15/2016
		E_104_16_001	SW6010B	6/7/2016	6/8/2016		6/15/2016
		E_104_16_001	SW6010B	6/7/2016	6/8/2016	6/10/2016	6/13/2016
		E_104_16_001	SW6020A	6/7/2016	6/8/2016	6/10/2016	6/17/2016
		E_104_16_001	SW6020A	6/7/2016	6/8/2016	6/10/2016	6/20/2016
		E_104_16_001MS	E1631E	6/7/2016	6/10/2016	6/10/2016	6/10/2016
		E_104_16_001MS	JEM/SM4500N	6/7/2016	6/21/2016		6/21/2016
		E_104_16_001MS	SW6010B	6/7/2016	6/10/2016	6/10/2016	6/13/2016

TABLE 3  
Overall Flagging Summary

Method	Matrix	Validation Reason	Qualifier*	Qualifier Type	Number of Affected Analytes
SM2540C	WATER				
	Category = FieldDuplicate	Field duplicate exceeds RPD criteria	J	Other	2
SM2540D	WATER				
	Category = FieldDuplicate	Field duplicate exceeds RPD criteria	J	Other	2
SM4110B	WATER				
	Category = HoldingTime	Holding time exceeded	UJ	Protocol	2
			J	Protocol	2
SW6020A	WATER				
	Category = Blank	Equipment blank concentration greater than the RL	U	Protocol	5

\* The most severe flag for each analyte becomes the final validation flag.

**Qualifier Description:**

- J = Analyte was present but the reported value may not be accurate or precise.
- U = This analyte was analyzed for but not detected at the specified detection limit.
- UJ = The analyte was not detected above the detection limit objective. However, the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

**Qualifier Type:**

Protocol = Flagging due to contractor/laboratory protocol violations.  
 Other = Flagging due to sample, matrix, or field issues not related to Quality Assurance Project Plan (QAPP) or Sampling and Analysis Plan (SAP) protocol.

TABLE 4  
Field Duplicate Precision - Qualified Data

Method	Matrix	Sample ID	Analyte	Result	Field Duplicate Qualifier*	Criteria
SM2540C	WATER		<b>Total Dissolved Solids</b>			
		CH15-106-MW008_GW061		411 mg/L	J	FD>RPD
		CH15-106-MW908_GW061		182 mg/L	J	FD>RPD
SM2540D	WATER		<b>Total Suspended Solids</b>			
		CH15-106-MW008_GW061		5 mg/L	J	FD>RPD
		CH15-106-MW908_GW061		9.6 mg/L	J	FD>RPD

\* The most severe flag for each analyte becomes the final validation flag.

**Qualifier Description:**

J = Analyte was present but the reported value may not be accurate or precise.

**Criteria:**

FD>RPD = Field duplicate exceeds RPD criteria

TABLE 5  
Holding Times - Qualified Data

Method	Matrix	Sample ID	Analyte	Holding Time	Result	Holding Time Qualifier	Final Flag*
SM4110B	WATER	CH15-106-MW002_GW0616					
			Nitrate-N	4 Days	0.207 mg/L	J	J
			Nitrite as N	4 Days	0.001 mg/L	UJ	UJ
SM4110B	WATER	CH15-106-MW006_GW0616					
			Nitrate-N	4 Days	0.112 mg/L	J	J
			Nitrite as N	4 Days	0.001 mg/L	UJ	UJ

\* The most severe flag for each analyte becomes the final validation flag.

**Qualifier Description:**

J = Analyte was present but the reported value may not be accurate or precise.

UJ = The analyte was not detected above the detection limit objective. However, the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

**Criteria:**

HTa>UCL = Holding time exceeded

TABLE 6  
Blank Contamination - Qualified Data

Method	Matrix	Analyte / Sample ID	Result	Blank Contamination Qualifier*	Criteria	Comments
SW6020A	WATER	<b>Aluminum, dissolved</b>				
		CH15-106-MW002_GW0616	0.0078 mg/L	U	EB>RL	blank target = 0.0042mg/L
		CH15-106-MW006_GW0616	0.0055 mg/L	U	EB>RL	blank target = 0.0042mg/L
		CH15-106-MW008_GW0616	0.0044 mg/L	U	EB>RL	blank target = 0.0042mg/L
SW6020A	WATER	<b>Zinc, dissolved</b>				
		CH15-106-MW908_GW0616	0.0037 mg/L	U	EB>RL	blank target = 0.0042mg/L
		CH15-106-MW002_GW0616	0.0075 mg/L	U	EB>RL	blank target = 0.0027mg/L

Blank target = concentration of field or laboratory blank.

\* The most severe flag for each analyte becomes the final validation flag.

**Qualifier Description:**

U = This analyte was analyzed for but not detected at the specified detection limit.

**Criteria:**

EB>RL = Equipment blank concentration greater than the RL

TABLE 7

## Site Completeness by Analyte - Qualified Data

Method	Analyte	Units	Number of Occurrences					Contractor R-Flags	Total Contractor Completeness (%)	Overall Completeness (%)
			Analyses	Detects	Non- detects	Blank Flags	J-Flags			
E1631E	Mercury, dissolved	MG/L	4		4				100	100
Ferrozine	Ferrous Iron, Dissolved	MG/L	4	2	2				100	100
JEM/SM4500N	Ammonia-N	MG/L	4	1	3				100	100
SM2310_HP	Acidity, hot peroxide	MG/L	4		4				100	100
SM2320B	Alkalinity, Bicarbonate	MG/L	4	4					100	100
SM2320B	Alkalinity, Carbonate	MG/L	4		4				100	100
SM2320B	Alkalinity, Hydroxide	MG/L	4		4				100	100
SM2320B	Alkalinity, Total	MG/L	4	4					100	100
SM2340B_CALC	Hardness	MG/L	4	4					100	100
SM2540C	Total Dissolved Solids	MG/L	4	4			2		100	100
SM2540D	Total Suspended Solids	MG/L	4	4			2		100	100
SM4110B	Chloride	MG/L	4		4				100	100
SM4110B	Fluoride	MG/L	4	4					100	100
SM4110B	Nitrate-N	MG/L	4	4			2		100	100
SM4110B	Nitrite as N	MG/L	4		4		2		100	100
SM4110B	Sulfate	MG/L	4	4					100	100
SM4500P	Phosphorus	MG/L	4	2	2				100	100
SM5310	Dissolved Organic Carbon	MG/L	4	4					100	100
SW6010B	Calcium, dissolved	MG/L	4	4					100	100
SW6010B	Iron, dissolved	MG/L	4	1	3				100	100
SW6010B	Magnesium, dissolved	MG/L	4	4					100	100
SW6010B	Phosphorus, dissolved	MG/L	4		4				100	100
SW6010B	Silica, dissolved	MG/L	4	4					100	100
SW6010B	Silicon, dissolved	MG/L	4	4					100	100
SW6010B	Sulfur, dissolved	MG/L	4	4					100	100
SW6020A	Aluminum, dissolved	MG/L	4		4				100	100
SW6020A	Antimony, dissolved	MG/L	4	2	2				100	100
SW6020A	Arsenic, dissolved	MG/L	4	4					100	100
SW6020A	Barium, dissolved	MG/L	4	4					100	100
SW6020A	Beryllium, dissolved	MG/L	4		4				100	100

TABLE 7

## Site Completeness by Analyte - Qualified Data

Method	Analyte	Units	Number of Occurrences					Contractor R-Flags	Total R-Flags	Contractor Completeness (%)	Overall Completeness (%)
			Analyses	Detects	Non- detects	Blank Flags	J-Flags				
SW6020A	Boron, dissolved	MG/L	4		4					100	100
SW6020A	Cadmium, dissolved	MG/L	4	4						100	100
SW6020A	Chromium, dissolved	MG/L	4	4						100	100
SW6020A	Cobalt, dissolved	MG/L	4	3	1					100	100
SW6020A	Copper, dissolved	MG/L	4	4						100	100
SW6020A	Lead, dissolved	MG/L	4	4						100	100
SW6020A	Lithium, dissolved	MG/L	4	4						100	100
SW6020A	Manganese, dissolved	MG/L	4	4						100	100
SW6020A	Molybdenum, dissolved	MG/L	4	4						100	100
SW6020A	Nickel, dissolved	MG/L	4	4						100	100
SW6020A	Potassium, dissolved	MG/L	4	4						100	100
SW6020A	Selenium, dissolved	MG/L	4	4						100	100
SW6020A	Silver, dissolved	MG/L	4		4					100	100
SW6020A	Sodium, dissolved	MG/L	4	4						100	100
SW6020A	Strontium, dissolved	MG/L	4	4						100	100
SW6020A	Thallium, dissolved	MG/L	4		4					100	100
SW6020A	Titanium, dissolved	MG/L	4	1	3					100	100
SW6020A	Uranium, dissolved	MG/L	4	4						100	100
SW6020A	Vanadium, dissolved	MG/L	4		4					100	100
SW6020A	Zinc, dissolved	MG/L	4	3	1					100	100

Attachment 3  
Site Photographs



Photo 1. Setup for aquifer testing at CH15-106-MW007



Photo 2. Pump Controller, generator and pump power line at CH15-106-MW007



Photo 3. 2-inch Grunfos pump



Photo 4. Computer connected to transducer cable; transducer deployed in CH15-106-MW007.



Photo 5. View down Faro Creek Valley from n CH15-106-MW002.



Photo 6. Discharge line running from CH15-106-MW007.



Photo 7. Checking transducer data at CH15-106-MW002



Photo 8. Pumping setup at CH15-106-MW006



Photo 9. FCD-1, looking upstream



Photo 10. Upstream FCD near FCD-1

ATTACHMENT 3: SITE PHOTOGRAPHS



Photo 11. Collecting discharge data at FCD-1



Photo 12. Collecting discharge data at FCD-2A



Photo 13. Upstream view from FCD-2A



Photo 14. View of CH15-106-MW004 (at left cone) and CH15-106-MW003 (at right cone) from FCD-2A



Photo 15. Collecting discharge data at FCD-2



Photo 16. Collecting discharge data at FCD-2



Photo 17. View upstream from FCD-2



Photo 18. Channeling seep flow with a plastic cone

ATTACHMENT 3: SITE PHOTOGRAPHS



Photo 19. Seep on the east bank of the FCD



Photo 20. FCO weir



Photo 21. FCO weir with West Ditch culvert and discharge point (circled)



Photo 22. FCO Pond



Photo 23. Seep Tributary, east side of Faro Creek valley



Photo 24. Seep Tributary entering Faro Creek



Photo 25. Seep Tributary entering Faro Creek



Photo 26. Seep Tributary entering Faro Creek

ATTACHMENT 3: SITE PHOTOGRAPHS



Photo 27. Faro Creek Spring



Photo 28. Faro Creek Spring



Photo 29. Faro Creek Spring, measuring point



Photo 30. West Valley Interceptor Ditch near CH15-106-MW010 (tape across), with tributary coming from up Faro Creek Valley



Photo 31. West Valley Interceptor Ditch near CH15-106-MW010, looking upstream

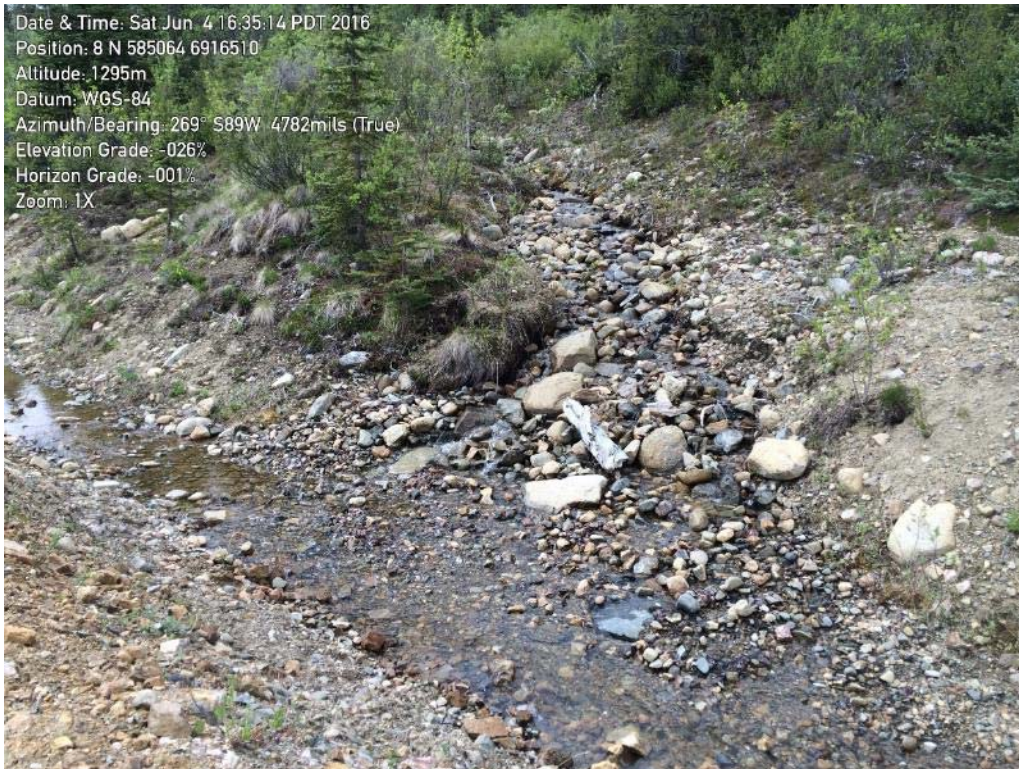


Photo 32. Unnamed tributary entering West Valley Interceptor Ditch



Photo 33. Unnamed tributary entering West Valley Interceptor Ditch, looking upstream



Photo 34. Unnamed tributary entering West Valley Interceptor Ditch, looking downstream

ATTACHMENT 3: SITE PHOTOGRAPHS

Date & Time: Sat Jun 4 14:07:56 PDT 2016  
Position: 4062°22'43" / -133°21'46.0"  
Altitude: 1351m  
Datum: WGS-84  
Azimuth/Bearing: 214° S34W 3804mils (True)  
Elevation Grade: -027%  
Horizon Grade: +004%  
Zoom: 1X



Photo 35. Beginning of flow in West Valley Interceptor Ditch, looking upstream



Photo 36. Piezometer drive point



Photo 37. Streambed piezometer, ready for installation



Photo 38. Streambed piezometer, installed

ATTACHMENT 3: SITE PHOTOGRAPHS



Photo 39. Streambed piezometer, installed with stage ruler, CH16-106-SG001



Photo 40. Measuring field parameters in the West Valley Interceptor Ditch